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THE YOKOHAMA SPECIE BANK LTD.

Capital (Paid-up): Yen 24,000,000 | **Reserved Fund: Yen 15,900,000**

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BARON KOREKIYO TAKAHASHI

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GENERAL MANAGER

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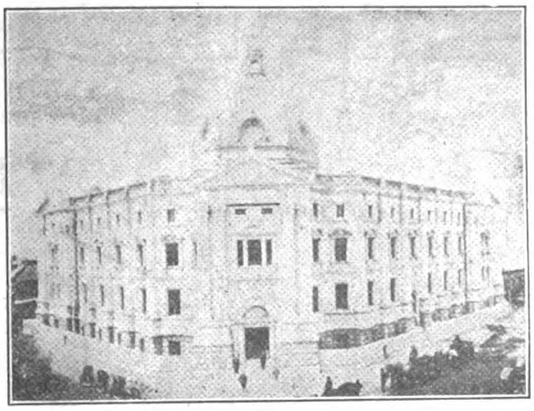

HEAD OFFICE OF THE YOKOHAMA SPECIE BANK, YOKOHAMA

HEAD OFFICE

Every description of Banking business transacted.

For particulars, apply to the Manager.

Certified cheques on this Bank will be taken by the Custom House as cash in payment of duty.

Special Safe Deposit Boxes are provided in the Vault of the Bank.

T. KAWASHIMA, Manager

Yokohama, September, 1909.

BRANCHES AND AGENCIES:

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Nagasaki	Peking	London	Liaoyang	Honolulu	Fengtien (Mukden)
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RUSSO-ASIATIC BANK

CAPITAL (Fully Paid).........Roubles 35,000,000
RESERVE FUND. ....Roubles 11,666,666.67
Special Reserve Fund. ....Roubles 5,338,480.93
Capital contributed by Imperial Chinese Government.......Kpg. $3,500,000
Reserve Fund.......................Kpg. $1,670,000

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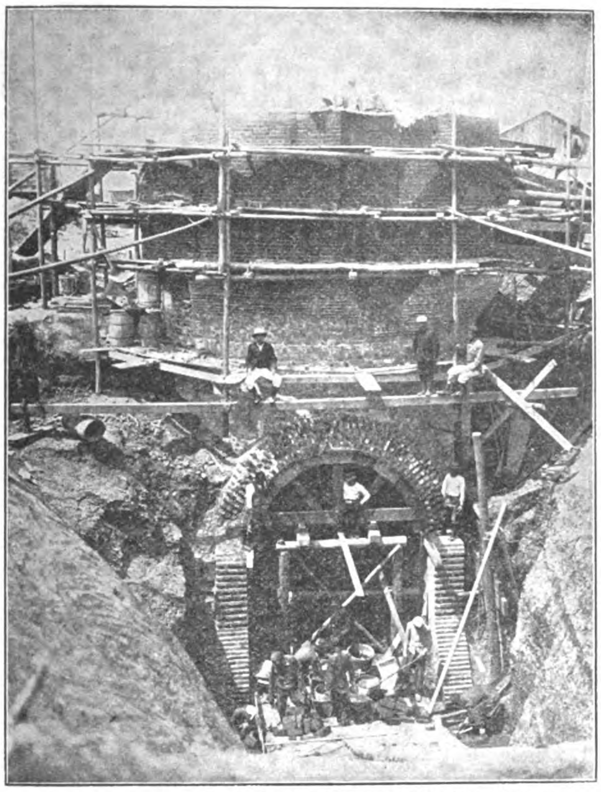

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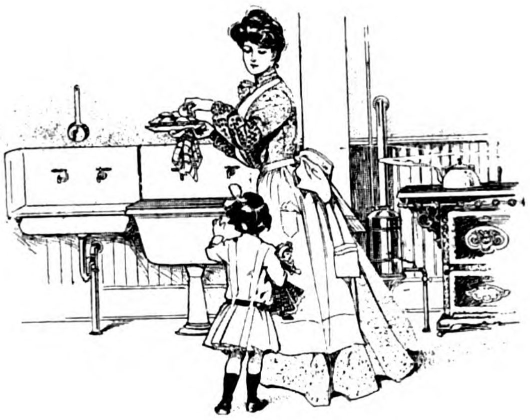
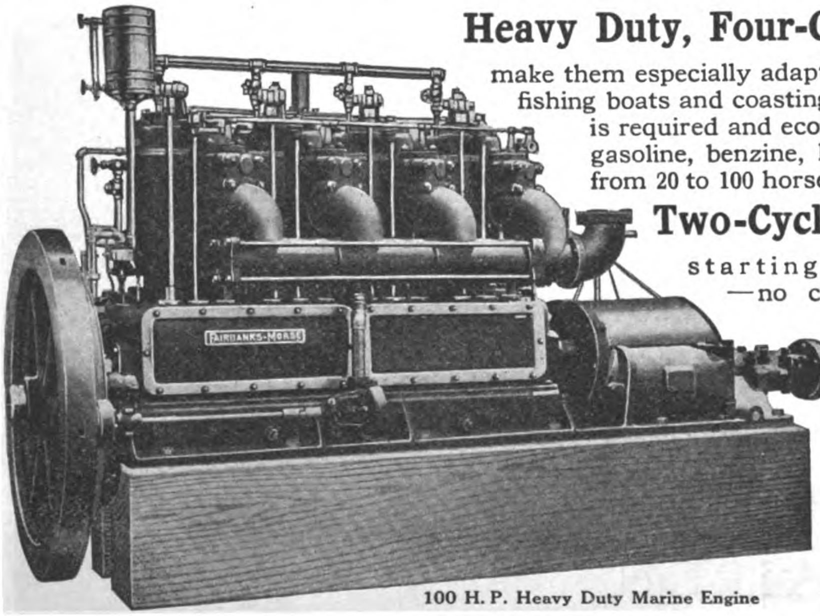


Fairbanks-Morse Marine Engines



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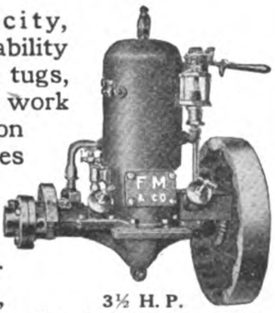
Heavy Duty, Four-Cycle Type Their simplicity, strength and reliability make them especially adapted for service in cruising yachts, tugs, fishing boats and coasting vessels, where hard, continuous work is required and economy of fuel is a factor. Operate on gasoline, benzine, kerosene or alcohol. Built in sizes from 20 to 100 horsepower.



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Two-Cycle Marine Engine

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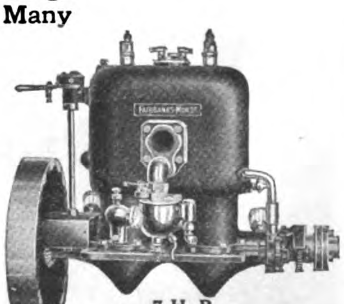

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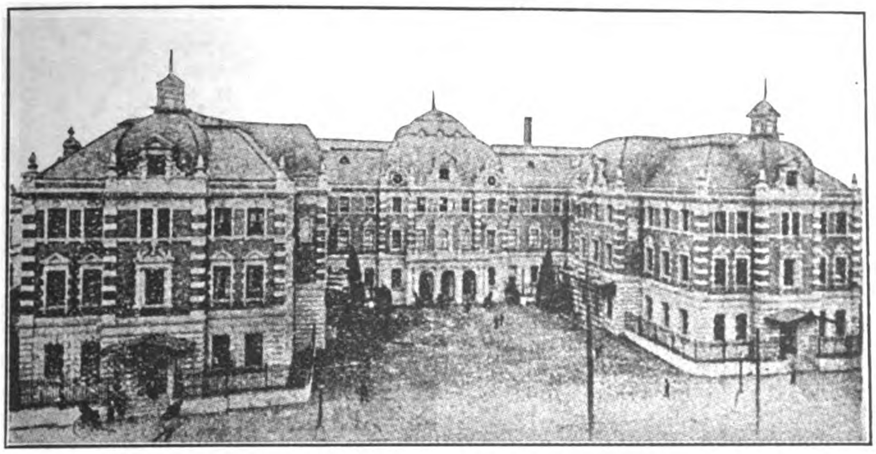

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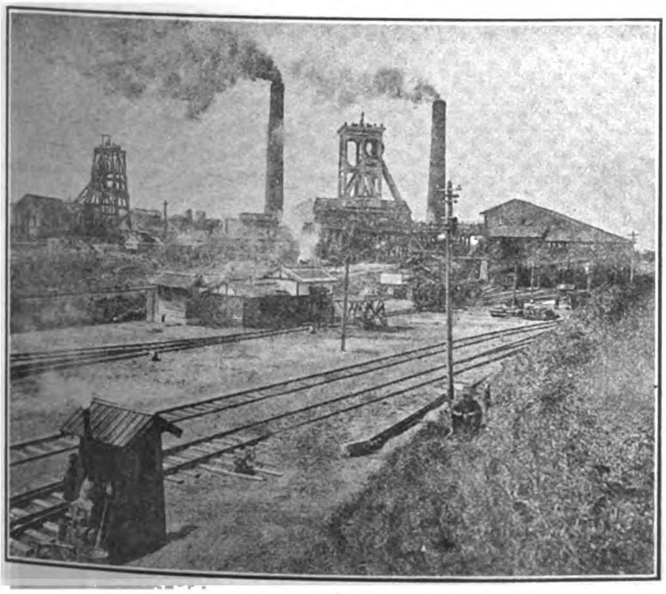

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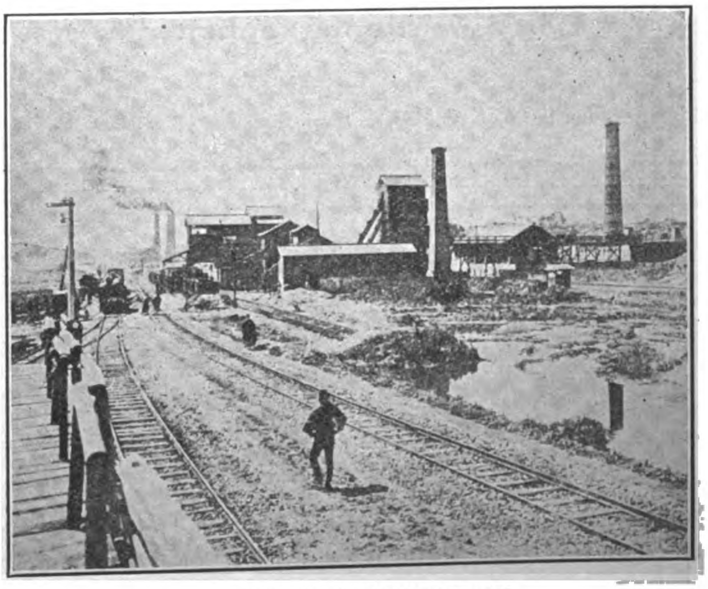

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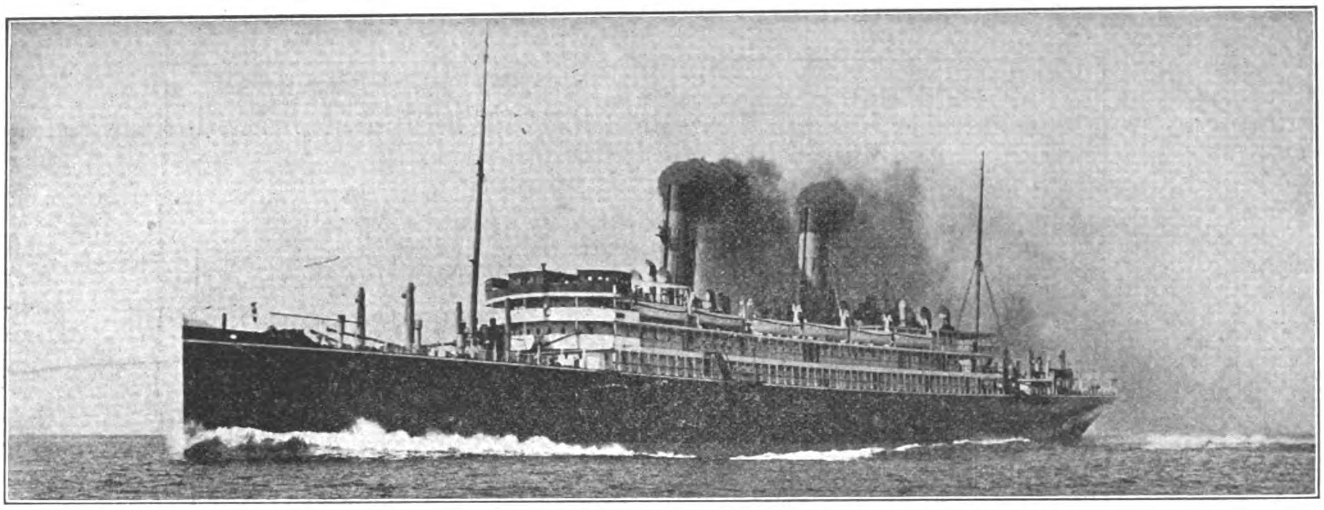

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EXTREME LENGTH	523	FT.
LENGTH ON BLOCKS	513	"
WIDTH OF ENTRANCE ON TOP	88	"
" " " " BOTTOM	77	"
WATER ON BLOCKS AT SPRING TIDE	26½	"

DOCK NO. 2.

EXTREME LENGTH	371	FT.
LENGTH ON BLOCKS	360	"
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" " " " BOTTOM	53	"
WATER ON BLOCKS AT SPRING TIDE	22	"

DOCK NO. 3.

EXTREME LENGTH	722	FT.
LENGTH ON BLOCKS	714	"
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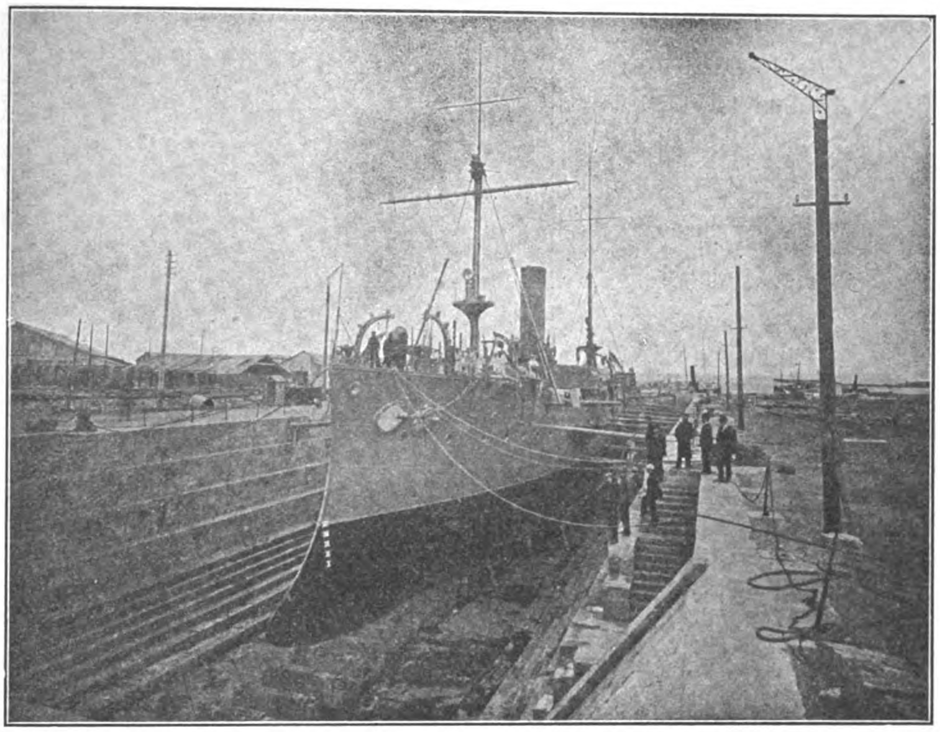

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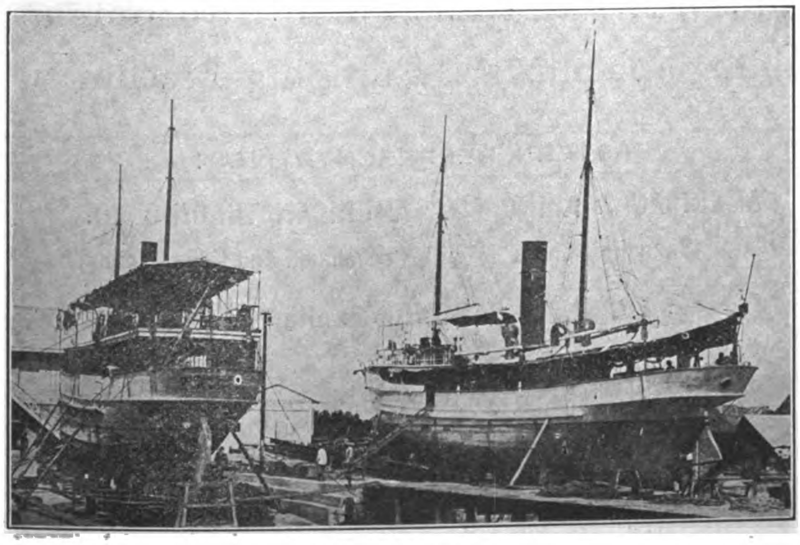

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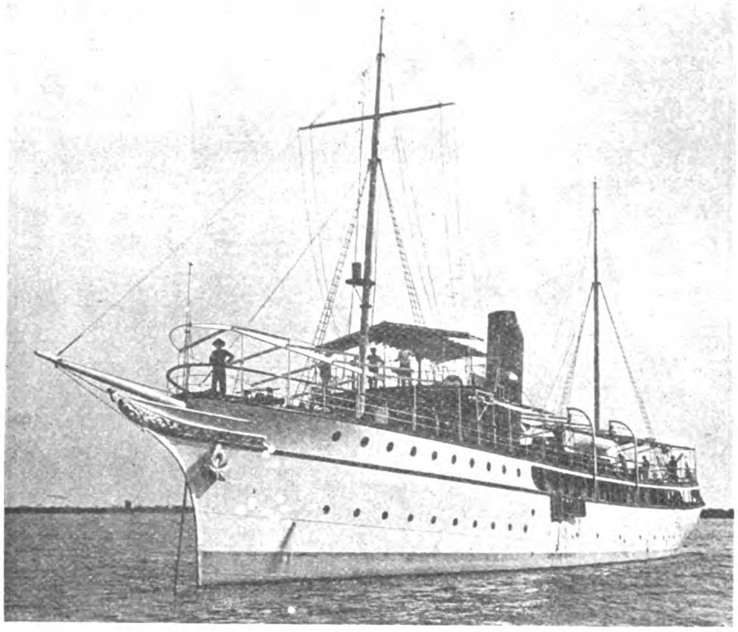

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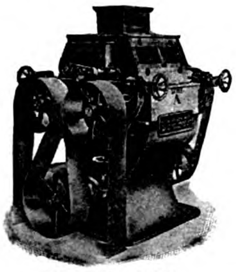

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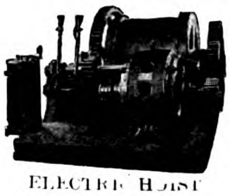

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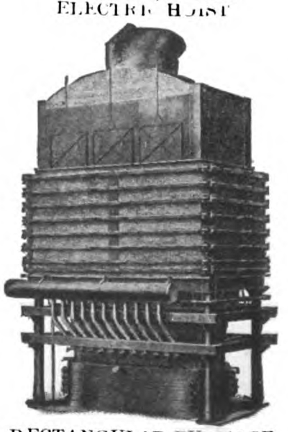

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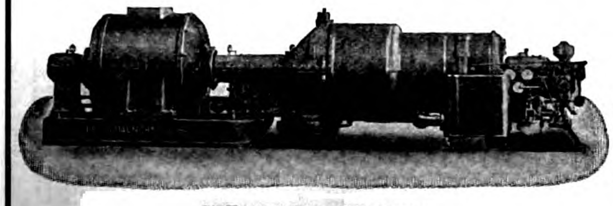

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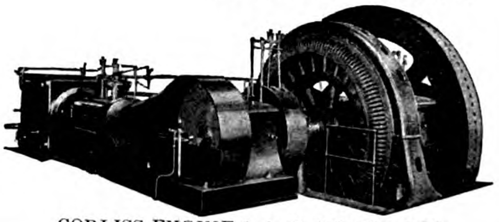

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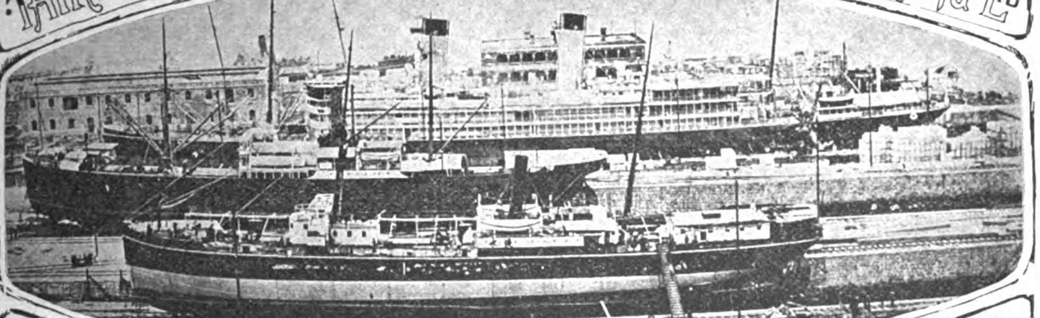

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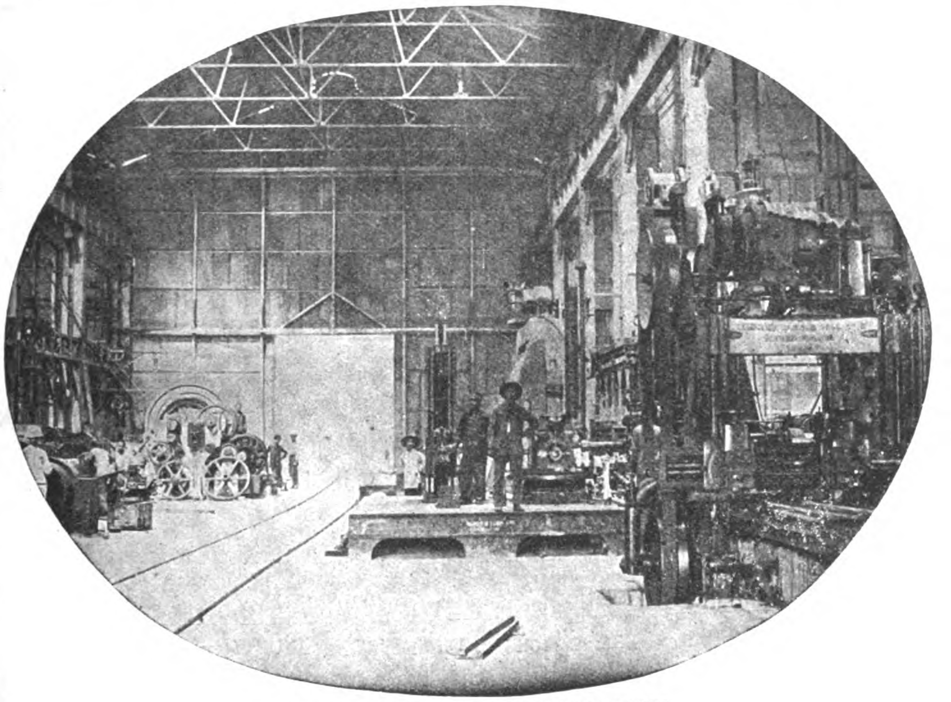

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THE POWER FOR THE ESTABLISHMENT is generated by Gas Producers, on the Mond System, supplying 4 Cockerill Gas Engines of 3,000 collective horse power, driving Electrical Generators, and is transmitted throughout the Works by means of Electrical Motors.

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THE DOCK PUMPS consist of 2 sets of Centrifugal, Electrically driven, pumps, together capable of emptying the Dock with 35 feet of water on the Sill in 2¾ hours.

THE MACHINERY in the Engine Works is laid out for dealing with the heaviest classes of Engines.

THE SLIPWAY CARRIAGES are of the latest pattern by Morton of Leith, and the Winding Gear consists of large electrically driven winches operating massive wire cables.

TENDERS SUBMITTED AND ESTIMATES GIVEN FOR BUILDING AND REPAIRING ALL CLASSES OF VESSELS; ALSO FOR EVERY DESCRIPTION OF ENGINE AND BOILER, MECHANICAL, ELECTRICAL AND CONSTRUCTIONAL WORK

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All classes of CONSTRUCTIONAL and GENERAL ENGINEERING WORK undertaken, also LOCOMOTIVES, RAILWAY ROLLINGSTOCK and PLANT, BRIDGES, etc.

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AUXILIARY MACHINERY for MARINE and LAND Purposes.

LAND and MARINE BOILERS of all sizes and classes.

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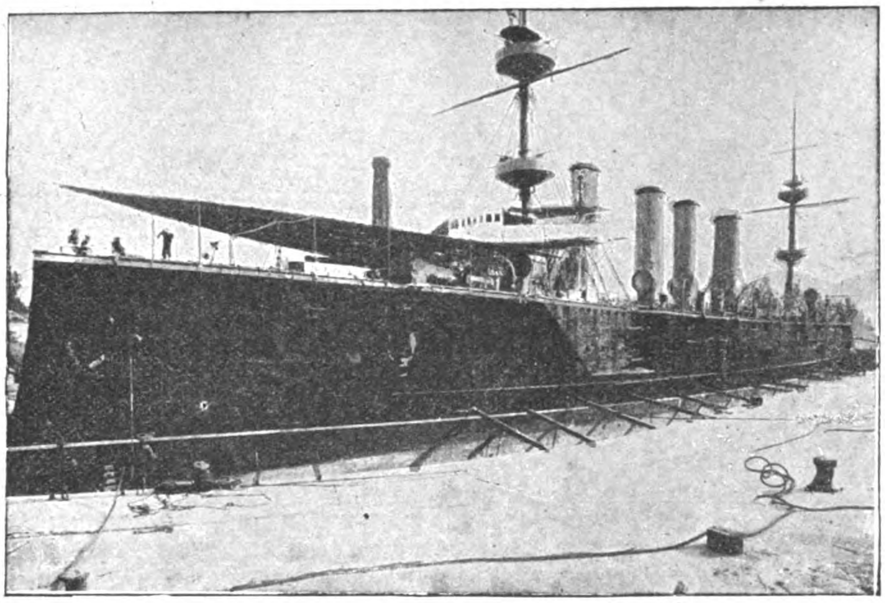

H. M. S POWERFUL IN NO. 1 DOCK, KOWLOON.

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Name of Dock or Slip	*Length on Keel Blocks*	*Entrance Breadth*	*Depth Over Sill at Ordinary Spring Tides*	*Rise of Tide*	
				Springs	*Neaps*
KOWLOON	*Feet*	*Feet*	*Feet*	*Feet*	*Feet*
No. 1 Dock, Kowloon.........	700	86 ft. top / 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon.	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon...	240	60′	14′	7′ 6″	—
Patent Slip, No 2, Kowloon...	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock..........	466	85′ 6″	20′	7′ 6′	—
ABERDEEN					
Hope Dock	430	84′	23′	7′ 6″	—
Lamont Dock................	333	64′	16′	7′ 6″	—

Please Address Enquiries to the Chief Manager, R. M. DYER, B. Sc., M. I. N. A., Kowloon Dock, Hongkong

Telephone No. 13 K. Head Office, Kowloon.

Town Office, Queen's Buildings Telephone No. 20, Hongkong

FINDLAY & CO.

AGENTS, MANILA, P. I.

W. F. STEVENSON & CO., LTD.

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PENINSULAR AND ORIENTAL STEAM NAVIGATION CO., OSAKA SHOSEN KAISHA (IN CONNECTION WITH THE CHICAGO MILWAUKEE & ST. PAUL AND THE CHICAGO MILWAUKEE AND PUGET SOUND RAILWAYS), "BEN" LINE OF STEAMERS, "INDRA" LINE OF STEAMERS.

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LIFE, STANDARD LIFE ASSURANCE CO.—FIRE, NORWICH UNION FIRE INSURANCE SOCIETY LTD., SCOTTISH UNION & NATIONAL INSURANCE CO., YORKSHIRE INSURANCE CO., LTD.—MARINE, MARINE INSURANCE CO. LTD., STANDARD MARINE INSURANCE CO. LTD. :

4 MUELLE DEL REY, MANILA, P. I.

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PURE MANILA ROPE

MADE WITH LATEST IMPROVED ROPE MACHINERY

Average Breaking Load After Three Tests:

2 Inch Rope Circumference........ 4,037 Pounds
3½ " " " .... 16,670 "
5 " " " .... 23,728 "

Factory and Salesroom.
Cor. Vives and Lara, Murallon,
San Nicolas, Manila, P. I.

TELEPHONE
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Cable Address: SANTAROPE
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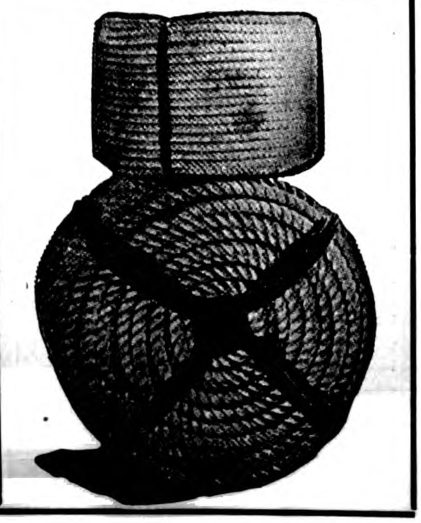

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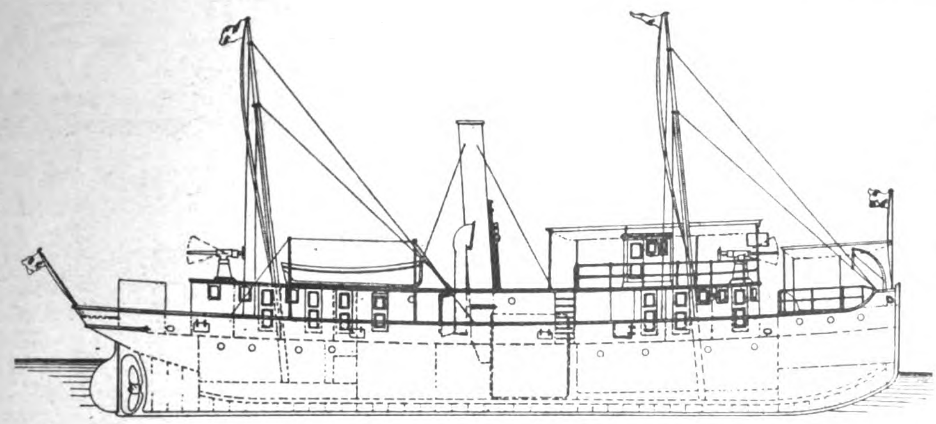

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COAST AND RIVER STEAMERS, TUGBOATS, LAUNCHES, LIGHTERS, PONTOONS, SHALLOW DRAFT SIDE OR STERN WHEEL STEAMERS. ENQUIRIES SOLICITED. PLANS, SPECIFICATIONS AND ESTIMATES FURNISHED. ALL CLASSES OF ENGINEERING WORK UNDERTAKEN

THE NEW ENGINEERING AND SHIPBUILDING WORKS, LTD.

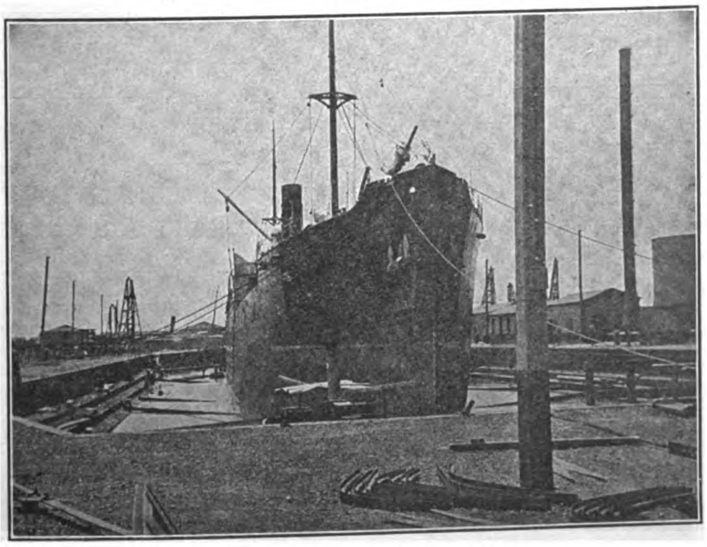
SHANGHAI

PROPRIETORS OF THE

YANGTSZEPOO DOCK

THE DOCK, WORKS AND OFFICE ARE LOCATED ON THE SHANGHAI SIDE OF THE RIVER, 15 MINUTES BY ELECTRIC TRAM FROM HEART OF THE CITY

THE WORKS ARE EQUIPPED WITH THE MOST MODERN MACHINERY, CAPABLE OF HANDLING THE LARGEST MARINE ENGINEERING WORK



VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK
LENGTH ON BLOCKS 455'0"
" OVERALL - 469'0"
WIDTH, ENTRANCE 74'0"
" SILL - - 64'0"
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21'0"
DEPTH ON 3'0" BLOCKS (H. W. O. S. TIDES) 19'0"
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
WORKSHOPS LOCATED AT HEAD OF DOCK

OFFICE, DOCK & WORKS, 37 YANGTSZEPOO ROAD, SHANGHAI

TELEGRAPHIC ADDRESS: "SPEEDY." CODE: A.B.C., 5TH EDITION — TELEPHONE 703. — MANILA AGENT, F. L. STRONG

THE SHANGHAI DOCK AND ENGINEERING CO., LTD.

DOCK OWNERS — ENGINEERS — SHIP BUILDERS — FOUNDERS

SHANGHAI
CHINA

Cable Address:
"FARNHAM," SHANGHAI

Codes Used:
A 1., A B C (4th & 5th Editions)
Watkin's, Scott's, Western
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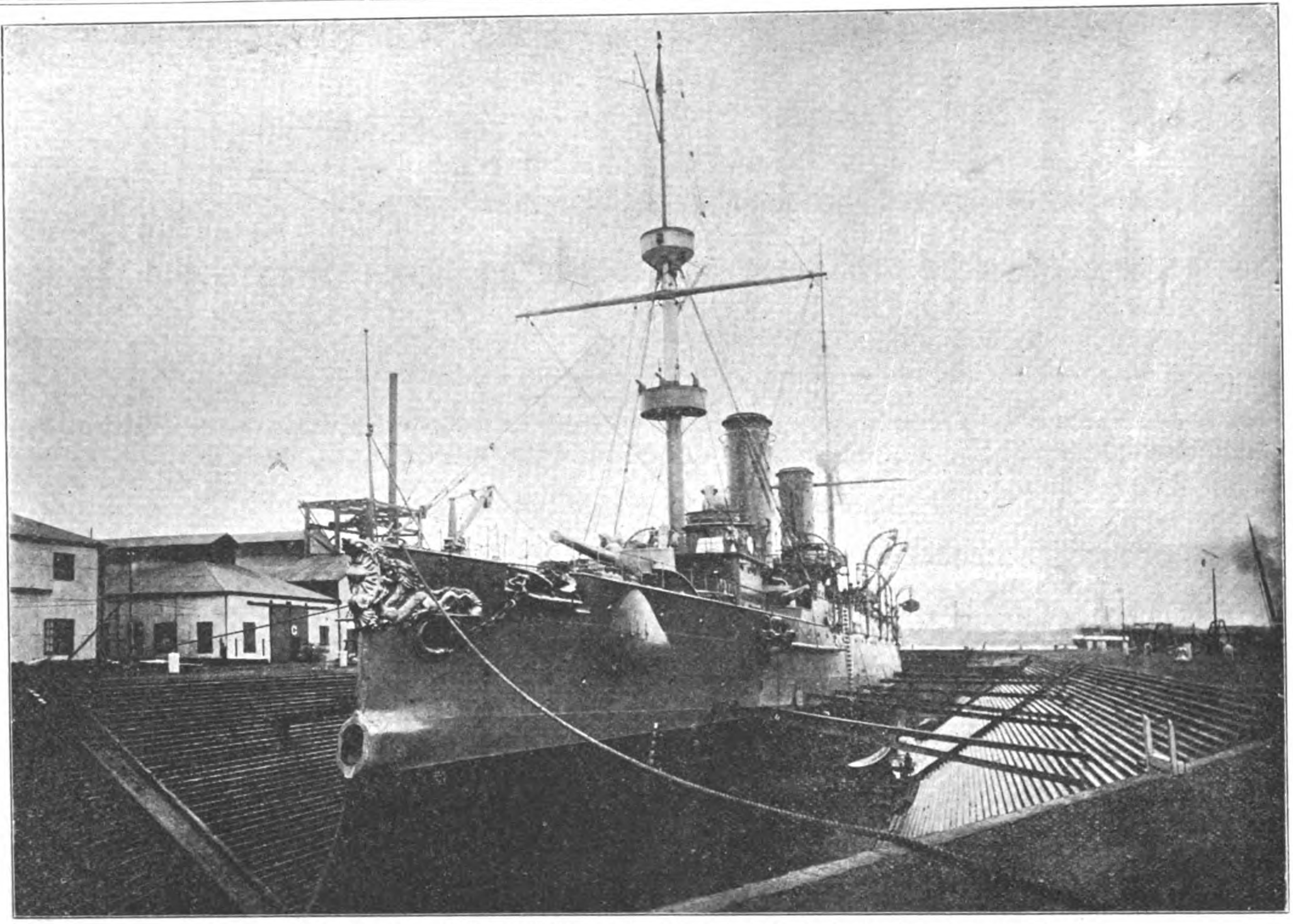

The HAI-CHI in the "OLD DOCK" of the Shanghai Dock & Engineering Co., Ltd.

The Docks are five in number, ranging in length from 360 feet to 560 feet, and breadth of entrance from 57 feet to 82 feet, with the depth of water on the sill from 16 feet to 24 feet.

The Dock charges are very moderate.

The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops are provided with the latest improvements in tools, traveling cranes of 70 tons' capacity, hydraulic and pneumatic machinery.

Lit up by Electric light with railway lines through workshops and yards.

Powerful salvage appliances can be supplied at short notice. Enquiries immediately attended to.

Estimates given for all classes of work; Coast Steamers, Side and Stern-Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

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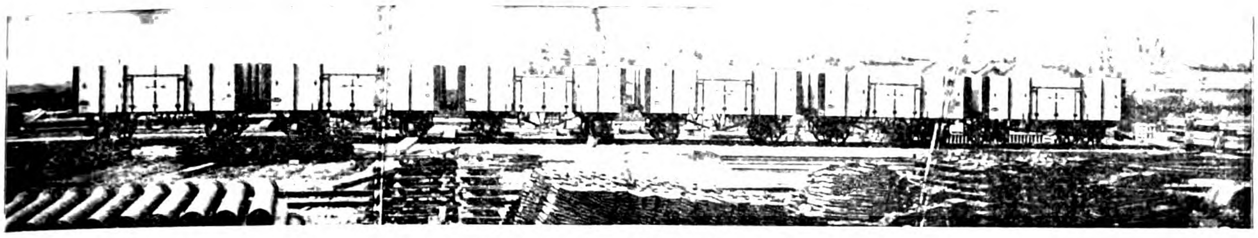

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THE WORKS are electrically driven, and are equipped throughout with up-to-date machinery and labour saving devices, including an HYDRAULIC PLANT, and appliances to undertake constructing or repairing SHIPS, ENGINES, BOILERS, etc.

EXPERIENCED EUROPEAN STAFF SUPERVISES ALL BRANCHES OF WORK

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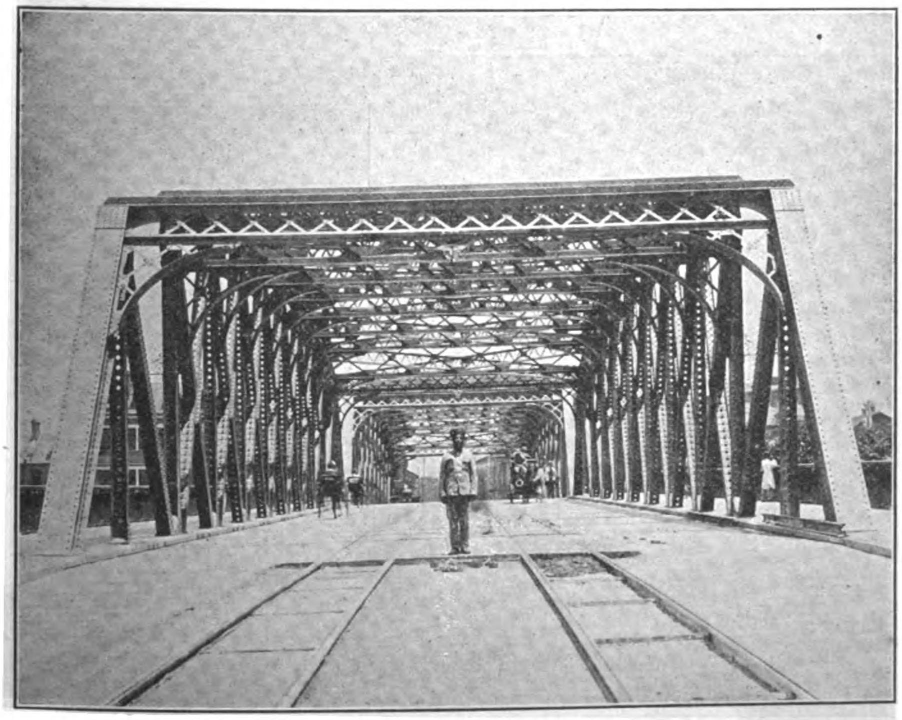

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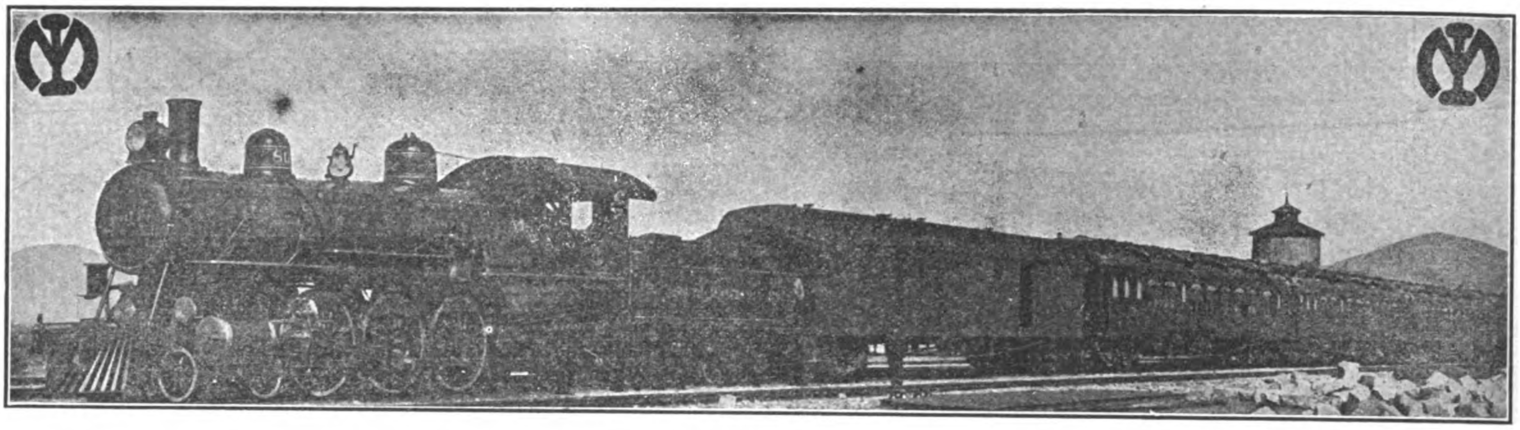

South Manchurian Railway

From Dairen	*Time Required*
To Changchun	15½ hours
,, Harbin	25 ,,
,, St. Pet'burg (via Viatka)	10 days.
,, Berlin	11 ,,
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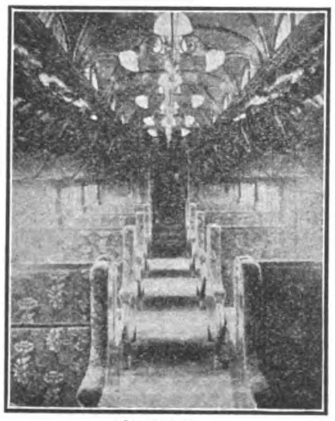
SHORTEST, QUICKEST AND CHEAPEST ROUTE BETWEEN THE FAR EAST AND EUROPE VIA DAIREN



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4 TIMES WEEKLY EXPRESS TRAINS

Composed of excellently equipped SLEEPING, DINING and 1st CLASS CARS, are operated between DAIREN & CHANGCHUN in connection with the TRANS-SIBERIAN ROUTE and SHANGHAI MAIL STEAMERS.

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These Express Trains connect at MUKDEN with the PEKING-MUKDEN RAILWAY running via TIENTSIN and connect also with the MUKDEN-ANTUNG LINE traversing a most picturesque country and connecting with the KOREAN RAILWAY.

INTERIOR PULLMAN DAY COACH

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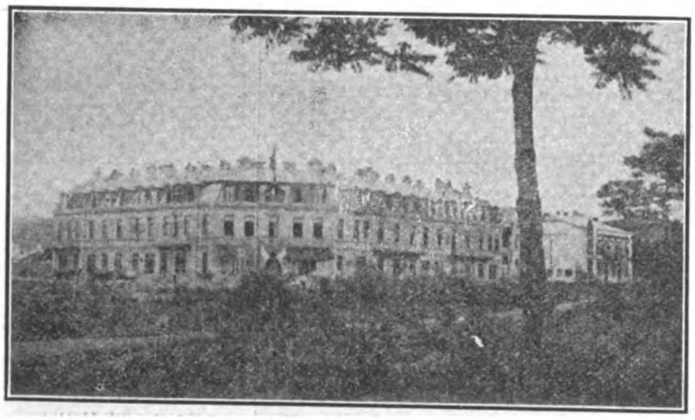
Regular Steamship Services are maintained from DAIREN to MOJI, KOBE, CHEMULPO, TIENTSIN, CHEFOO, TSINGTAU and other ports in Japan and China.



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YAMATO HOTEL, DALNY

RAILWAY HOTELS

YAMATO HOTEL (Tel. Add. "Yamato") at DAIREN, PORT ARTHUR, MUKDEN, FUSHUN and CHANGCHUN all managed by the Company, provide comfortable accommodation.

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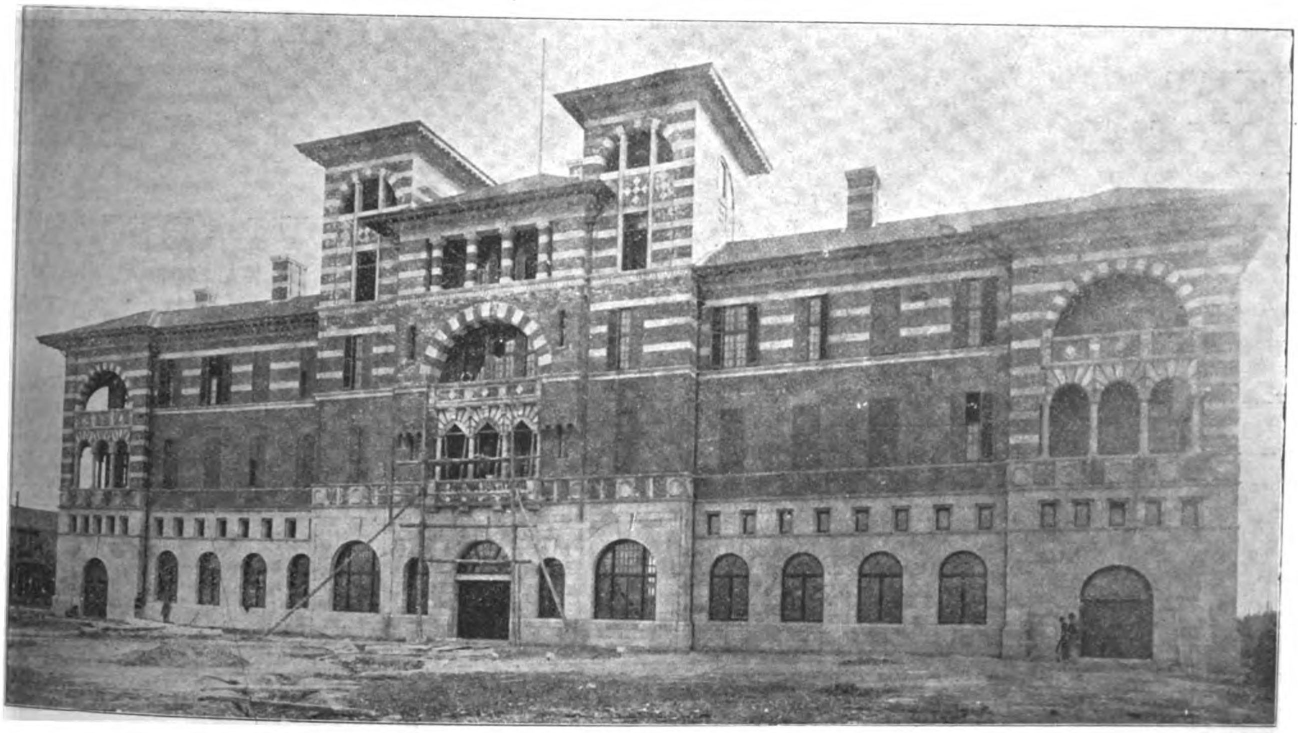


NEW STATION AND ADMINISTRATION BUILDING AT SHANGHAI

PASSENGERS TO THE YANGTSZE RIVER PORTS SHOULD TAKE THE STEAMER AT NANKING, THUS ENJOYING A TRIP THROUGH THE INTERESTING LAND OF PAGODAS AND "THE GARDEN OF CHINA." NANKING, THE SOUTHERN CAPITAL OF CHINA, WITH ITS MANY INTERESTING SIGHTS, THE CELEBRATED MING TOMBS, AND OTHER ATTRACTIONS, CAN BE SEEN IN TWO DAYS' TRIP FROM SHANGHAI. THE FIRST AND SECOND CLASS COACHES OF THE S-N. RAILWAY COMPARE WITH THE BEST IN EUROPE OR AMERICA FOR COMFORT AND SERVICE. TWO EXPRESS TRAINS DAILY.

CHINESE EASTERN RAILWAY

STEAMER & EXPRESS SERVICE

FAR EAST EUROPE

TICKET
SHANGHAI
8 KIUKIANG ROAD

PEKING
AMBASSADOR'S STREET

HEAD OFFICES

OFFICES
NAGASAKI
THE BUND

VLADIVOSTOK
ALEUTSKAIA, No. 37

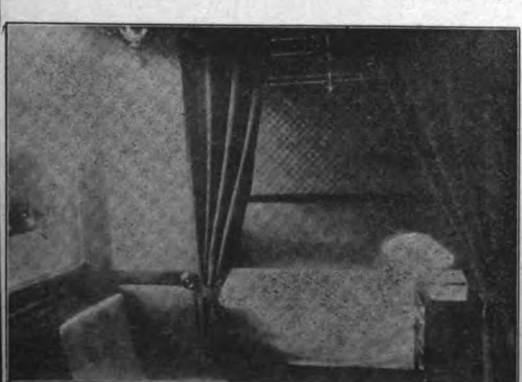
AT HARBIN

STEAMER AND TRAIN TIME TABLE

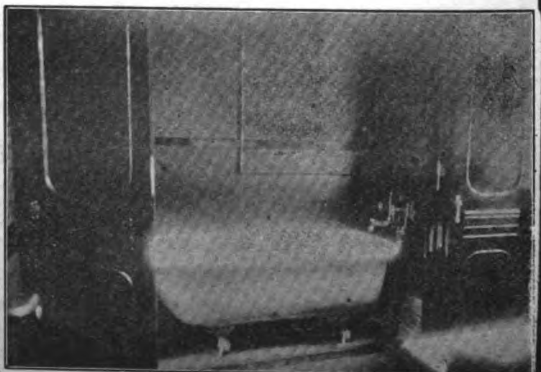
STEAMERS		Free Time Between the Arrival of Steamer and Departure of Train	TRAINS			
				ARRIVE		
DEPARTURE	ARRIVAL AT VLADIVOSTOCK		DEPARTURE FROM VLADIVOSTOK	IRKUTSK	MOSCOW	ST. PETERSBURG
			(Harbin Time)	(St. Petersburg Time)		
SHANGHAI Saturday*..........	Thursday, 9.00	31.25 hours	Friday, 4.25......	Tuesday, 1.29...	....	Monday, 6.00
NAGASAKI Monday, 6.00......	do do	31.25 "	Friday, 4.25......	Tuesday, 1.29...	....	Monday, 6.00
TSURUGA Saturday 5.00	Monday 11.00	29.25 "	Tuesday 4.25..	Saturday, 1.29.	Friday, 7.06......	. . ..
TSURUGA Thursday 5.00	Saturday 11.00	29.25 "	Sunday 4.25..	Thursday, 1.29..	Wed., 7.05......	....

The hours of departure depend upon the tide. The express trains of the Chinese Eastern Ry. Co. leave Vladivostock on Fridays and Sundays. The express leaving on Fridays connect at Irkutsk with the express State trains running between Irkutsk and St. Petersburg via Vologda-Viatka. The Chinese Ry. Co.'s expresses consist of luggage car, restaurant car, two second and one first class cars, and are provided with a 1st class kitchen and servants speaking English and French.

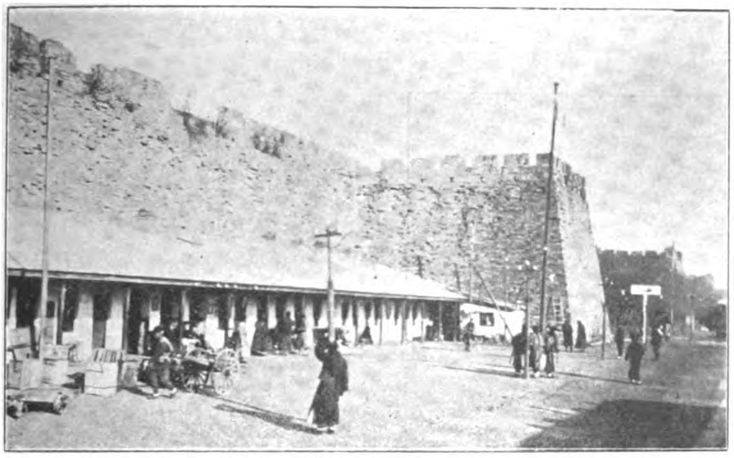
THE COMFORTS OF THE CHINESE EASTERN EXPRESS


SLEEPING ROOM

DINING CAR


BATH ROOM

IMPERIAL RAILWAYS OF NORTH CHINA



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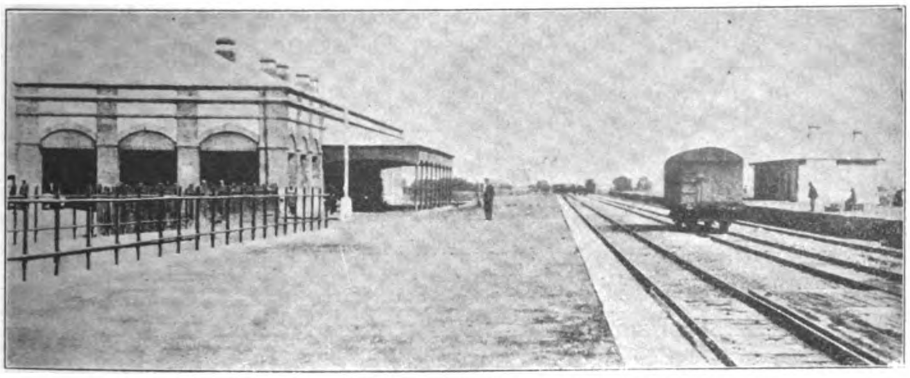
THROUGH SERVICE FROM PEKING TO MUKDEN, CONNECTING AT MUKDEN WITH THE SOUTH MANCHURIA EXPRESS FROM TRANS-SIBERIAN ROUTE: AT PEKING CONNECTION IS MADE WITH THE IMPERIAL PEKING-HANKOW RAILWAY FOR HANKOW AND YANGTSZE PORTS, AND INTERMEDIATE POINTS REACHED BY THE IMPERIAL CHEN-TAI LINE TO TAIYUANFU, THE TAO-CHING LINE, AND THE PEINLO RAILWAY TO KAIFENGFU AND HONANFU. CONNECTION IS ALSO MADE AT PEKING WITH THE PICTURESQUE KALGAN LINE, "THE ROAD TO THE GREAT WALL."



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THE IMPERIAL RAILWAYS OF NORTH CHINA PASS THROUGH THE MOST INTERESTING PART OF CHINA

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TIENTSIN, NORTH CHINA J. E. FOLEY, Traffic Manager

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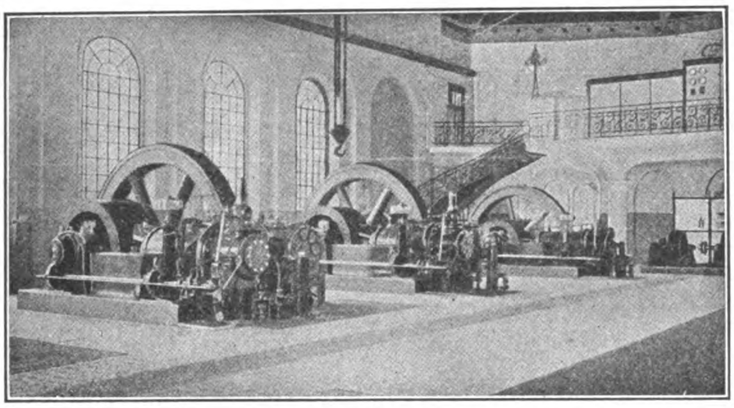

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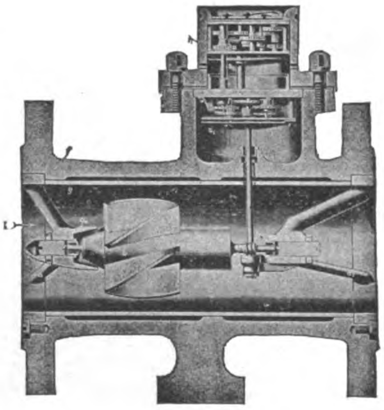

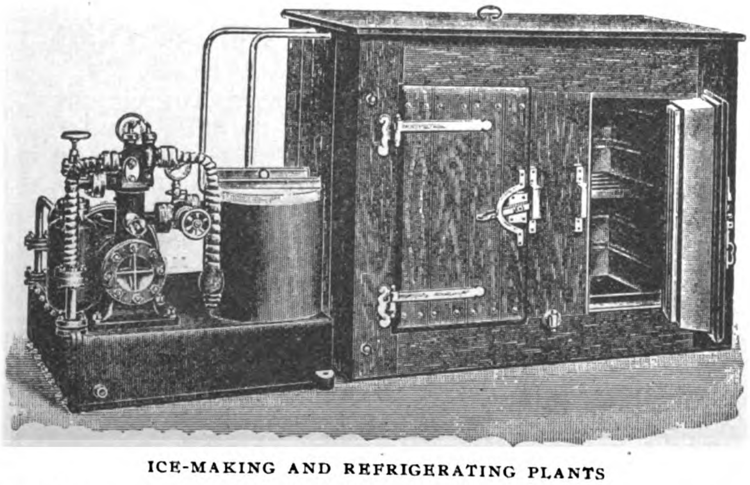

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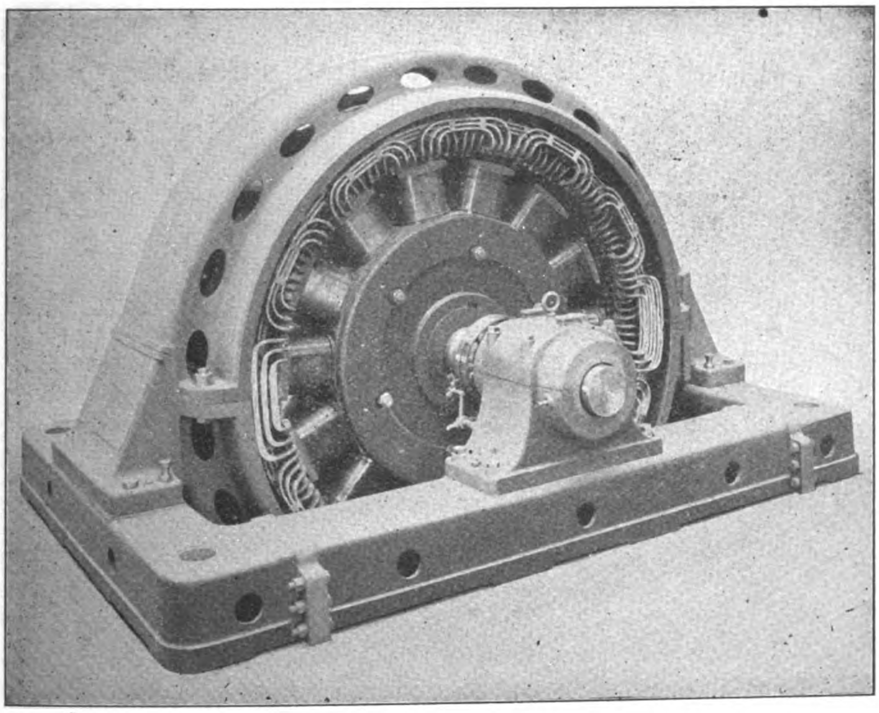
BRIGHTEST AND MOST ECONOMICAL LIGHT



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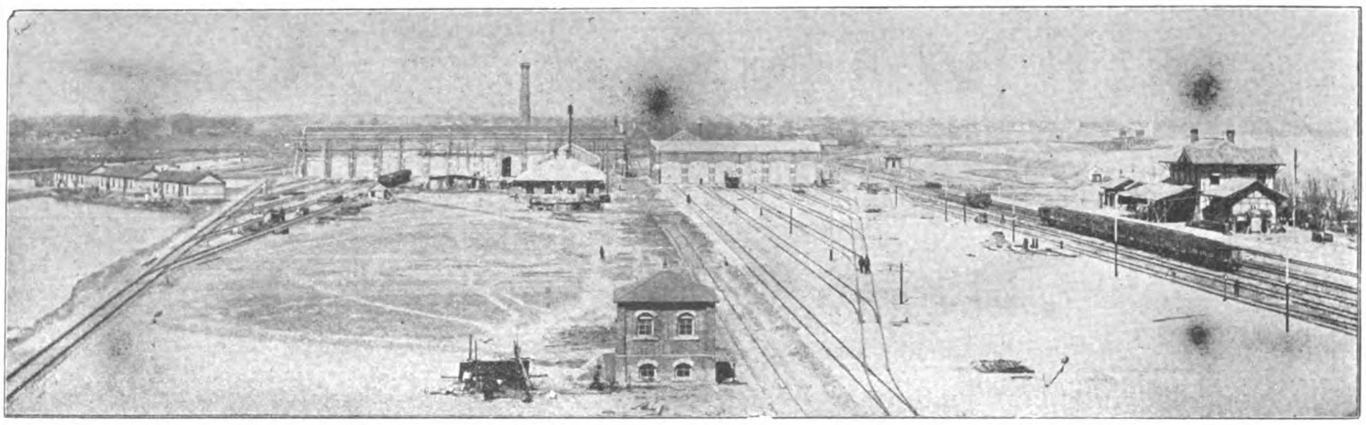

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OF THE

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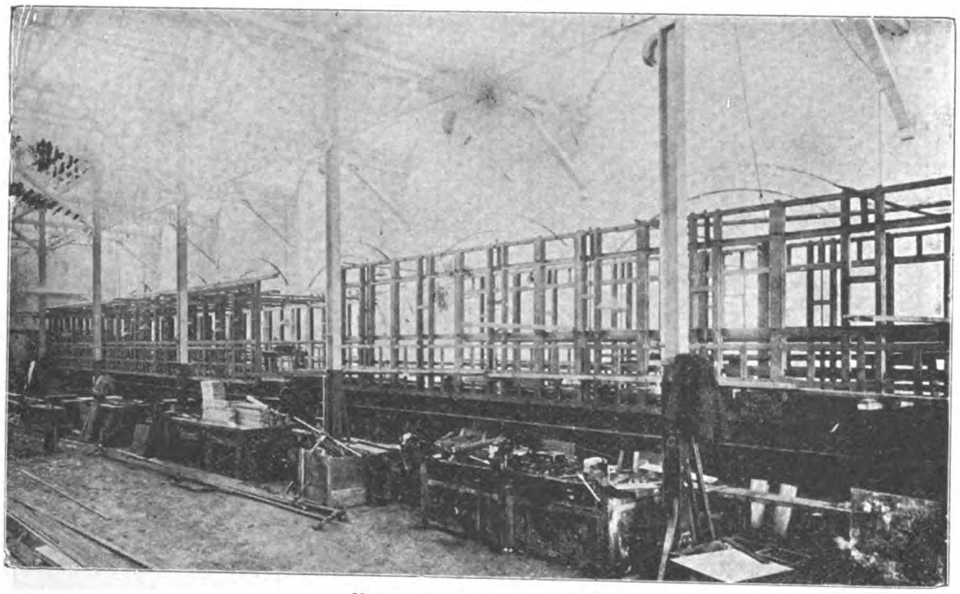
LOCATED AT WOOSUNG AT ENTRANCE TO WHANGPOO RIVER, SHANGHAI. DEEP WATER WHARF WITH EVERY FACILITY FOR HANDLING HEAVY MATERIAL.



VIEW OF ERECTING SHOP

THESE SHOPS ARE FULLY EQUIPPED WITH THE MOST MODERN PLANT AND APPLIANCES FOR THE CONSTRUCTION OF CAR BODIES AND SETTING UP CAR PARTS ORDERED FROM ABROAD, ALL UNDER EXPERT SUPERVISION : : : : : : : : : : : : : : : : :

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CORRESPONDENCE WITH OTHER RAILWAY COMPANIES SOLICITED

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Managing Director
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General Manager
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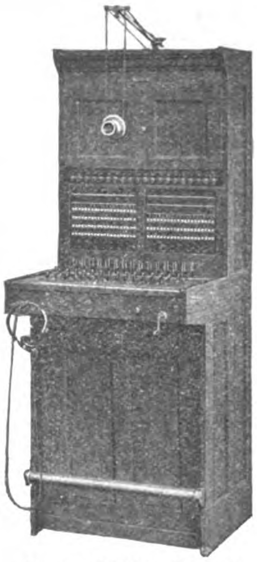

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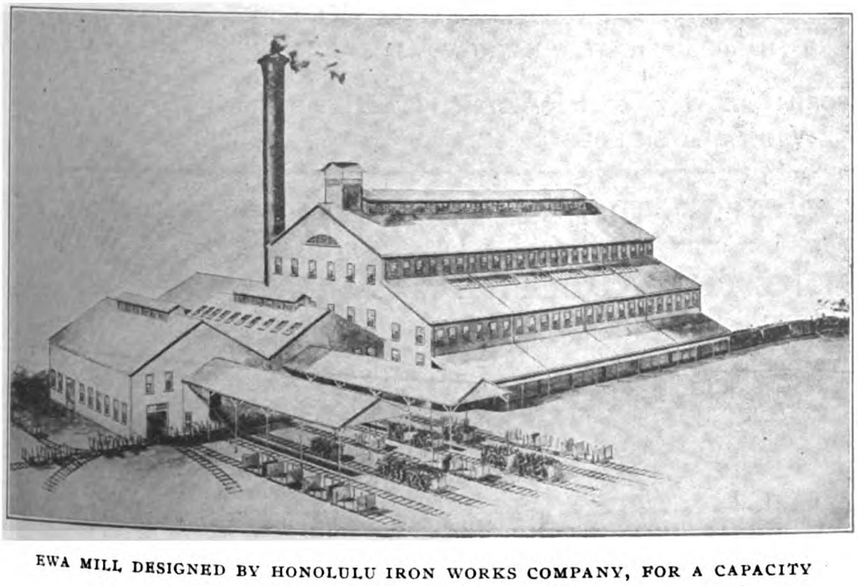

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OF ALL DESCRIPTIONS

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Cane Cars
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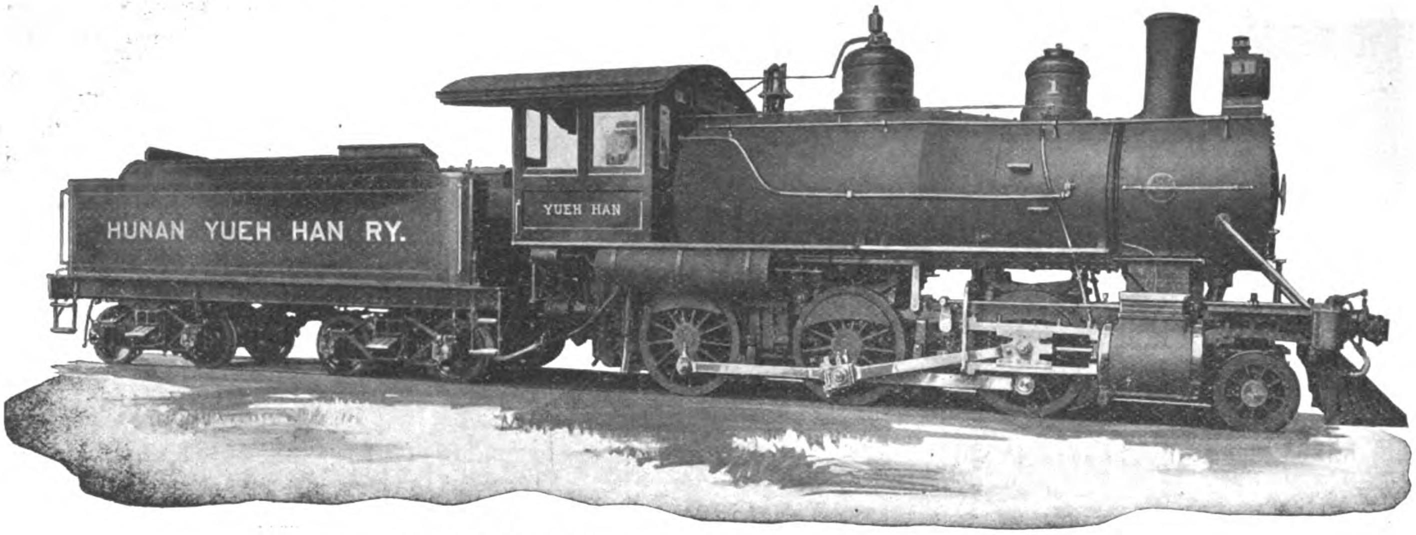

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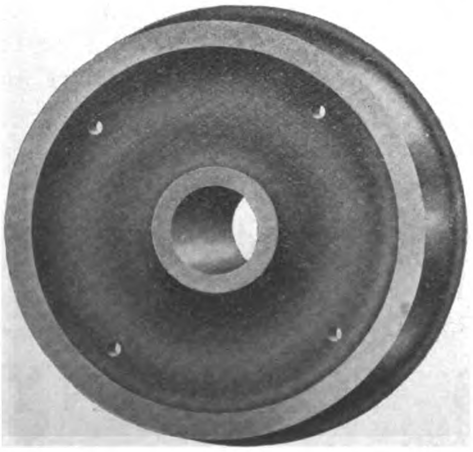

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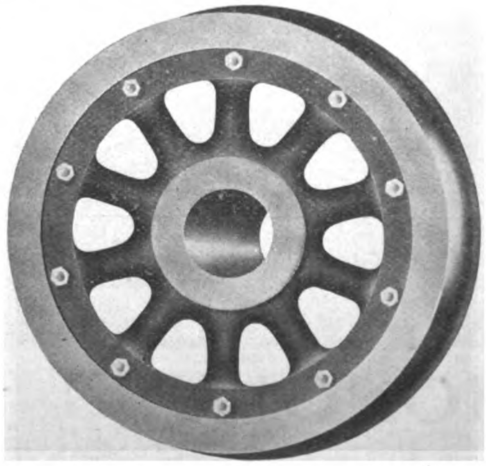

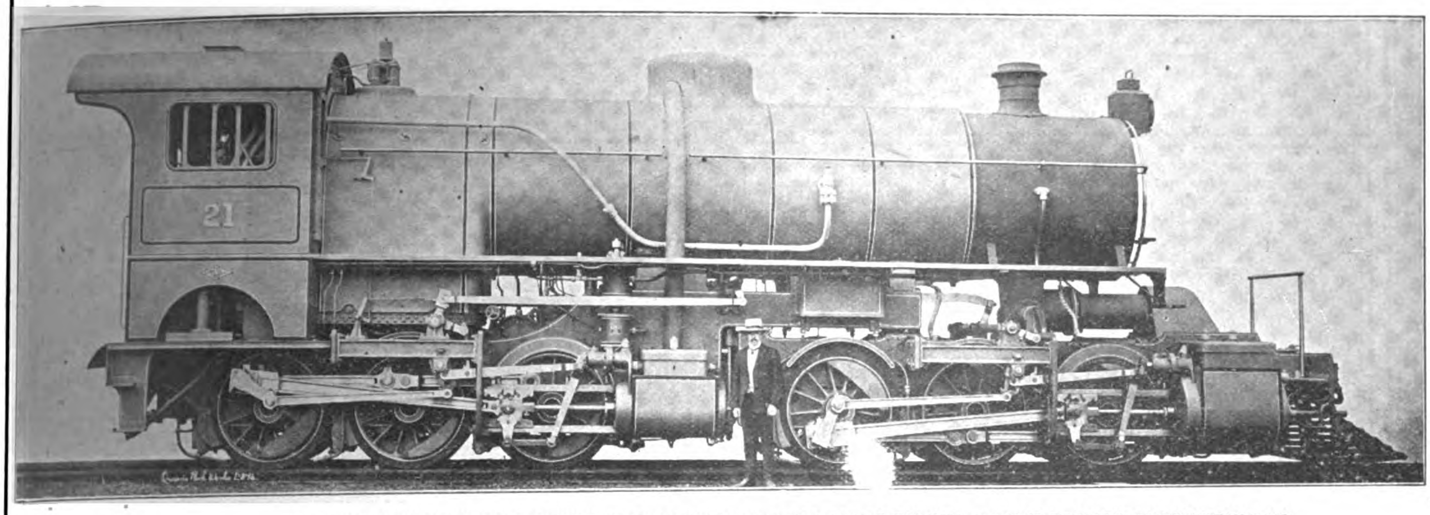

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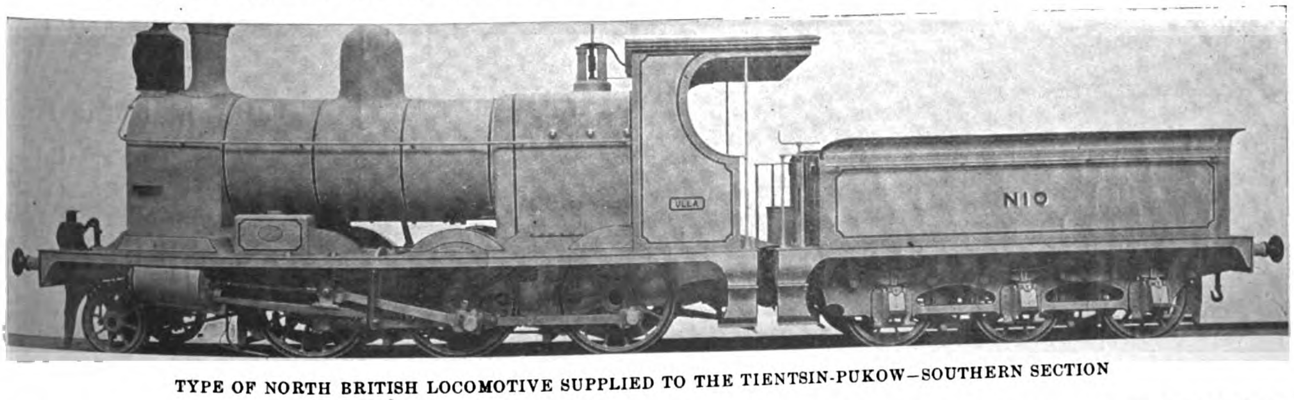

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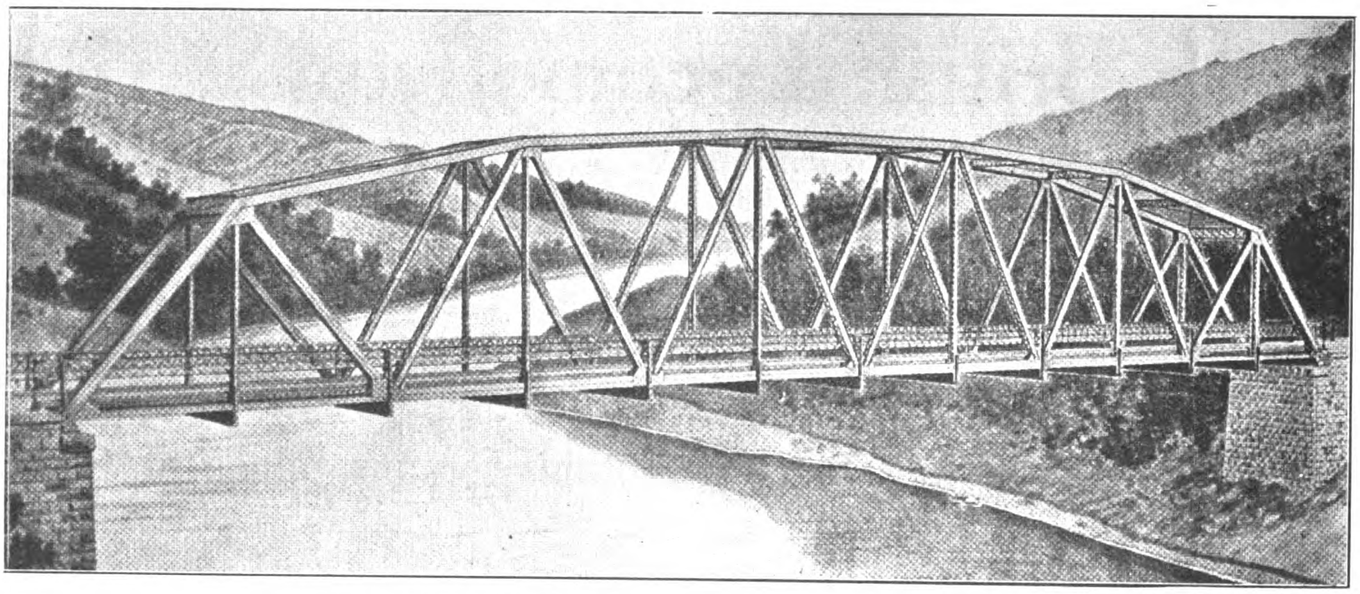

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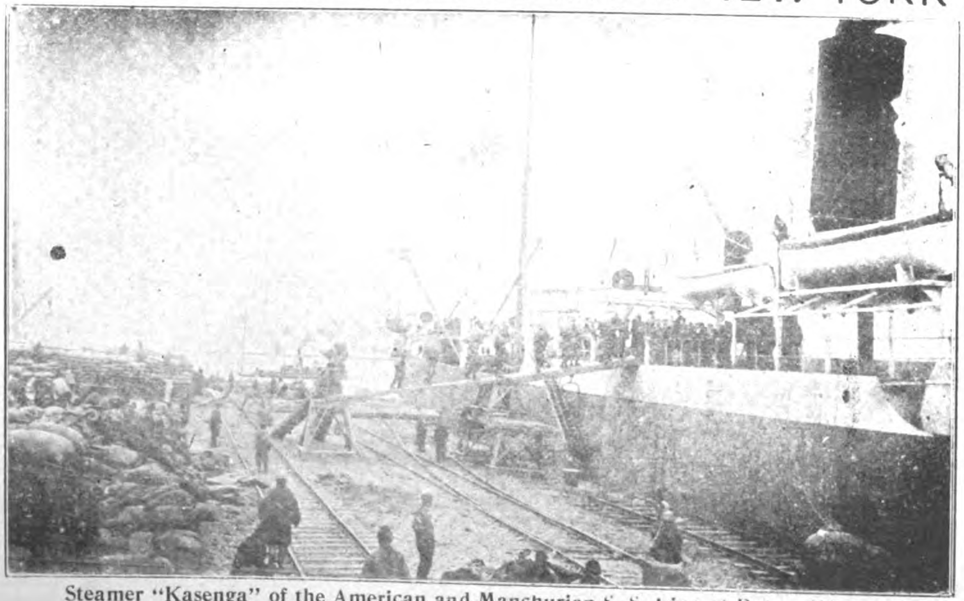

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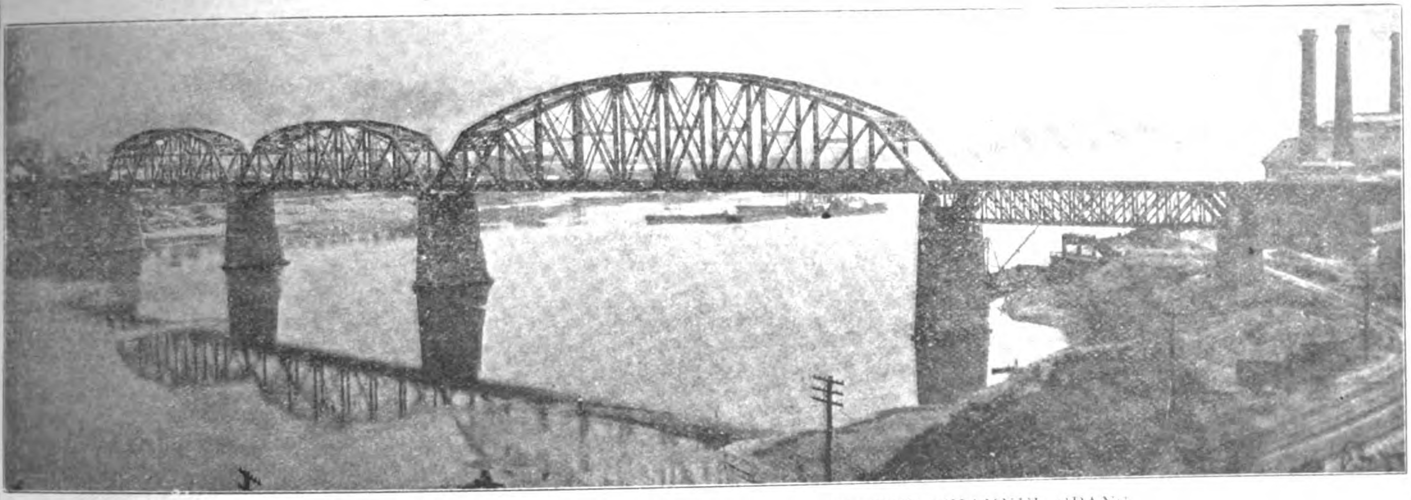

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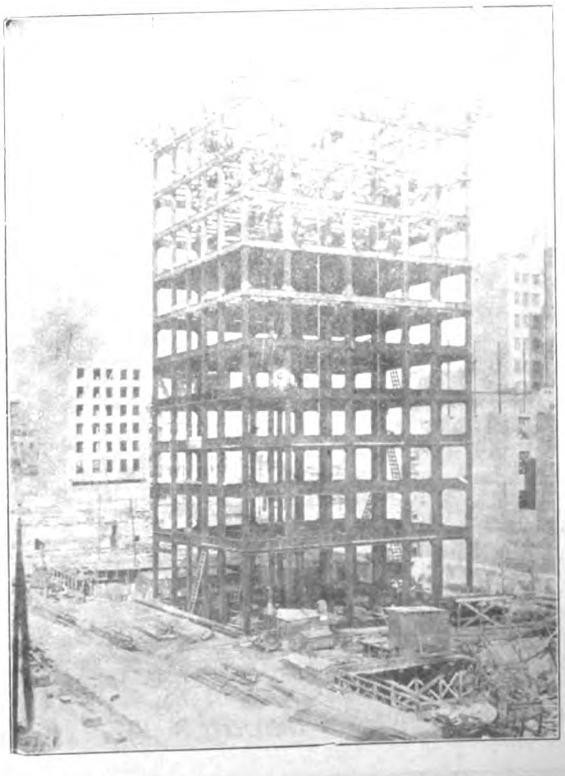

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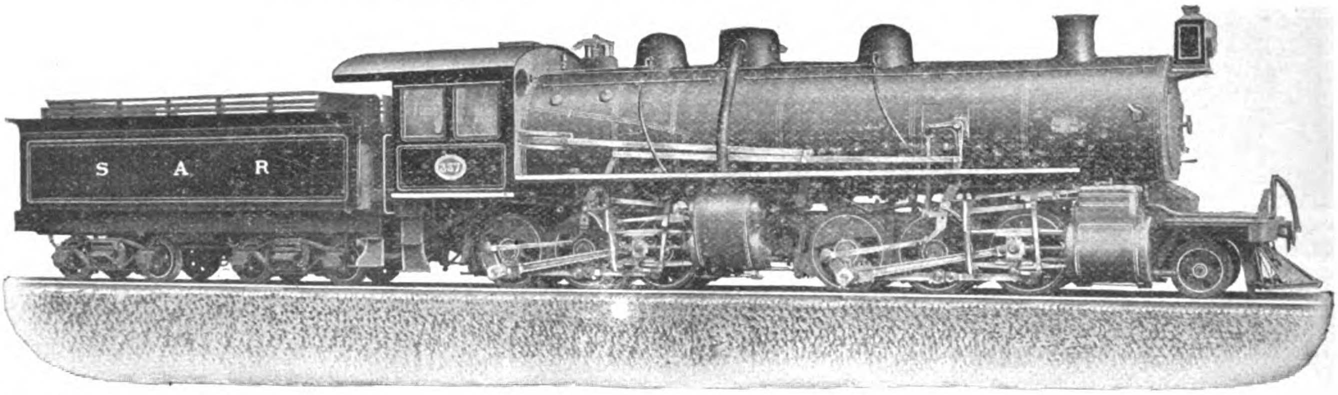
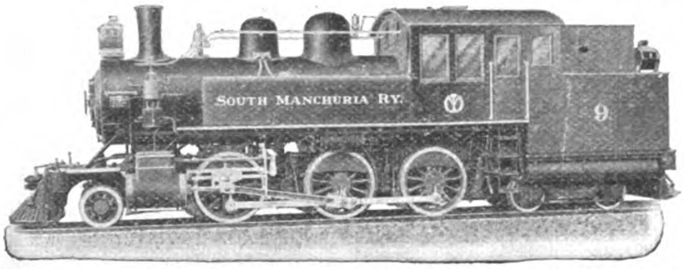
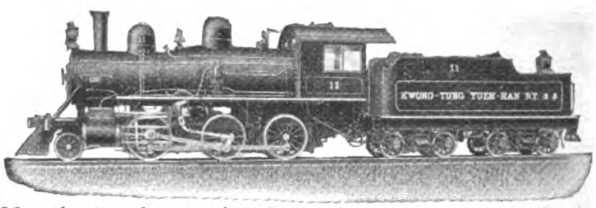


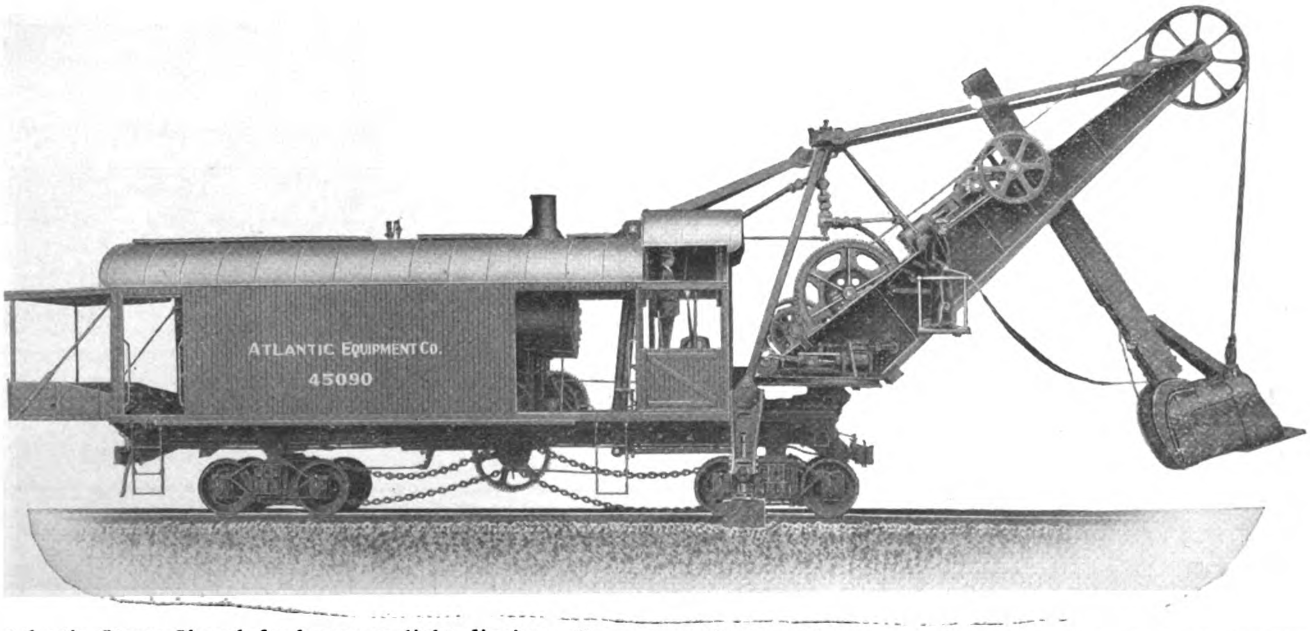
Articulated compound locomotive built for South African Government Railways to operate heavy trains on roads with steep grades and sharp curves.



Six coupled, double end locomotive built for South Manchuria Railway.



Mogul type locomotive built for Kwong-Tung Yueh-Han Railway.



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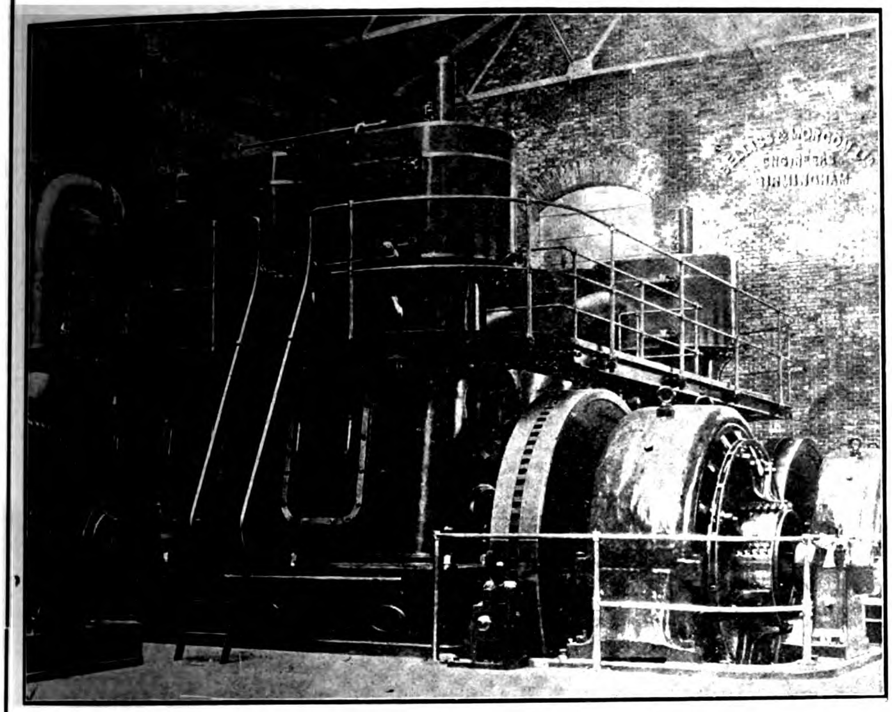

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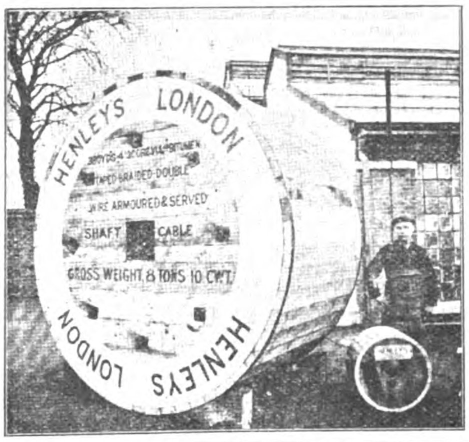

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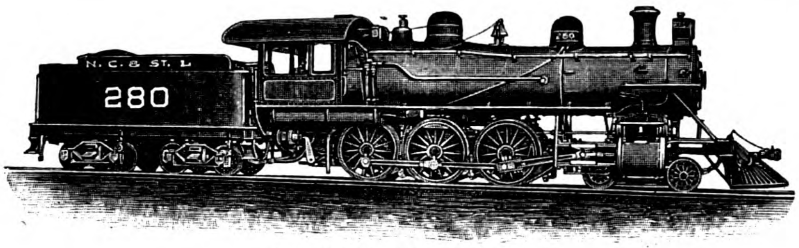
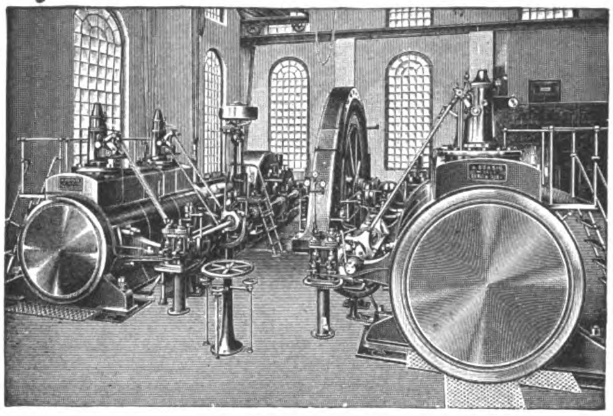


BALDWIN LOCOMOTIVE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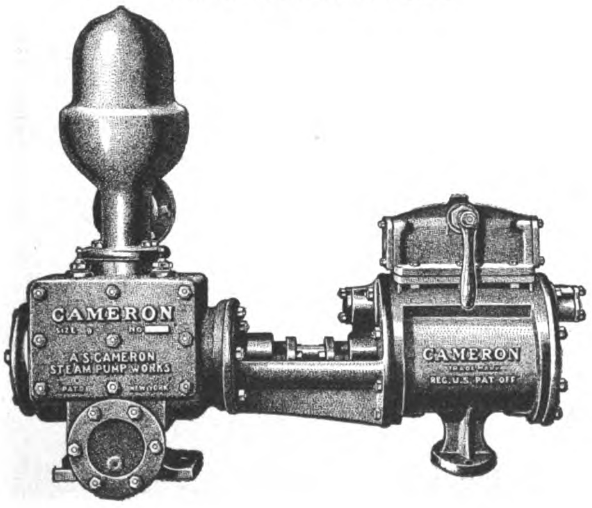

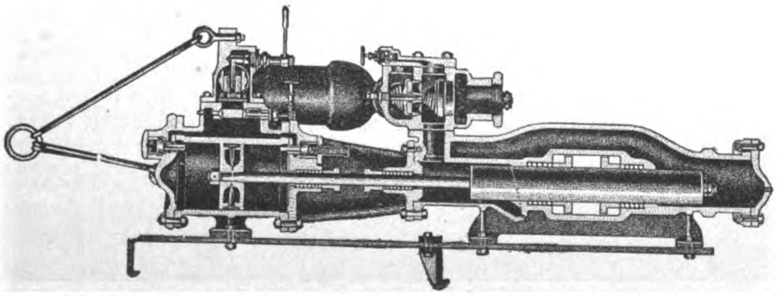

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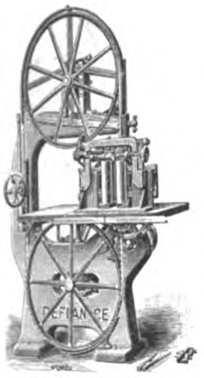

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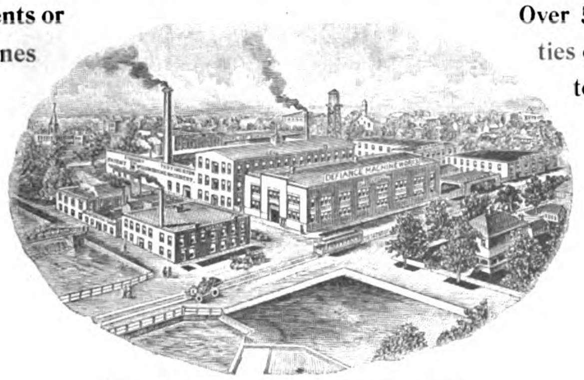

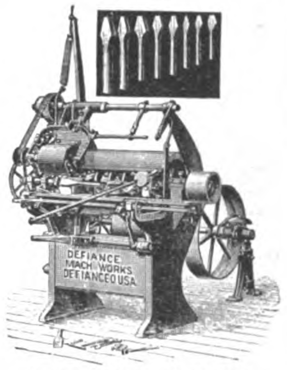

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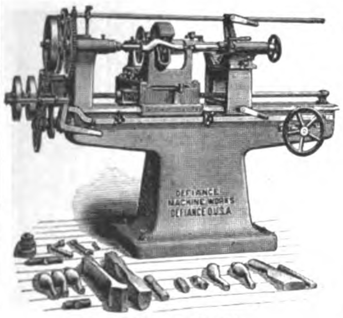

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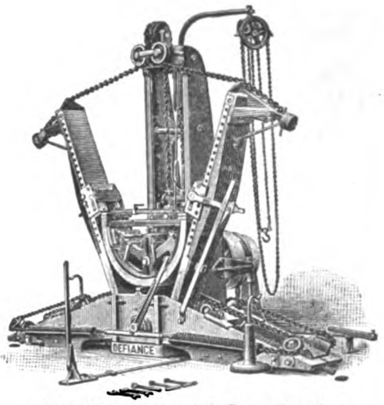

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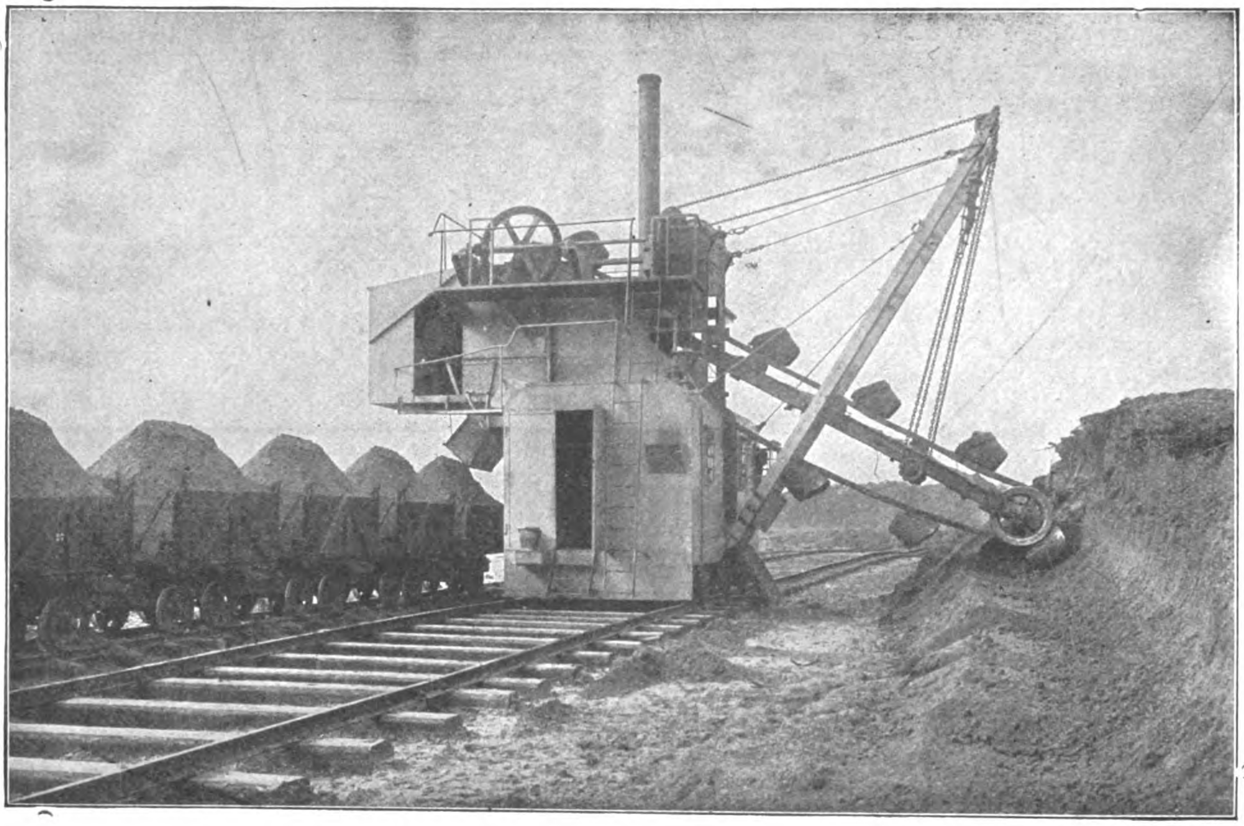

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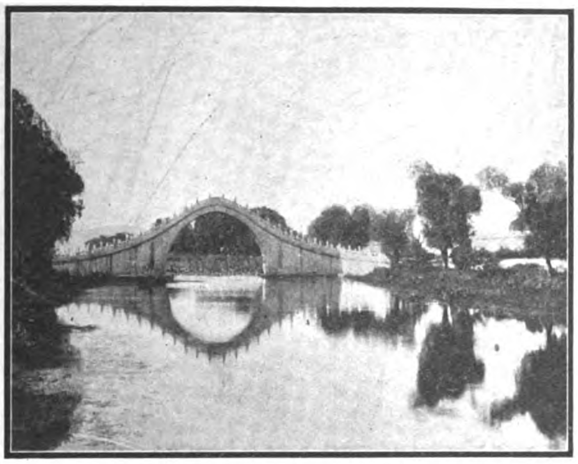

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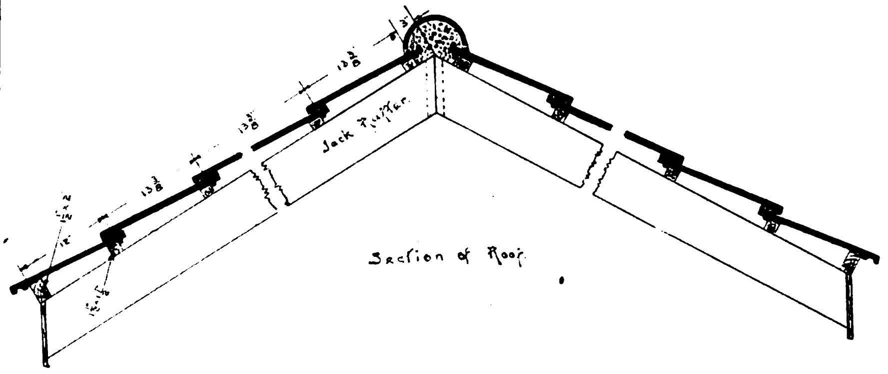

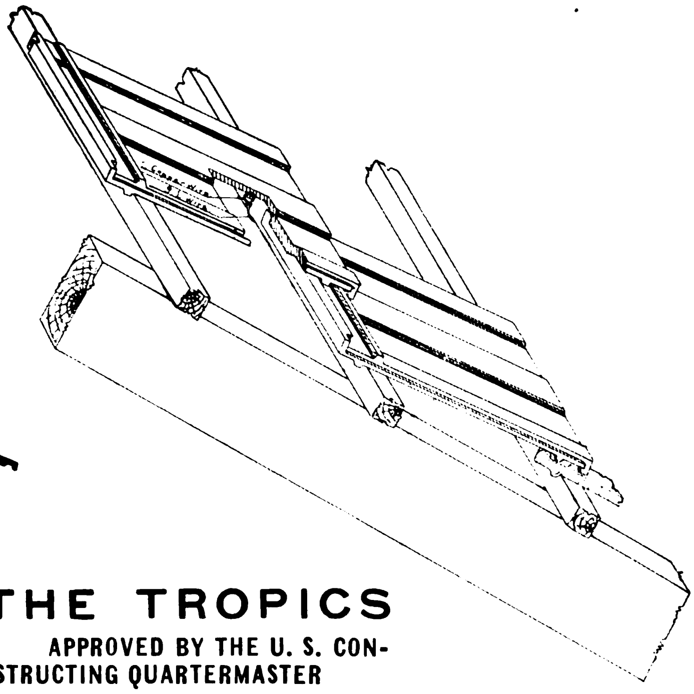

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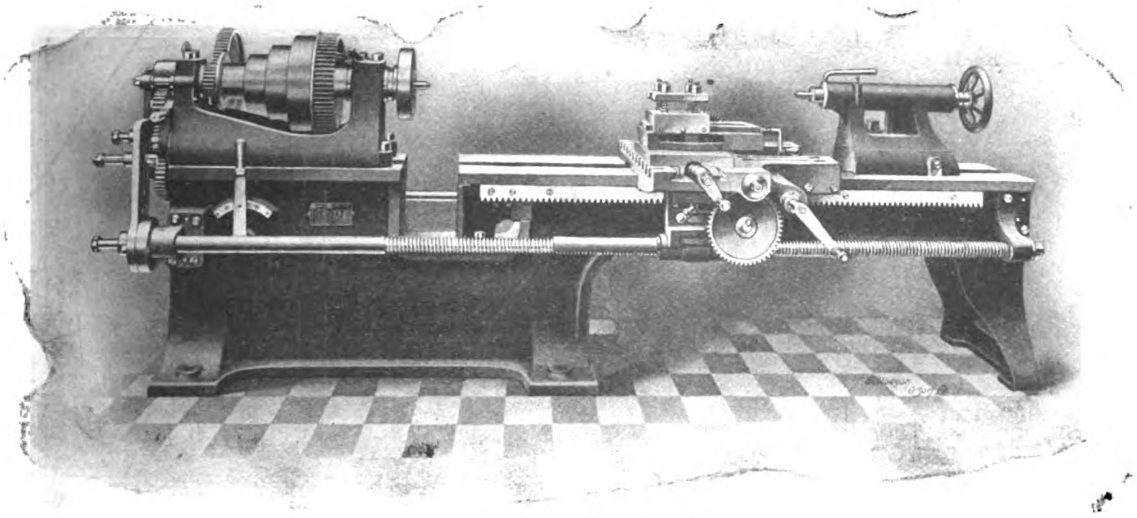

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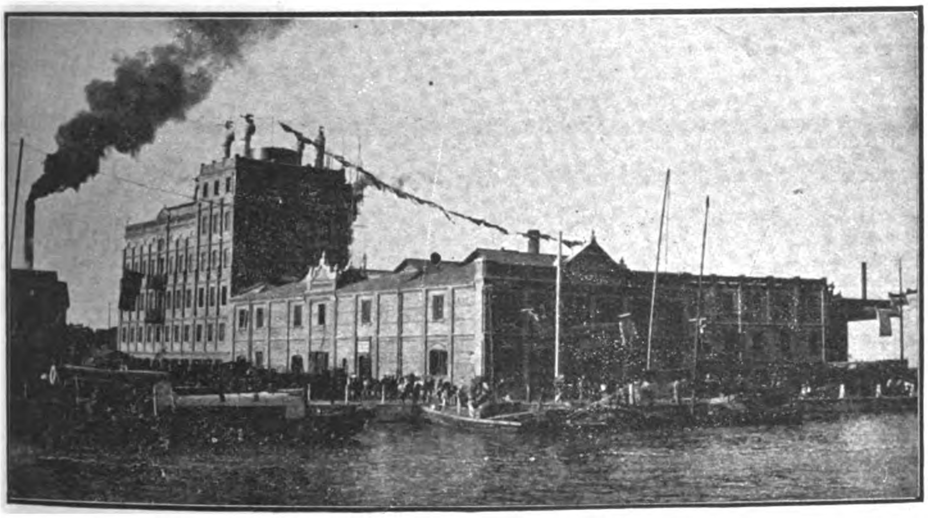

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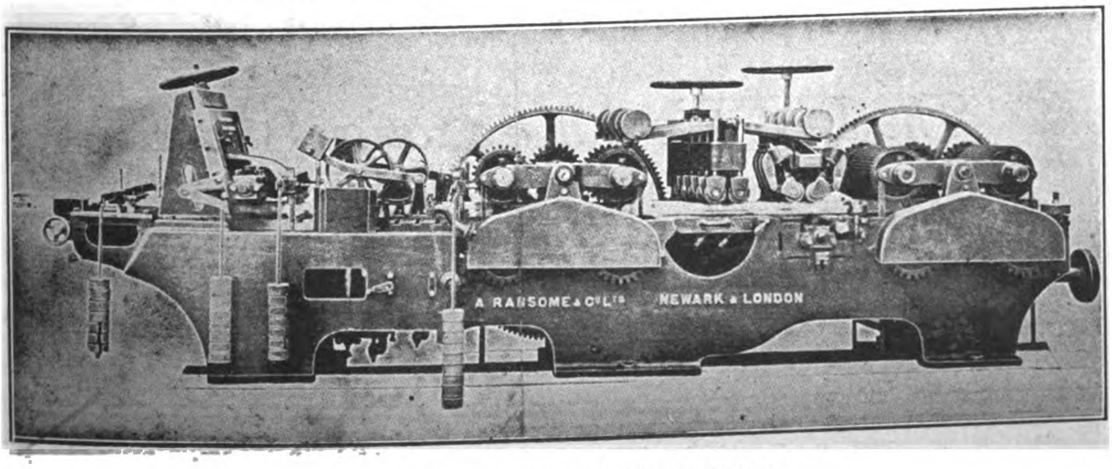

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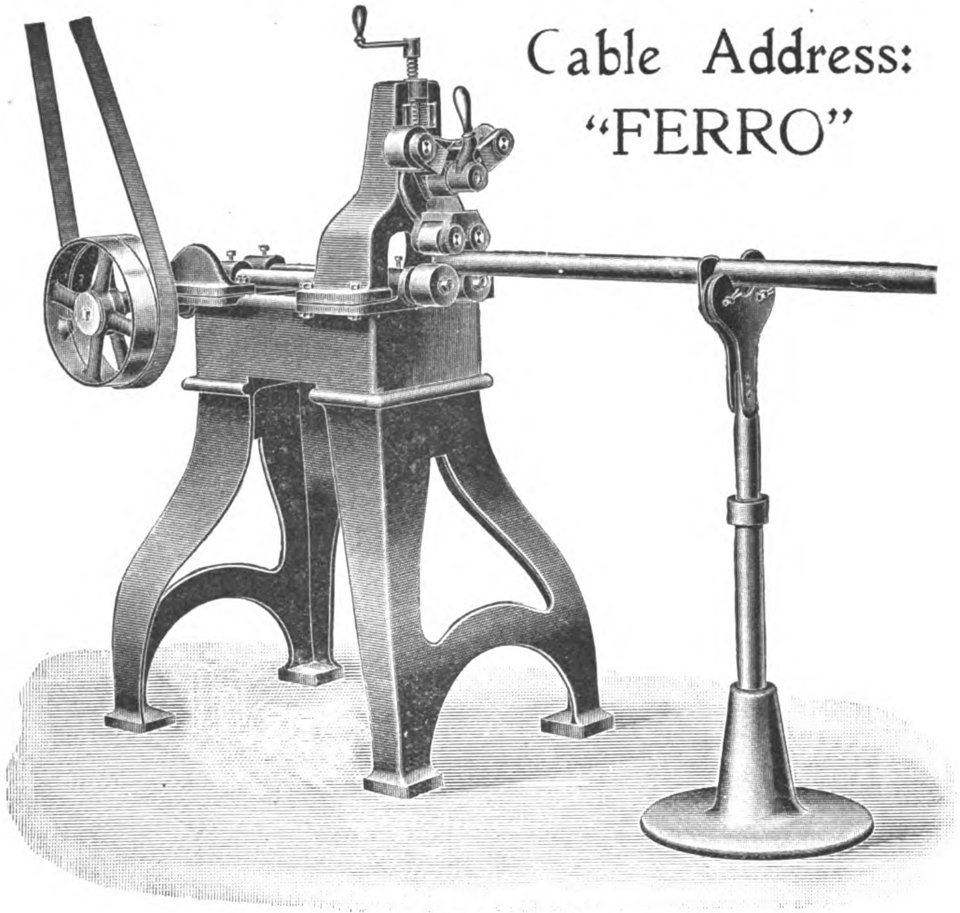

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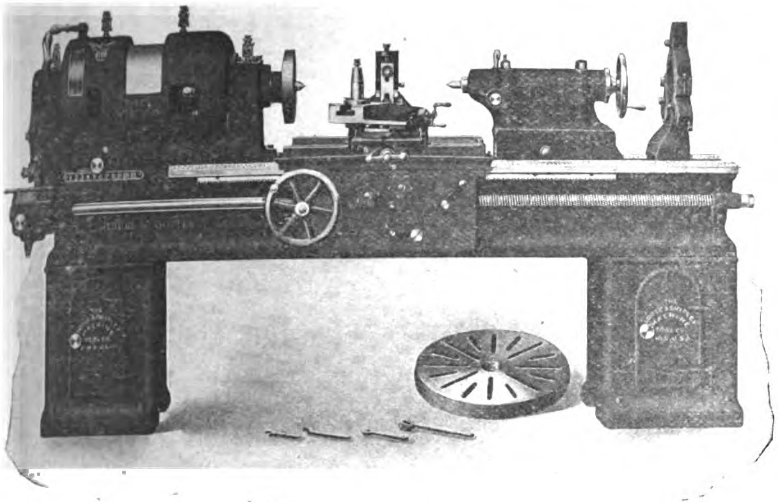

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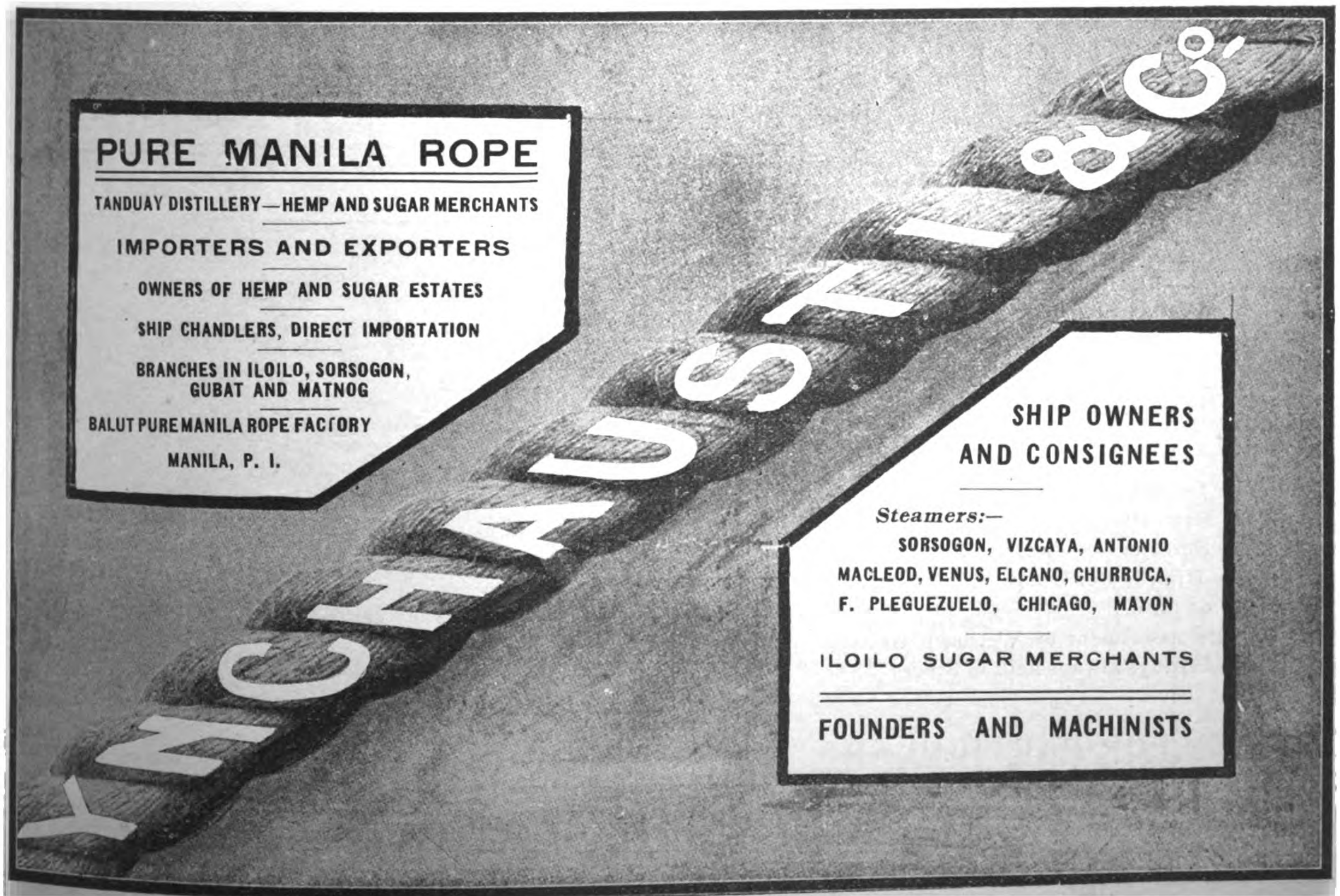

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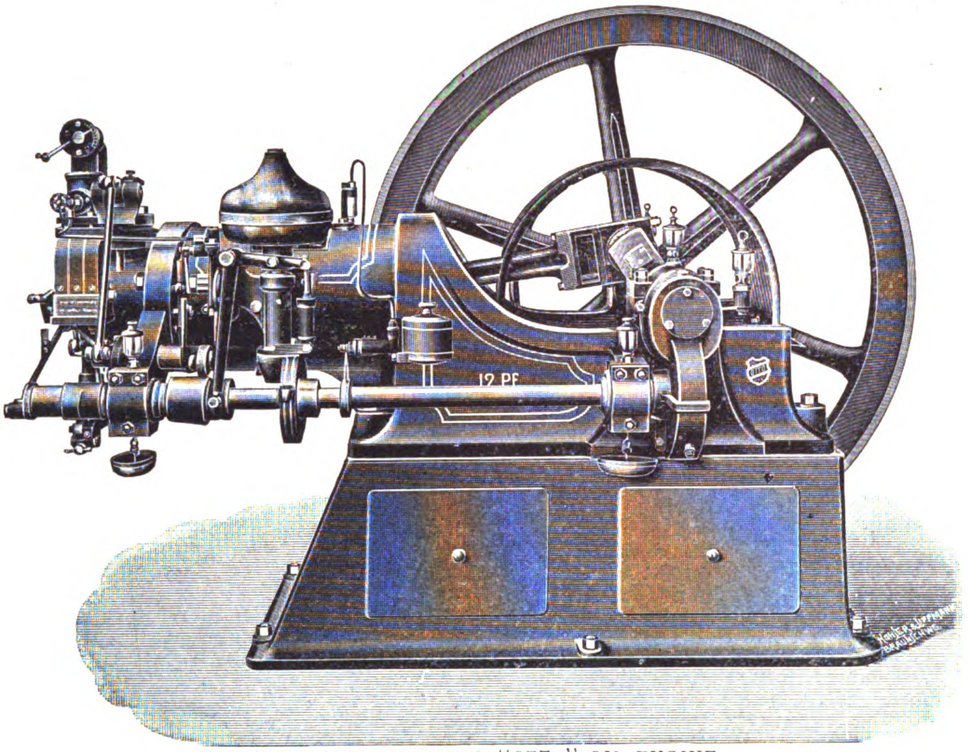

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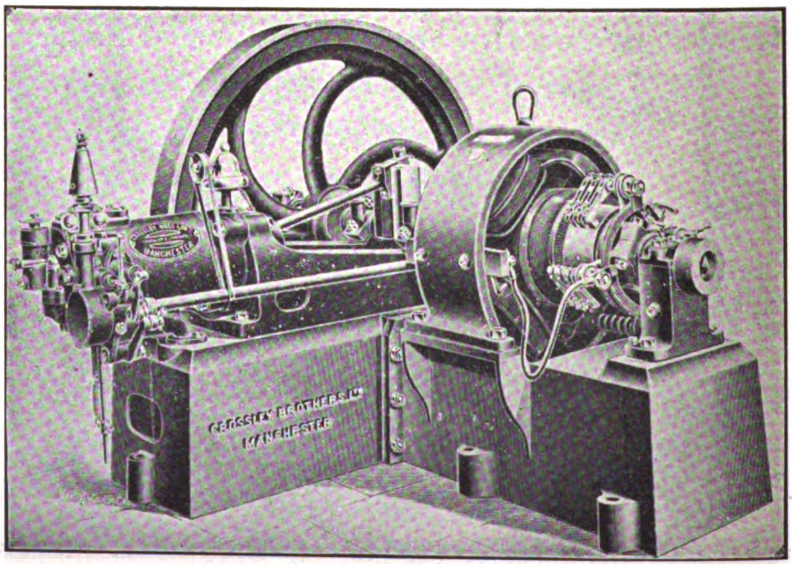

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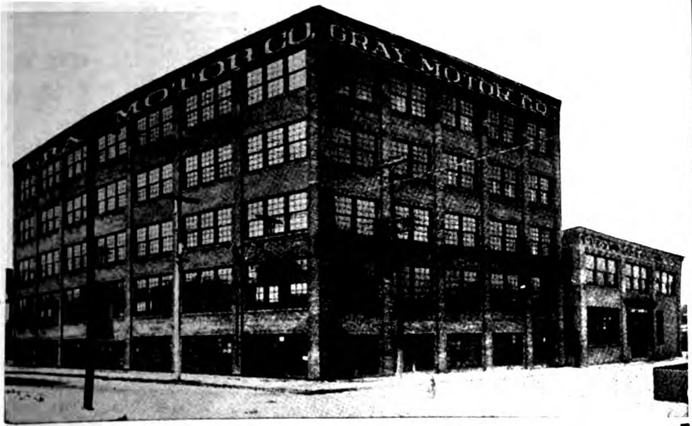

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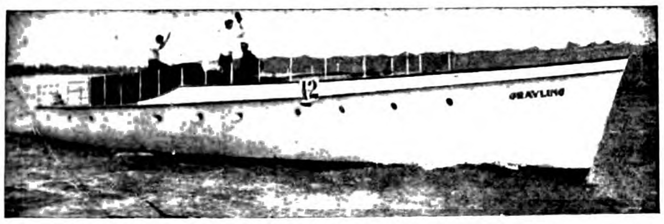

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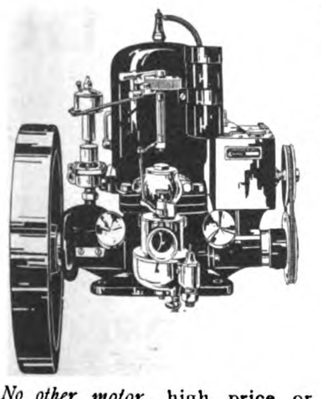

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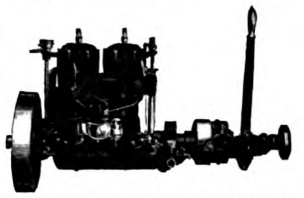

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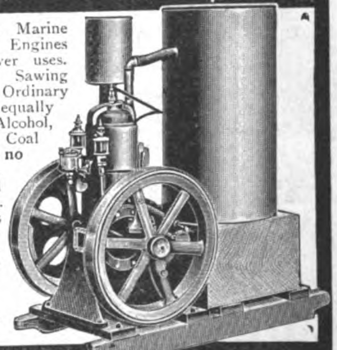

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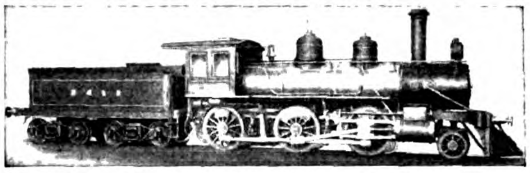

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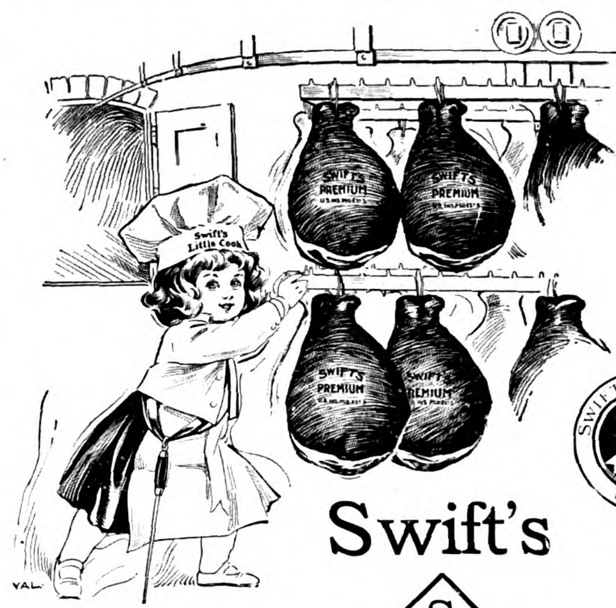

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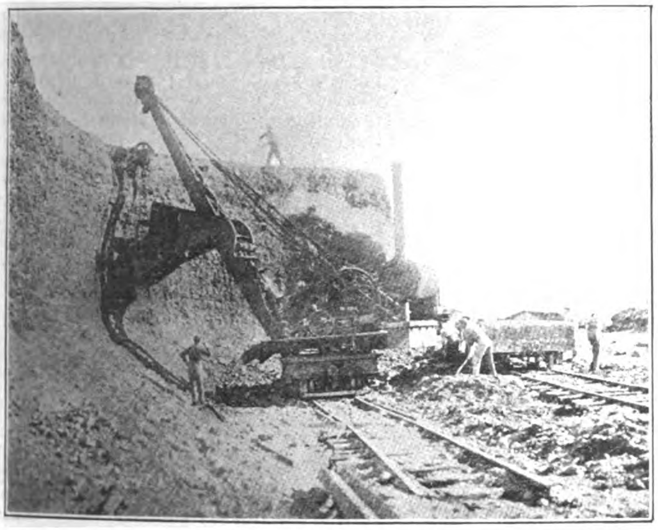
THE FAR EASTERN REVIEW

COMMERCE ✪ ENGINEERING ✪ FINANCE

VOL. VII. MANILA, P. I., SHANGHAI, AND YOKOHAMA, JANUARY, 1911 No. 8.

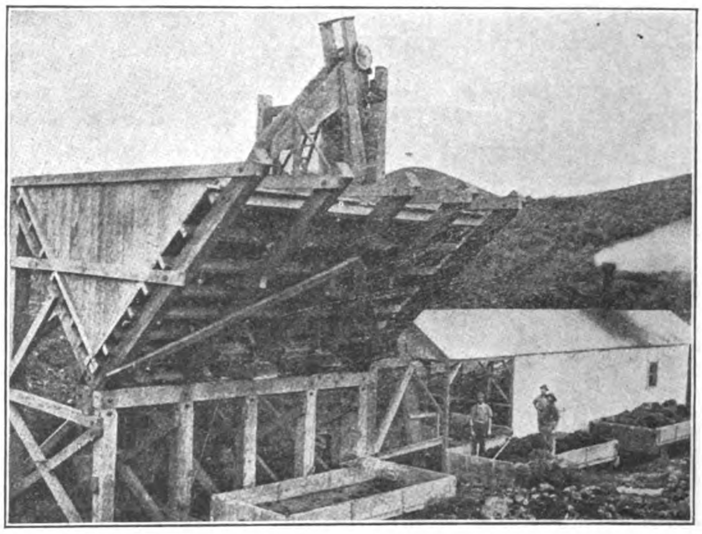
NEW ZEALAND RAILWAYS AND PUBLIC WORKS

The report of the Hon. Roderick McKenzie, Minister of Public Works for New Zealand, for the year ended March 31, 1910, just received, contains a comprehensive review of the activity of the department. In all for the year £2,218.975 were expended under the different heads and the amount charged to Public Works Fund to date was £52,617,988, a remarkable figure when the area and population of the colony are considered.



From Official Report.

STEAM "NAVVY" AT WORK LOADING BALLAST-CARS NEAR CASS STATION, MITLAND RAILWAY, NEW ZEALAND



BALLAST CRUSHING PLANT ON THE OPUA-GRAHAMTOWN RAILWAY, NEW ZEALAND

RAILWAYS.—Of the total of £2,149,946 expended for public works during the year the amount represented by construction of new railway lines was £786,952 and of additions to open lines £468,518, approximately, a total of £1,155.570 exclusive of £59,282 for expenditure on the new Hutt road of £67,244.

During the year, railway construction covered the opening of ten sections in all, an aggregate of 61 miles, 6 chains.

Detailed reference is made to these sections which may be more clearly understood by reference to maps reproduced by courtesy of the Minister of Public Works as follows:

	M.	ch.	Opened.
Ruatapu to Ross.........	7	21	1st April, 1909.
Waihoaka to Tuatapere	8	7	1st Oct., 1909.
Riversdale to Waikaia.	13	70	1st Oct., 1909.
Catlin's to Houipapa...	2	30	17th Dec., 1909.
Towai to Hukerenui....	4	31	3rd May, 1910.
Wellsford to Te Hana..	3	27	16th Mar, 1910.
Huiroa to Te Wera......	7	0	20th June, 1910.
Ngahere to Blackball...	3	40	16th July, 1910.
Domett to Mina..........	3	63	1st Aug., 1910.
Lawrence to Big Hill...	7	37	Ready to open.

The above shows an average cost of approximately £13,000 per mile including equipment, etc. At the close of the year under government control there were 2,716 miles, 48 chains of railroads in operation which represented a total outlay of £29,918,488 or approximately £11,014 per mile. For the year 1911 the total estimates submitted for railway construction purposes amount to £1,000,000.

ROLLING STOCK AND WORKSHOP MACHINERY.—The total amount expended during the year in this department included £228,332 for rolling stock and machinery, while the sum of £89,758 was spent in additions to station accommodations, signals and interlocking gear, telegraph and telephone facilities, lighting of stations, crushing and excavating machinery, etc., a total of £318,090.

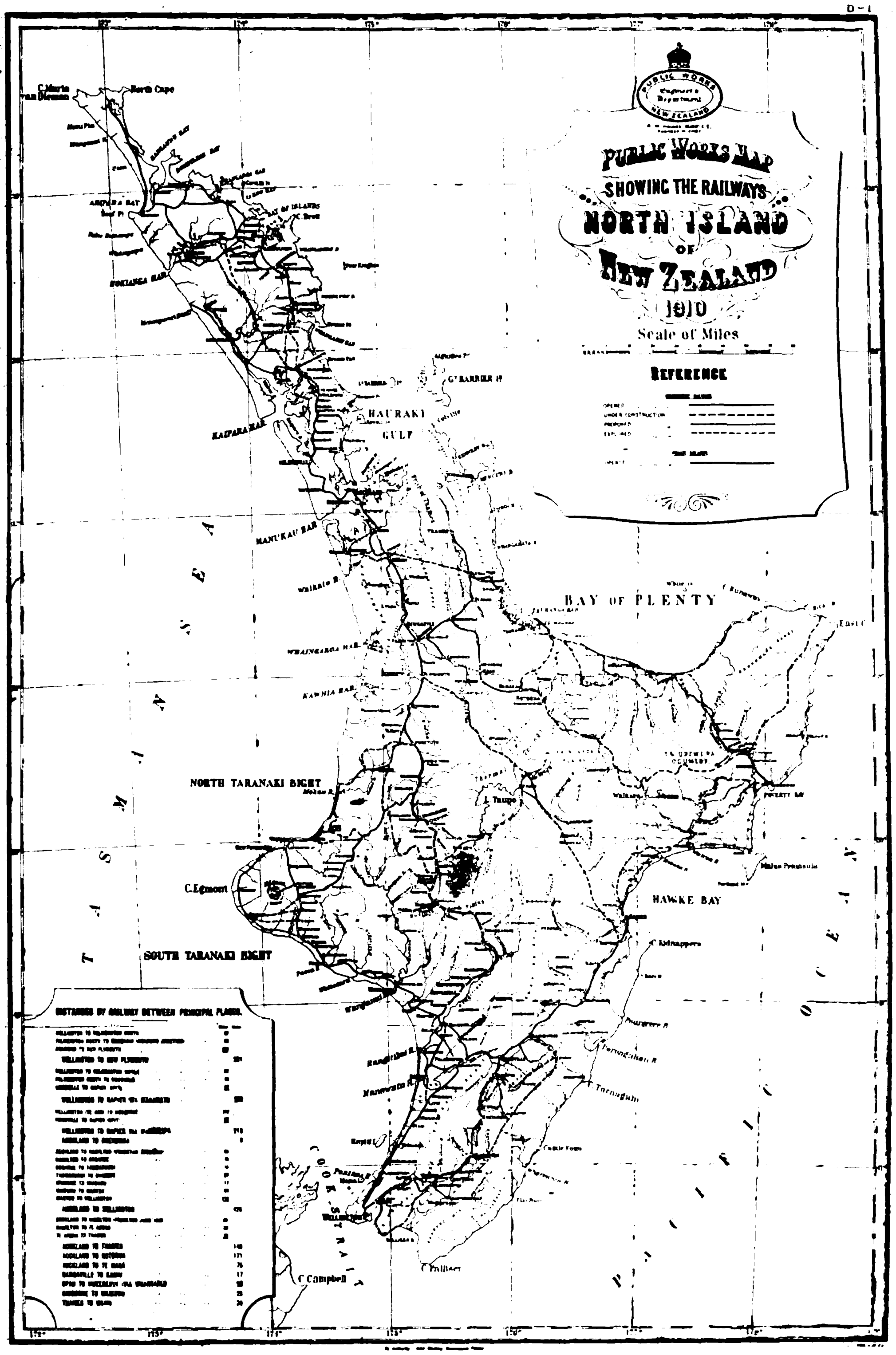
The proposed vote for 1911 in this department under the different headings amounts to £350,000.

LINES SURVEYED AND UNDER CONSTRUCTION.—At the end of the fiscal year 1910 there were 1272 miles of new lines surveyed, 30 miles under formation and 45 miles ready for the steel on the North Island system. On South Island there were 540 miles of new lines surveyed, 51 under formation and 59 ready for track laying.

HYDRO-ELECTRIC DEVELOPMENT. — The government of New Zealand has been making extensive investigation into the feasibility of utilizing the colony's water power for the development of electric energy for manufacturing enterprises and there is every indication that a few more years will see extensive plans covering two very large projects, well under way. Under the direction of the Department of Public Works, the services were secured of Mr. Lawrence Birks, B. Sc., A. M. S. C. E., A. M. I. E. E., and other experts, who went into the details of demand for power, working cost, etc., supplemented by the comprehensive report of Mr. R. W. Holmes, Engineer-in-Chief of the Department, so that the Government is now in possession of complete data upon which to base a comprehensive campaign. The most complete reports refer to the Lake Coleridge Scheme and the Hutt River project and the following comparative table presents the estimates submitted by Messrs. Hancock, Hay and Birks respectively with that of Chief Engineer Holmes.

	Hancock.	Hay.	Birks.	Holme.
LAKE COLERIDGE SCHEME				
Horse-power provided for.......	10,000	58,000 or 29,000	13,300	15,000
Estimated capital cost........	£241,667	£700,000 or £440,000	£291,500	£421,000
Working-expenses per annum..	£58,792	....	£44,070	£44,500
Probable receipts per annum....	....	£200,000 or £100,000	£90,000	....
Probable profit per annum....	....	....	£45,930	....
HUTT RIVER SCHEME				
Horse-power provided for.......	....	17,000	13,300	12,500
Estimated capital cost........	....	£470,000	£443,960	£422,000
Working-expenses per annum..	....	....	£50,639	£38,000
Probable receipts per annum.....	....	£50,000	£118,300	....
Probable profit per annum.....	....	....	£67,661	....

At the present time there is but one existing hydro-electric plant, Waipori, which supplies Dunedin. This plant was originally installed four years ago with a capacity of 2,000 kilowatts, but was increased last year to a plant capacity of 4,000 kilowatts. The capital outlay to date is £290,000. The transmission line of this scheme is 30 miles in length over rough country and the line pressure



35,000 volts. Deducting interest, depreciation, etc., the net balance was £4,242 last year.

In his report on the Lake Coleridge scheme Mr. Birks gives the following description:

"The lake constitutes an ideal storage reservoir. It is 11 miles long, and has an area of 14 square miles, 382 acres at its present level. By driving a tunnel through the hill to the Rakaia River, a distance of 68 chains, with a 4 chain approach canal at the lake end and 40 chains of pipe-line at the lower end, a head of 470 ft. is available. These headworks would cost £60,000, and by lowering the intake of the tunnel to 20 ft. below the existing lake-level, to regulate the flow, it would yield an average power of 5,500-horse power. By diverting the Acheron into the lake the power available could be increased to 7,600-horse power at an additional cost of £16,000; and by diverting a portion of the Harper River it could be further increased to 14,000-horse power at an additional cost of £34,000.00: making a total of £110,000 00 for headworks. The above horse-powers are for continuous working at 100 per cent. load-factor. At 50 per cent. load-factor the maximum power available in each case is double the above figures; and at the 28 per cent. power-factor estimated for the Christchurch demand the maximum power available is nearly four times the above figures. The estimates show that the maximum demand in Christchurch in five years' time will be 11,100-horse power (8,300 kilowatts); and the average, 3,460-horse power £(2,592 kilowatts). Allowing for all losses, this power will require an average flow of only 108 cubic feet per second throughout the year, and considerably more than this is available by regulating the lake-outflow without diverting either of the rivers. Allowing for transmission and transformation losses, I would recommend that a plant consisting of four generators, each of 2,500 kilowatts (3,400-horse power), be installed at once, and that headworks, foundations, and switchboard-panels be provided for two additional units of the same size. Of these four units, three would carry the maximum load if required, with a reasonable overload on each, up till the early part of the third year of operation, so that one unit could be dismantled for overhaul or repair without interfering with the operation of the station. During the third or fourth year of operation the question of adding a fifth unit to meet the increasing demand and providing a spare unit at full load will probably have to be considered.

"The water motors would be of the Pelton-wheel type, mounted on horizontal shafts coupled direct to the generators. These should operate at 2,500 volts, three-phase, with a frequency of 50 cycles per second. Two direct-current exciters would also be required, of 200 kilowatts each, which would also supply the lights in the station and staff-houses, and operate the travelling-crane and other station motors. These exciters would run at 120 volts direct current, and would be connected in parallel with a small storage-battery in order to maintain absolute certainty of supply and steadiness of voltage. The exciters would be driven by two smaller Pelton wheels of 300-horse power each.

"The current from the main generators and exciters would be controlled by a switchboard built in a special switchboard-gallery, the switches themselves being entirely enclosed in brick or concrete cells, and operated by insulated handles from the operating-board. The switchboard would be provided with the necessary panels for the final equipment of six 2,500-kilowatt generators and four outgoing feeders. It would be divided into two entirely separate portions by a coupling switch, and two independent sets of feeders would be run to Christchurch, one from each of these independent switchboards. With these provisions no single fault whatever in the plant or gear, even if in the most vulnerable parts, could interfere with the continuity of supply. From the switchboard the mains would be carried to the step-up transformers, which would raise the pressure from 2,500 to 45,000 volts for the transmission and thence to the outgoing-cable towers, suitable lightning arresters being interposed to protect the plant from damage from this cause. From the power-house the distance in a direct line to Christchurch is fifty-eight miles; but, following the roads by the most convenient routes to give the cheapest right of way, accessibility for construction and repair, and to tap the available distributing centres on the route, the distance is about seventy miles. Provision is made for two entirely separate transmission-circuits on separate pole-lines, again in order to provide that no accident, however serious, could possibly interfere with the continuity of the supply. The transmission-line would be carried on 36 ft. poles spaced 2½ chains apart in level country, and up to 5 chains in hilly country, according to the nature of the surface. As every insulator is a point of risk, the longer the spans within the limits permitted by the sag the less the danger of break-down. In modern practice the spans are made as long as the nature of the ground and the height of the poles will permit, on level ground from 150 ft. to 180 ft. with wooden poles, and in hilly country up to a quarter or half a mile between ridges, and with special poles. The insulators would consist of triple built-up earthenware, cemented together, and arranged in an equilateral triangle about 60 in. apart. Each pole, with cross-arm and insulators, erected complete, would cost about £5, the necessary shingle for concrete being available practically on the spot. This provides for a type of construction that will be ample for twenty years' service. By that time the development of ferro concrete construction will probably enable a much more permanent type of pole to be adopted. In the meanwhile, the accrued depreciation reserve will more than cover the cost of reconstruction.

"For the transmission-line, considering the necessity of providing for future extensions, the total weight of copper required would be 143 tons for each circuit of three wires from the power-house to the substation in Christchurch. This size of wire would involve transmission losses ranging from 3 per cent. of 1,200 kilowatts up to 13 per cent. with a load of 5,000 kilowatts (6,600-horse power) on each of the two circuits—that is, at a delivered power of 13,200-horse power. The transformation losses in raising the pressure at the power-house and

stepping down again at the substation would be 4 per cent. additional at full load, making a total loss of 17 per cent. at a total load of 13,200-horse power; at a total load of 10,000-horse power the total loss would be 15 per cent.; and at 6,000-horse power 13 per cent. In working out fuller details a lighter line may prove sufficient, but the above is a safe estimate. A telephone circuit would be required following each transmission-line, with small exchange boards in the power-house and substations.

"The maintenance of the transmission will involve patrolling its whole length at frequent intervals; and for this purpose two linesmen's cottages would be required along each route, dividing it into suitable lengths for regular patrol service. Telephone instruments in each house connected with the telephone circuit would enable the linemen to be concentrated rapidly in the case of an emergency.

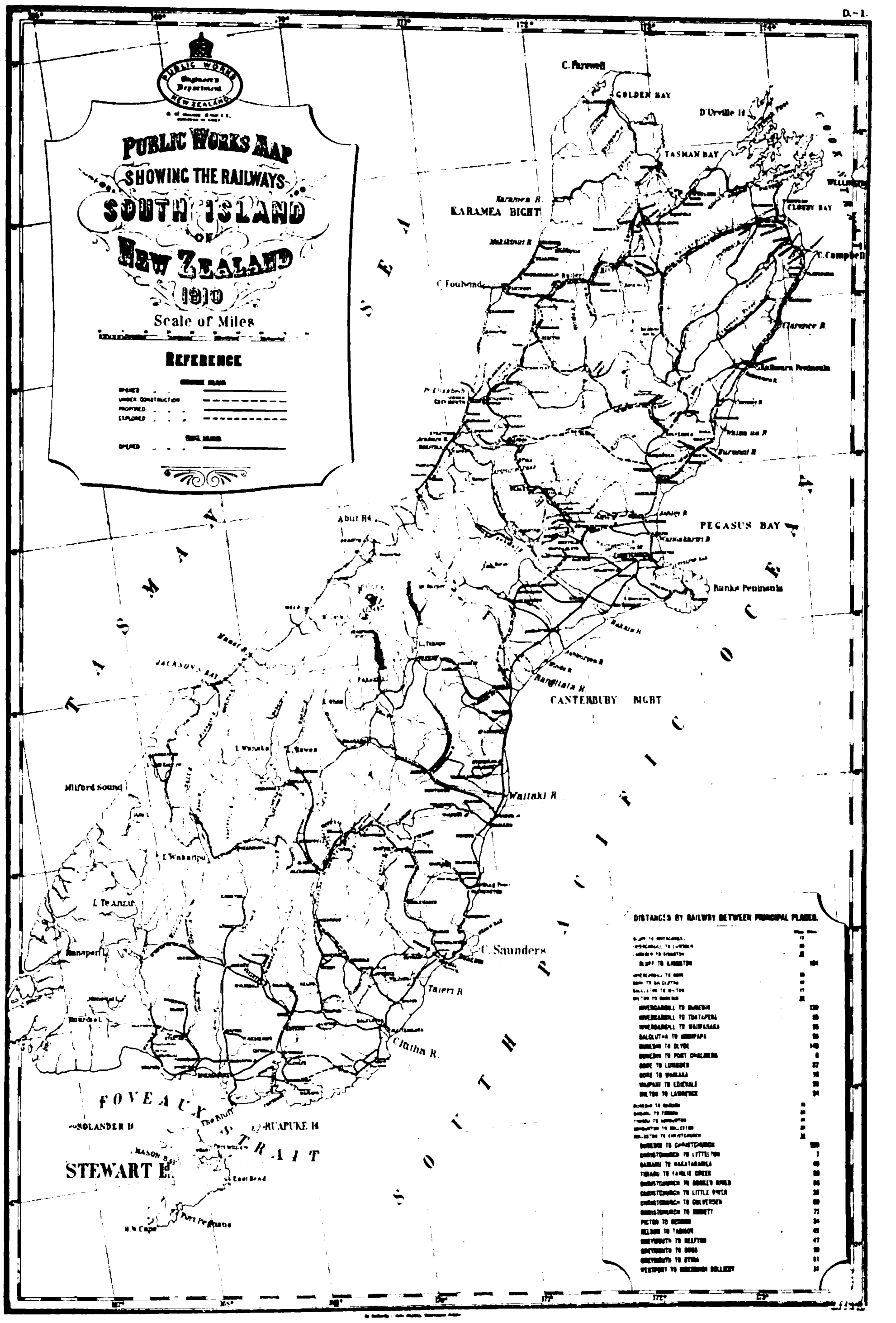
"The two transmission-lines should terminate in independent substations, one towards the northern and the other on the southern side of the city, in order to give a good lay-out of the distributing mains. These two substations would be cross-connected by a cable, again providing for continuity of service in case it is necessary to cut out either of the transmission-lines at any time. The main transmission-lines should not be brought farther into the city than is necessary to obtain good centres for distribution, and on this account the southern substation would be situated in Addington, near the Railway Workshops, and the northern one near the Exhibition Grounds. These substations would be provided with lightning-arresters, step-down transformers reducing the pressure from 40,000 volts to 6,600 for distribution in bulk, and switchboards controlling the various circuits. From the Addington substation distributors would be run to the Railway Workshops, the tramway power-house, the Sydenham, Cashmere Hills, and Heathcote pumping-stations, the factories and mills in Woolston, Addington, Islington, and Hornby, the Halswell and Redcliffs quarries, and the Lyttelton Harbour. From the Exhibition substation distributors would be run to the City Council Electric-power Station, the Drainage Board pumping-station, the Belfast, Kaiapoi, and Rangiora mills and factories. Provision would be made in the distributors from the substations to supply each suburb or section of the city not already supplied by the City Council mains, and each town, village, group of houses, mill, or factory within fifteen miles of the substations that offers sufficient inducement.

"In addition to the two main substations, a number of transformer and distributing huts would be required for supplying current to smaller centres in which there is no authority to take the power in bulk, and in which the Government might have to undertake the retail distribution. The exact positions of these would be fixed as the demand arose, but I have allowed for twenty-five, with an average capacity of 100 kilowatts. The following would be the approximate length of main distributors:—

	Miles.
Christchurch to Rangiora *via* Belfast and Kaiapoi	20
Addington to Lyttelton	8
Branches from main lines to Halswell, Islington, Hornby, and Lincoln	15
Branches from substations to various distributing centres	25
Total	68

In addition, low-tension 220-volt distributors would be necessary for retail distribution in smaller centres, requiring about forty miles circuit with meters and services.

"I attach complete estimates for these works, amounting to £291,500, exclusive of the purchase of any land or way-leaves that may be necessary, the construction of main roads, interest during construction, and preliminary departmental expenses. For four years hence—that is, for the first two years of operation—the load would be considerably less than the maximum of 13,300-horse power provided above, and one of the generating units might be omitted in the meanwhile, reducing the power-station capacity to 10,000-horse power and reducing the outlay by £17,000. Similarly, one of the two transmission-lines would have



ample capacity for the first few years of operation, and the £34,000 on the above outlay might thus be held over in the meanwhile. If it were decided at first to supply current only from the main distributors or the transformer-huts, leaving the local bodies or groups of consumers to make their own arrangements for distribution, a reduction of £25,000 would be effected in the capital outlay. The costs of the full development of 10,000 kilowatts or 13,300-horse power thus work out as follows:—

	Total.	Per Kilowatt.	Per Horse-power.
	£	£	£
Headworks	60,000	6	4.5
Power-house	110,600	11.1	8.3
Transmission-line	44,300	4.4	3.4
Substations	18,800	1.9	1.4
High-tension distribution	29,200	2.9	2.2
Low-tension distribution	28,600	2.9	2.1
Total	£291,500	£29.2	£21.9

"Compared with the costs of other power plants of similar output, the cost of headworks is low, owing to the exceptionally favourable circumstances of Lake Coleridge for partial development. The other items show a fair margin above the cost of similar works in the older countries, which would more than cover the necessary allowance for higher freight and wages."

Engineer-in-chief Holmes increased the estimate to £421,000 on the Lake Coleridge scheme with a view to develop 15,000 horse power and later extend the project at minimum expense to from 25,000 to 30,000 horse power, practically endorsing Mr. Birk's report, and in conclusion gives the following valuable epitome:

"On the assumption that there will be a maximum demand of between 10,000 and 15,000 horse power, it is estimated that if a quantity of power amounting to a continuous demand of 5,000-horse power is sold, it could be produced at 0.244d. per horse-power hour, or 0.327d. per electrical unit; and if a quantity of 4,000-horse power only is sold, it will cost 0.305d. per horse-power hour, or 0.408d. per electrical unit; and if a quantity of 3,000.

horse power only is sold, it will cost 0.406d. per horse-power hour, or 0.545d. per electrical unit, which rates are much lower than power can be produced at by any other means at the present time.—"

Of the Hutt Project Engineer-in-Chief Holmes says:

"The generation of power from the Hutt River depends entirely upon the formation of an artificial lake or reservoir, by the construction of a high dam in the valley of the Hutt River below the confluence of the Pakuratahi River. Without this dam neither sufficient fall nor water can be obtained, as the low summer flow, together with the available fall, would only be sufficient to generate a few hundred horsepower. Fortunately, one of the finest sites in the Dominion for the construction of a dam exists exactly where required; and, although the dam would be 170 ft. in height, the length of the bottom would only be some 60 ft. or 70 ft., and the width of the top not more than 400 ft., and by the adoption of the arched principle of dam-construction, as has been adopted in New South Wales and America, the cost of the dam can be reduced very materially, and likewise its safety increased when subjected to earthquake shocks, as the pressure of the water will tend to close, instead of open, any cracks which might be formed.

"The question of the silting up of the reservoir by detritus from the hills has been investigated; and, judging by the quantity of land which has made at the mouth of the Hutt River since the settlement of the district commenced, it will take many hundreds of years for the reservoir to be detrimentally affected. Silting can be very much decreased by the preservation of existing forests and the reafforestation of the denuded areas; so no alarm should be experienced on this account.

"Some records have been obtained from time to time of the flow of the water, and from these has been deduced that the quantity which will be available during three consecutive dry seasons is sufficient to generate a continuous load of 5,000-horse power delivered in Wellington, which, with the variation in the quantity required throughout the twenty-four hours, will allow a maximum demand of from 10,000 to 15,000 horse power, or perhaps 20,000-horse power for short periods. This has been deduced in a conservative manner, as our records are not yet sufficiently complete to enable a very close and accurate determination to be made at the present time.

"With the known fact that the average rainfall in any place can only be obtained by observations taken over a cycle of nineteen years, it is obvious that very considerable allowances have to be made when the observations only extend over three years, which is the case in the present instance.

"Fortunately, in this scheme the information to hand is sufficient to enable a very close estimate of the cost of the works to be made, as it has been possible to calculate the quantities in most instances, and from this information the following estimate has been derived:—

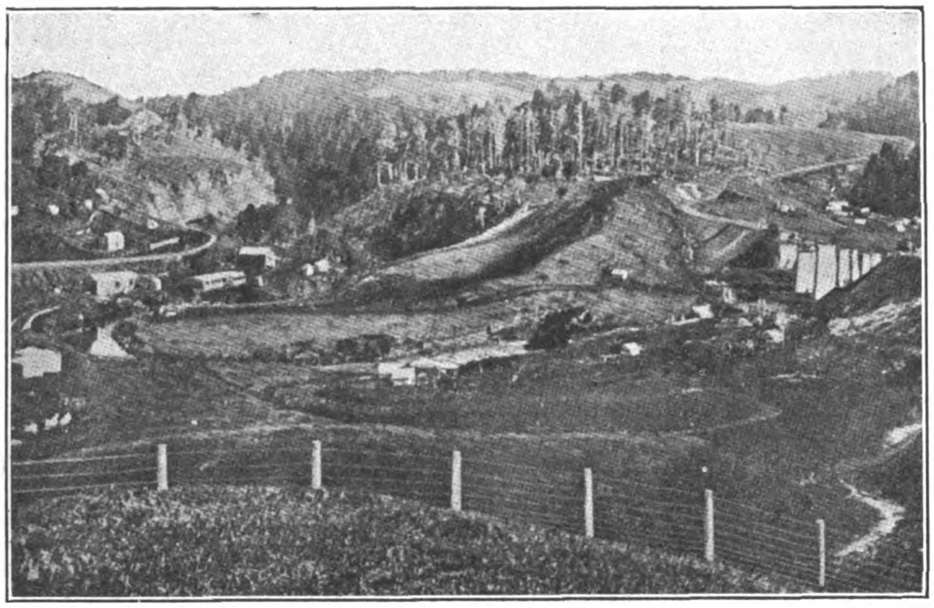
	£
Purchase of land for reservoir	18,000
Purchase of land in watershed to provide for reafforestation	10,000
Dam	125,500
Tramway from nearest railway-station to dam-site	12,000
Deviation of main road where affected by reservoir	10,000
Head-race	17,000
Pressure-pipe line	21,000
Power-station and equipment	133,500
Transmission-line	36,000
Telephone-lines	1,000
Contingencies	38,000
Total	£422,000

"The following is an estimate of the annual charges in connection with generation:—

	£
Interest at 4 per cent	16,880
Sinking-fund, 1 per cent	4,220
Maintenance	4,000
Depreciation	6,280
Running-costs	6,200
	£38,000

"In order not to complicate the report by the introduction of obscure technical terms, the estimate has been prepared on the assumption that the maximum demand will be 12,500-horse power; then, if a quantity of current amounting to 5,000-horse power for the whole of the twenty-four hours of each day of 365 per annum is sold, the cost per horse-power hour will be 0.208d., or 0.280d. per unit; if only 4,000-horse power is sold, the cost will be 0.260d. per horse-power hour, or 0.349d. per unit; if only 3,000 horse power can be sold, the cost will be 0.347d. per horse-power hour, or 0 465d. per unit.

"It is estimated that the Wellington City Corporation would be able to take, by the time the works are completed, at least one-third of the total quantity of power available. It is also estimated that the balance would be easily disposed of to industries along the route of the transmission-line, and also to industries at present being carried on in Wellington, to which current could be supplied at a very much cheaper rate than the City Council can supply with their present plant, or are in possession of a separate plant. It therefore appears that from a financial point of view the Hutt power scheme will be one of the most favorable in the Dominion.



HORSE SHOE CURVE ON NORTH ISLAND MAIN TRUNK

"The height of dam required may seem excessive, and of too great a magnitude for practicable carrying-out; but a dam in an exactly similar situation is being constructed in America, of a height of 246 ft. exclusive of depth of foundations, to dam up the Shoshone River in Wyoming. The construction of the dam was commenced in 1908, and in about two years it had been nearly completed, so that the construction of the dam required in the Hutt cannot be considered in any way beyond the region of easy practicability."

The estimates submitted for the year to cover the initial work for the year 1911 amounted to £300,000.

RAILWAY ELECTRIFICATION.—With the development of hydro-electrical plants, the gradually electrification of railways will be included in the government program. The proposal submitted in 1908 for the use of electric power for the Christchurch Lyttleton Railway, which failed in approval as a result of a comparison of cost with steam power on the basis of a hydro plant designed for that purpose, will again be taken up as the Coleridge Lake scheme progresses, as also the construction of electric interurban lines.

PUBLIC BUILDINGS, ROADS AND BRIDGES.—The total expended in public building construction reached the sum of £335,114 and an estimate of £360,000 was submitted for 1911. This construction includes the new government house, parliament buildings and departmental buildings, offices for the post and telegraph, hospitals, schools charitable, institution, etc.

The expenditure for road and bridges construction for the year amounted to £381,904. The total road mileage maintained by the department was 3,843, of which 2 597 miles were dray roads and the balance bridle roads.

Roads on Goldfields is under a special head and the expenditure is charged to the encouragement of the gold mining industry in that section. The total expenditure in this direction for 1910 was £40,830 and £50,000 was asked for 1911.

The total expenditure for construction and maintenance of all roads and bridges for 1910 amounted to £599,093 and the estimates call for £712,035 for 1911.

TELEGRAPH-EXTENSION.—During the year £123,422 were expended on telegraph and telephone extensions. The mileage of extensions and trunk circuits was 497 miles of line and 2,134 miles of wire, and telephones, 103 miles of line and 5 037 miles of wire with 121 new offices and 17 telephone exchanges.

WIRELESS.—Tenders for two high power wireless stations in the neighborhood of Doubtless Bay and Bluff and three medium power stations near Gisborne, Cape Farewell and Summer were invited and expected opened last month. The high power stations are to have a radius of 1,250 nautical miles so as to communicate with Sydney and Fiji, while the medium power stations will have a radius of 500 miles. Proposals from the United Kingdom and America were received. It is expected that the installations will be completed by the end of 1911. The vote submitted amounted to £140,000.

LIGHTHOUSES, HARBOR-WORKS, AND HARBOR DEFENCES. "The lighthouse works undertaken during the year were: The completion of the first-order light at Cape Brett, and the necessary outbuildings and dwellings for the keepers; the erection of the new acetylene-gas light at Tuahine Point, near Gisborne; the erection of the new Pintsch-gas light on Jackson's Head, to replace the Wigham oil-light; and the connection of Cape Brett and Cape Palliser Lighthouses with the telegraph system.

"The fog-signal for Timaru, for the purchase of which a sum of money was voted, has arrived in the Dominion, and will be erected at an early date.

"The total expenditure on this vote for the year was £6,763.

"During the current year the new works to be provided for are: The erection of two lights on the East Coast of the North Island,

Commercial Commissioners from Central West to Visit Orient

The recent visit of the Commercial Commissioners from the Pacific slope to China is soon to be followed by that of a body of representatives of the Chicago Association of Commerce and of the commercial associations and chambers of the Central West to the Philippines by way of Honolulu. The editor of the FAR EASTERN REVIEW is in receipt of a letter from Mr. J. Newton Nind, the veteran American trade journalist and dean of the profession in the Central West, to the effect that the preliminaries have been arranged, and through the courtesy of President Hill, of the Great Northern Railway, the S. S. Minnesota has been placed at the disposal of the party. The Minnesota will proceed from Seattle to Honolulu and then to the Philippines, calling at Japan on the return trip, if present plans are not revised. It is not improbable, however, but that other points in the Far East will extend hospitality to these visitors who represent the commercial potentiality of the great Central West.

The party will be headed by Mr. Homer A. Stillwell, President of the Chicago Association of Commerce, and the head of Messrs. Butler Bros., one of the most progressive wholesale drygoods house in the United States, and will start from Chicago in March next.

The decision of the Chicago Association of Commerce is the result of the interest in Far Eastern trade aroused by the personal effort of Mr. Nind, who was a member of the Seattle party that toured the Orient in 1909. He was especially sanguine with regard to the development of Manila as an American distributing center for the Orient and pledged himself at a dinner given by the Merchants' Association of Manila to do all in his power to interest the leading businessmen of Chicago in this project. The development of the large and effective distributing center for the middle west that Chicago has become, impressed him that the businessmen of that city would have a greater appreciation of the value of a distributing

Reproduced from *The Saturday Evening Post*

MR. HOMER A. STILLWELL, PRESIDENT OF THE CHICAGO ASSOCIATION OF COMMERCE WHO WILL HEAD A COMMERCIAL COMMISSION ON VISIT TO ORIENT

center at Manila than those of any other section and he believed that the response would be prompt. That he has succeeded beyond expectations is evidenced by the following extracts from his letter:

"The present plan is for the Chicago Association of Commerce, which is the most representative body of the kind in the country, to gather together representative members of like bodies from the Central West and make a trip to the Orient. Mr. J. J. Hill has given orders to do the thing 'regardless' and the Minnesota will be placed at the disposal of the Association making the trip direct to Honolulu and then to the Philippines returning by way of Japan. The only unfortunate thing about this plan is that the departure from here can not be made before March 17, which will bring the party to Manila in April which Mr. Lawrence tells me is not a good time............ Mr. Homer A. Stillwell, now the Presid nt of the Association of Commerce, and who is head of Butler Bros., will head the party. That much has been determined. When I was in Manila, I said to you that I hoped he of all other men might go on this trip which I had in mind, for Butler Bros. are the logical merchants to put in a house in Manila. They are progressive beyond the other big dry goods houses, and do a more general business. Mr. Stillwell's commitment to the project is therefore most important."

The Chicago Association of Commerce may be said to have made Chicago the greatest manufacturing and distributing center in the Central West through an effective system of co-operation for the general good. involving every commercial interest in the city. Its creed is "All for one—one for all." Some idea may be gathered of its splendid public service and its methods of building up the commercial and civil interests of Chicago in the following excerpts from an article under the caption "The Pride of the Cities" from the pen of Isaac Y. Mercoson, published in the Saturday Evening Post.

"As a general rule, cooperation for civic and industrial betterment is easier and more compact in a small city than in a very large one. The greater the community the less likely are you to find a spirit of close cooperation for the public good, especially where there are strong competitive interests. Yet you have only to turn to Chicago to find, in the work of its Association of Commerce, an example of the beneficent practice of the 'All for one—one for all' creed. Here, in our second largest city, is an organization of four thousand men recruited from every activity, and including rectors and rabbis, that has worked out a scheme of city reconstruction that may be followed with credit and profit by any town, large or small.

"For years the average Chicago citizen, and especially the merchant, believed in the 'every-man-for-himself' theory. As was the case in other large centers, the moneyed men gave freely of their means to public movements, but little of their time. 'The city is growing fast enough,' they said. They got together for the World's Columbian Exposition and the shortsighted ones believed that the city had received enough publicity to last for all time; but the men who looked ahead realized that, with publicity for a city, as with any definite business movement, you must keep everlastingly at it to make it permanent and successful. A few men, headed by the late Alfred M. Compton, felt the need of a non-partisan force to develop the city in a big way; and through their efforts, and by the welding of some smaller wholesale, jobbing and shipping organizations, the Association of Commerce was formed.

"You can take any one of the many significant activities of the association and find beneath it clear-headed business organization. There is no better way to begin, perhaps, than with the difficult problem of getting membership, which is the first step in any work of this kind. Instead of making sentimental appeals the body sold memberships just as its merchant members sold their goods. 'You may not get financial profit out of this at once,' they said, 'but your business will grow as a result of the work of this association, because the city will be cleaner and better governed and better advertised.' Among other things a great dinner for twenty-five hundred people was given at the Coliseum to boom membership. The speeches were so arranged as to create the four motions necessary to successful salesmanship—that is, approach, interest, desire and resolve. Within ninety days over eight hundred members had been added.

"At this dinner occurred an incident that showed the mettle of the men behind the association. Just before the meal was to be served the waiters went on a strike, demanding double pay and threatening to quit if their demands were not met. It was a critical situation: outside were more than two thousand guests waiting for food; and, in addition, all was in readiness to launch a movement that meant much to the future of the organization. The executive committee had a hurried meeting in the cloakroom.

"These demands are intolerable!" it said. "Let's call the police, throw the waiters out and serve the supper ourselves."

"In five minutes the place had been cleared of striking waiters—and millionaire bankers, merchant princes, eminent judges and leading persons generally were handing about chicken and soup. They saved the night; and thus Chicago got its first real impression of a mighty spirit of cooperation that has met civic problem just as it faced that waiters' strike.

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the protection from land slips of the track leading to Godley Head fog-signal, and the connection of another lighthouse with the telegraph system. Since the Tuahine Point Lighthouse was erected heavy land-slips have occurred at the site, rendering the immediate removal of the light necessary. It has been decided to re-erect it on a safer and more suitable point near the old site.

"For the works mentioned above a sum of £10,167 will be required, and provision for a vote of £5,000 on account is made on the estimates.

"Under the heading of "Harbor-works," last year's expenditure amounted to £4.548, the principal items being: Wharves at Elmslie Bay, Horseshoe Bay, and Half-moon Bay, Okuru Wharf and River improvements, Waipu River improvements, Havelock Harbor improvements, snagging the Waitotara and Patea Rivers, removal of rocks from Kaipara and Kaikoura Harbors and Hollyford River, and acquisition of Tata Islands as a harbor of refuge.

"For the current year, in addition to renewing the unexpended items on last year's appropriations, it is proposed to provide for the following: Wharves at Motukaraka (Hokianga), Kirikopuni (Kaipara), Waiuku, and Lemon Point (Kawhia), Waipu and Karamea River improvements, the erection of a meteorological observing-station at Wellington, alterations to the ponds at the Portobello Fish-hatchery, and improvements in the harbor at Collingwood. The sum of £11,718 will be required for these works, the vote proposed for the current year being £7,000.

The expenditure on harbor defences amounted to £5,372, and, as further important works are in hand or contemplated, a larger vote will be necessary for the current year. Provision has accordingly been made for an appropriation of £8,000."

In concluding his report the Minister of Public Works says:

"The practical initiation of our hydro-electrical-energy policy will, I am sure, act as a great stimulus to industrial development of all kinds, and lead to the starting of numerous new enterprises. Trade is rapidly improving, the public revenue is increasing and with the amounts for public-works services that are provided, the fullest possible employment should be available for our people in the development of the country, and I therefore look forward to a year of considerable activity and progress."

The total amount of proposed appropriations for the Public Works Department for 1911 amounted to £3,105,935 as against £2,624,480 voted and £2,218,975 actually spent in 1910.

"Early in its life the association saw that if it was to build industrially it must likewise build civically; so both of these branches were grouped under the control of one division. There could be no progress, however, without proper cooperation from the city authorities. Here was encountered one of the great obstacles to any city's advance, because so often men are elevated to high municipal power who have no sympathy or interest in real commercial development. But what has happened?

"The story of the spur-track reform will answer. For many years in Chicago, as elsewhere it took much time and money for a manufacturer to obtain a railroad spur to his plant. It made no difference if this delay retarded the applicant's business and thereby checked the progress of the whole community. The granting of the track ordinance depended upon the sweet will and often the cupidity of the alderman in the district where the spur was wanted. Sometimes a whole year elapsed before any definite action was taken. The same thing happened when a factory wanted to have a useless alley vacated—that is, closed so as to permit the extension of a plant. This kind of procedure drove industries from the city.

"The civic and industrial committee of the Association of Commerce took the matter up with the mayor and his cabinet. It said: 'Time in business is worth money. If factories want spurs there should be no delay in considering the cases. If their demands are unfair we will be just as willing as you are to turn them down. But there must be no delay.' As a result, there has been organized an aldermanic committee on local industries, to which all switch ordinances are referred. When a member of the association wants a spur the committee asks for a public hearing on it. Instead of waiting a year he gets action in two weeks. The same course is open to any man in Chicago, for the association works for the general good. Thus the way has been cleared of obstacles that have beset the path of bestowing ordinances through the city council.

"This work has established friendly relations between the railroads and the city and has helped to put an end to the lobbying that was always the prelude to the granting of favors by the city to the various transportation lines. Equally important was the community of interest created between the association and the city government.

"But the civic and industrial committee had only started its campaign. Since the committee on local industries must pass on the eligibility of tracks and site extensions, it reasoned, 'Why not give these aldermen a real look at Chicago and her industries?' There began a series of what are known as industrial excursions. The hosts are the association and the railroads and steamship lines, and the guests are the aldermen and city officials. One of these trips was by boat through the Sanitary Canal district to study the industrial opportunities there; a second was to Argo; a third to the steel plants at South Chicago. A twofold purpose was served by the excursions: the city officials not only became well acquainted with the representative business men of the community and found out their needs, but also, as one alderman expressed it, 'really saw Chicago and her possibilities for the first time.' The net result is that today, instead of mutual suspicion between big business and city government, as is so often the case, there is frank and friendly feeling and—what is more to the point—cooperation.

"One more episode will show how the association works civically. Chicago levies a wheel tax on vehicles which nets the city about seven hundred and fifty thousand dollars a year. This money is devoted to street improvement. Now, though the sum is not large, there was much significance in its unequal distribution. The association found that, where one ward paid in twenty-six thousand dollars taxes and only received six thousand dollars for its streets, another ward that only contributed six thousand dollars got forty thousand dollars. The matter was brought before the mayor and council, with the result that the wards now get their pro rata of wheel money on the basis of their contributions. This incident showed the city administration that the association was keeping an eagle eye on the conduct of affairs and this scrutiny has made for efficiency and economy in every public department

"Now turn to the work of industrial expansion. One of the association's jobs is to get new factories. To expedite this it has an industrial commissioner who keeps tab not only on Chicago's growth, but on the development of every city. He gets industrial clippings from everywhere. If he reads that John Jones, in Oshkosh, has had a fire, or is looking for a larger site, he at once writes to him, stating the advantages of Chicago. This rule underlies all the association campaign work: 'Dwell on your own advantages; never knock the disadvantages of your neighbors.' If the out-of-town merchant or manufacturer is interested the industrial commissioner will go to see him. If he wants a site the association will send him the names of every one of its members in the real estate business.

"More spectacular than this are the trade embassies that sally forth to distant points bearing the banner of the association. They are crusades of acquaintance, and they have been to Seattle, New Orleans, Oklahoma and many other places. Likewise there are many trade-extension trips to points nearer home.

"One specific excursion will show a picturesque method of advertising a city. The association hired one of the biggest boats to be had on Lake Michigan, and spent two weeks on the water, visiting thirty towns. Instead of accepting entertainment from the places visited, as is usually the case, the association did the entertaining. A week ahead it sent three thousand tickets to every town for distribution among its business men and citizens generally. When the boat tied up at the wharf the decks were cleared for entertainment and the populace streamed aboard. Nobody solicited trade, but everybody talked Chicago.

"In the main saloon of the boat was a moving-picture show which presented sights and scenes in the big city; but instead of the grime of Packingtown there were views of Drexel Boulevard, with its gay equipages; Lincoln Park and its statues; snapshots of the university and crowds on State Street going into the big stores. A lecturer from the University of Chicago told of the artistic and esthetic advantages of the city. All this was to show that Chicago was a good place to live in, to work in and to buy in.

"On its trips the association gets out a daily newspaper. On trains it is mimeographed. On this trip the boat used a press on which was printed the Daily Log. It had the news of the day—live, hot matter about Chicago and the itinerary. These papers were generally distributed and provided what might be called a portable publicity. The association believes in trade missionary work in its own state. It sends a trainload of members to the state fair at Springfield or to a reunion at Elgin. Its speakers then do not talk of Chicago, but talk Springfield and Elgin. 'Your interests are ours,' they say.

"Two distinct innovations in trade missionary work have been planned by the association. One is a series of trolley specials through the interurban territory. The plan is to establish headquarters at a place like Peoria and take trips on the electric cars each day to a different territory. More ambitious than this is a series of automobile trips planned through such states as Iowa and Nebraska. Here the trade extensionists can stop and visit in the smallest towns and hamlets, and gather in the trade neglected on the big special train excursions.

"There is still another kind of business expansion work. It grew out of the complaint to the association that the Chicago retail merchants were not buying enough homemade goods. 'Why go elsewhere when you can buy at home?' contended the manufacturers.

"We will help you," replied the association, 'by the establishment of a market week, which will be a carnival of Chicago-made goods.' The third week in August, which is ordinarily the dullest of the season, was selected for the time. The retail merchants, at the request of the association, tendered the use of their windows for an exposition of Chicago goods. Reduced rates were obtained on the railroads. The result was that what had been the dullest week of the season became the most active—save for the holiday season; the local stores got the home-patronage-of-home-products habits and benefit was brought to the whole business community. The market week will be an annual feature hereafter.

"All this trade building and general business getting would go for naught if there were no adequate traffic facilities. Though Chicago had a remarkable strategic position as to railroads there were some defects. The most serious was the lack of a through freight package service to small towns, especially in the South. On account of long delays in shipments Chicago houses lost some of their Southern trade. Something had to be done and the Association of Commerce did it through its traffic bureau.

"Here was the old system: A merchant, let us say, in Wilson, North Carolina, bought a small bill from a Chicago drummer. When asked how he wanted it shipped he said, 'Atlantic Coast Line,' because it ran into his town. But the Atlantic Coast Line was not the initial line—that is, the line on which the package started on its journey. The shipper in Chicago, therefore, would ship it by the road nearest to his warehouse or factory. What happened? Suppose it started on the Moon route, over which it would go to Louisville. Then it would be transferred to the Southern Railway and proceed to Salisbury, North Carolina. Here there would be a change to Richmond, Virginia, where it would get into an Atlantic Coast Line car and be hauled to Wilson. There were five transfers and it took nine days from Chicago—often longer. So frequent were the delays it became the custom to start a tracer the moment the goods got under way. The loss of time was costly to the consignee. Besides, there was the liability to loss from theft and damage from much handling in the many changes in the freight yards. Everybody cursed the railroads and complaints rained in from all sides.

"It happened that there was a man in the traffic bureau of the Association of Commerce who had made a specialty of dissecting tonnage and who worked out a plan for the establishment of direct car service on all lines out of Chicago that would solve the package problem. The key was in starting the stuff by the initial line that would not only carry it the farthest but make the quickest and closest connections and with the fewest transfers. It meant the putting on of direct cars to certain central points. He laid the plan before the bureau; it was approved, and with the assistance of the railroads he established a through package service that has wrought wonders for the Chicago shipper. A book called The Way to Ship has been prepared which tells the Chicago shipper exactly how to route a package to any remote point and get it there in half or even one-third the time that it took before.

"Let us take the case of the Wilson, North Carolina, merchant that I used as an example. Suppose a package is to go to him now. The merchant goes to his Way to Ship book, looks up Wilson, North Carolina, and finds this explanation: 'Ship Baltimore & Ohio, care Atlantic Coast Line. Car due fourth day.' This means that, instead of sending it by the roundabout way that I have described, the package starts on the Baltimore & Ohio, goes direct to Richmond and, with only one transfer, is put aboard an Atlantic Coast Line car, and gets to Wilson the fourth morning after it is shipped, or in less than half the time.

"The introduction of this service, for one thing, has caused a decrease of eighty per cent in the number of tracers sent out after package shipments. It enables the railroads to have more cars at their service and thus do more business; it puts the shipper in closer touch with his customer and he can handle consignments on short order and with profit, especially with goods rushed to meet sudden changes in temperature. Likewise it reduces the risk of loss from pilferage and damage in transfer. It is one more general benefit that the association has brought about.

"Very soon the association realized that, to advertise and enrich Chicago, an organized effort must be made to get conventions. A convention bureau was established which has reduced the business to a real science. It wastes neither money nor energy. For a long time it was the practice of cities to distribute badges and lapel buttons. 'Why not give something practical?' said Chicago—and her bureau gives away leadpencils, with the inscriptions: 'Mark it down and then come to Chicago.'

"How is the bureau to know where and what the conventions are? In the answer to this question is a revelation of the remarkable extent to which this kind of organization has gone. You can go to the convention bureau of the Chicago Association of Commerce and find a complete file of the name, strength, organization, method of selecting meeting place, and, what is more important than anything else, the spending capacity of every kind of organization that meets in the United States. It may surprise you to know that there are exactly four thousand such organizations. Some only meet every four years. Numbers do not always count. For example, the bureau estimates that, though the average religious convention averages a daily expenditure of a dollar and seventy-five cents a person, the usual daily spending capacity for a visitor during a Shriners' meeting is twelve dollars and seventy-five cents. On the spending capacity depends the degree of work expended to get the meeting. You get some idea of the value of some conventions when you discover that the Knights Templar alone left nine million dollars this year.

"Formerly a city was satisfied when it got one convention of a certain kind at a time, but the Chicago bureau has a plan that rounds up all the affiliated interests. For instance, it secured the national dairy show this year. Having obtained this, it set out to get the annual conventions of the butter makers, the cattle breeders—in fact, all lines associated with dairying. The result was that it made the dairy-show bigger and better and at the same time brought ten times more people to the city than would have come if there had been nothing more than a mere dairy-show. The net result of the work of this bureau is that already there have been three hundred and fifty conventions in Chicago this year, which brought in nearly half a million strangers who spent nearly twelve million dollars.

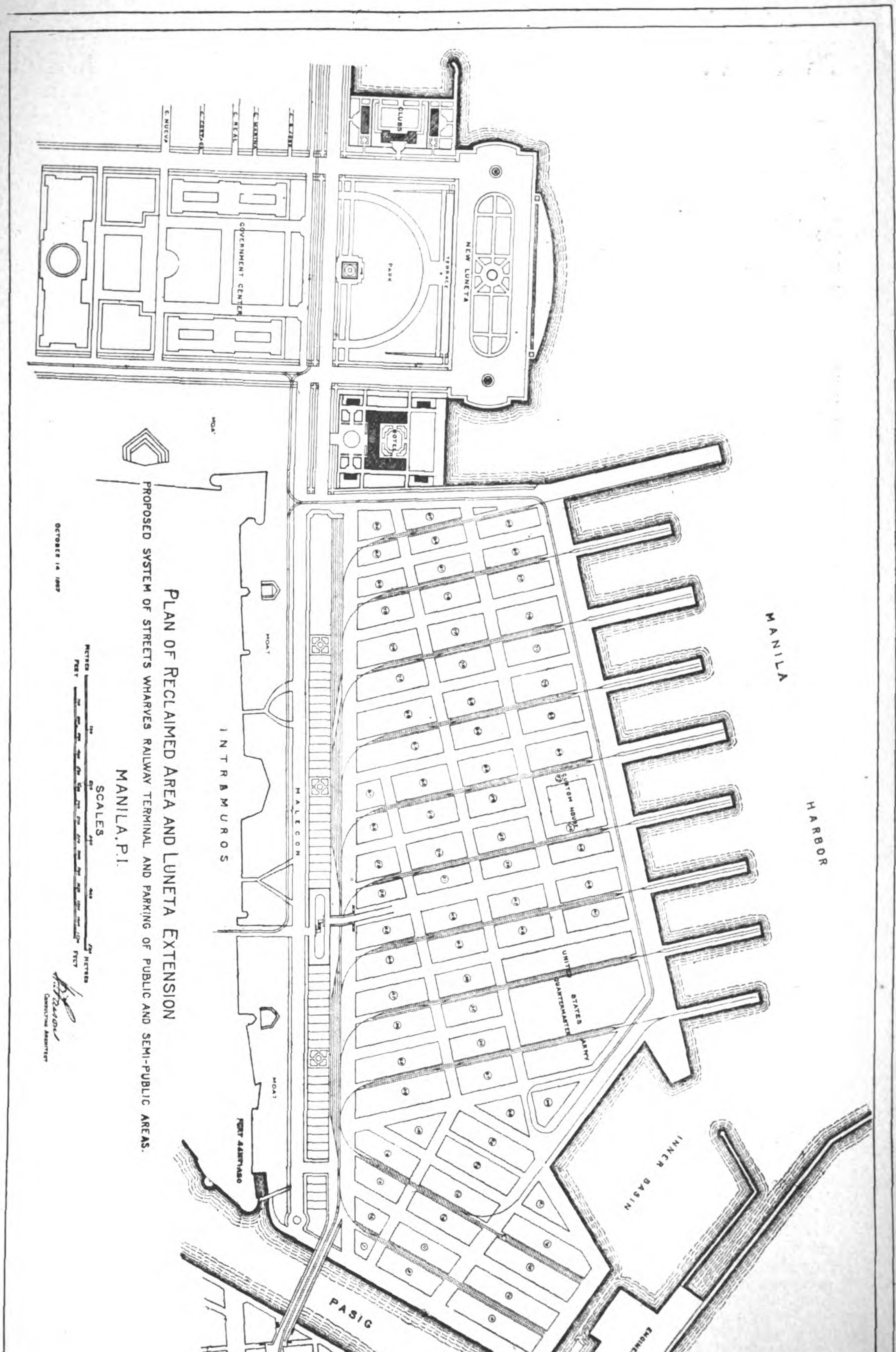
"Somewhat different is the work of the association in having the saloon license raised from five hundred to one thousand dollars. Within a year this reduced the number of saloons from eighty hundred and ninety-seven to seventy-one hundred and fifty-two. The increased revenue which came to the city has been devoted, at the suggestion of the association, to adding a thousand patrolmen to the police force and to the erection of new police stations.

"This leads to the very interesting and helpful connection between the Association of Commerce and the police force. When the association got well under way there was no traffic squad and no organized police supervision of the streets. The street traffic committee of the association took the matter in hand, sent a police captain to Europe at its expense to study traffic rules, and secured, on his return, the introduction of a code of tr ffic rules governing the principal streets and the organization of a traffic squad.

"I could cite many more constructive tasks performed by this association, but I have saved, practically for the last, the one that in a larger sense seems more far-reaching than all the rest. It is the significance of the excursions given each year for the sons of members. The beginning was interesting. One day some of the officers were talking about the future of the association and one of them said: 'Who will take it up? We have grown into our tasks, but we will not be here always. Let us train our sons while they are young in the big lesson of organization and for civic and industrial leadership.'

"How can we do it?' asked some one.

"'By showing them how our industries are organized and operated and how this association is carried on,' came the answer. Thus began the excursions.



THE NEW PORT OF MANILA WHICH FORMS THE BASIS OF THE PROGRAM FOR AN ORIENTAL DISTRIBUTING CENTER

NEW WATER SUPPLY FOR CEBU

The city of Cebu, and capital in the province of that name, is rapidly forging to the front as one of the leading commercial centers of the islands. Centrally located with steamship connections and a modern railway tapping the more important agricultural districts, with splendid port accommodations, this city has a future not less promising than any trade center in the Philippines. But the development of her trade, while engaging a large measure of the attention of her progressive businessmen, has not been so absorbing that the health and happiness of the people are being neglected. This is evidenced by the extensive plans for the development of a modern city along sanitary lines under way. Among the latest projects to which the city is pledged is a new water supply system designed to provide Cebu with pure water which, when completed, will cost approximately ₱500,000. The system will be known as the "Osmeña Water Works System" in honor of the Hon. Sergio Osmeña, the speaker of the Philippine Assembly, who is a native son of Cebú. The contract covering the project includes the construction of a circular dam built of reinforced concrete with intake appurtenances and valve chamber; a concrete spillway; the excavation of a 4,000,000 gallon reservoir; a 14 and 16 inch main pipe line, six and one-half kilometers long; a distribution system with four to fourteen inch pipe, twenty-one kilometers long, together with the necessary gate valves, valve boxes, fire hydrants, etc.

Bids were advertised for on August 5 and opened November 15, 1910.

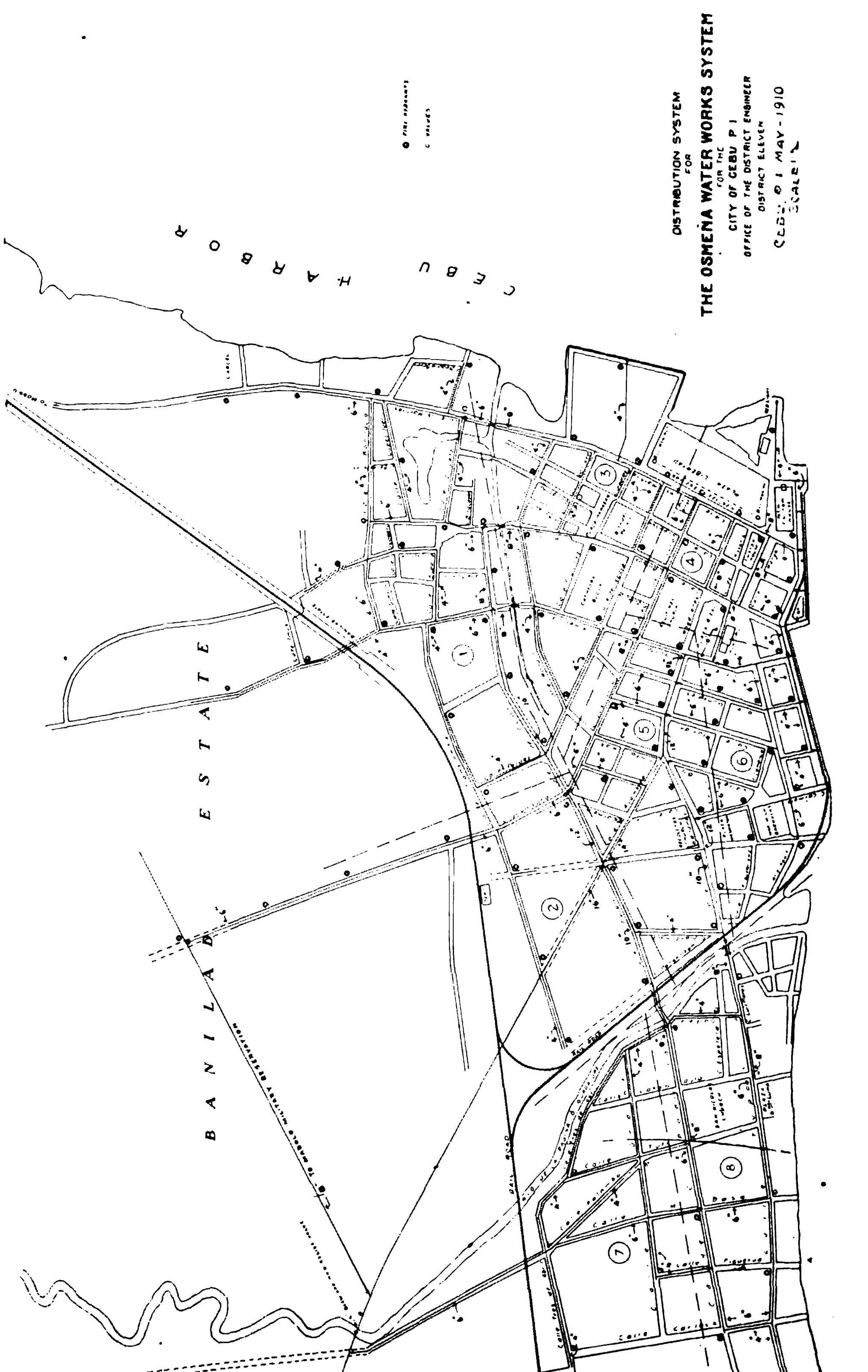
The proposals were divided into the following items which were subject to separate tenders covering the whole or part as follows:

(a) The construction of a reinforced concrete dam with gate house, and concrete spillway dam with concrete side walls and apron.

(b) The construction of a distributing reservoir with gate house and other necessary appurtenances.

(c) The construction of a distribution system and main pipe line with all appurtenances.

(d) The furnishing and delivering of cast iron water pipe and specials, gate valves, air valves, fire hydrants, reinforcing steel, and other metal.



"There are half a dozen trips each year. The boys are taken in a body to institutions like the United States Steel Corporation plant at Gary; to the Pullman works; to Packinton and to the Edison electric plant. The trip to Gary was typical. More than six hundred sons went on the big steamer United States. On the way to the steel city there was an open-air meeting on the upper deck, where there were addresses in simple language by prominent members of the association on such helpful subjects as 'thrift' and 'organization.' Mr. Homer A. Stillwell, president of the association, who happened to be in New Haven, sent a telegram which contained the following paragraph that seems to convey fittingly the spirit and usefulness of these excursions: 'Study the lesson of this day and this visit, thus preparing yourself to accept the larger responsibilities time is sure to bring to you. From among your number will be selected the future officers of the Association of Commerce—even its presidents.'

"Thus, wherever you turn in the swift drama of a great city's activities you find the impress of this association. It may be in the shape of a check on the pollution of the water supply, or an organized effort to restore the lost lake-shipping prestige through river-and-harbor agitation, or a censorship on solicitations for charity."

Manila is fortunate in having the opportunity to entertain representatives of a commercial body that has accomplished so much not only in building up Chicago's trade, but in advancing her civic interests and instilling into the minds of the younger generation the great responsibilities that will be soon their portion, thus preparing the children of today to follow in the footsteps of their progressive, patriotic fathers.

We believe it is not yet too late for the commercial bodies of the different ports to arrange to receive these gentlemen and at this time when the different nationalities in the Far East are looking towards greater cooperation and the abandonment of the "Every Man for Himself" creed, the men who have for their motto "All for one—one for all" and have made it a real live slogan with comprehensive results, would be the right kind of "folk" for members of local commercial bodies in the Orient to rub elbows with

The tenders received follow:

BIDS OPENED.—Bureau of Public Works.—Cebu Waterworks.—J. E. Ainsworth bid on A. B. C. as follows: A, construction of dam and spillway, ₱148,060. B, construction of reservoir, ₱63,850; and C, construction of distributing system, ₱99,651, or a total of ₱311,561.

The Manila Construction Company bid as follows: A. ₱142.650, B. ₱76,450, C. ₱106,095 or a total of ₱325,195.

Coleman & Goodman: A. ₱133,010, B. ₱78,150, C. ₱108,142, or a total of ₱318,302. Their offer called for an award on all three or none.

The Atlantic Gulf & Pacific Co. bid on A. B. C. and D., the last named representing the delivery and purchase of the material for the distributing system and main pipe line. They bid on A. ₱144,385. B. ₱73,457.50, C. ₱90,247.90, or a total of ₱308,090.40, on D, they bid ₱155,537.50, which makes a grand total on the work and supplies of ₱463,627.90. The A. G. & P. Co. bid on A. B. C. and D, collectively, and on A. B. C. separately. They specified that they would accept D. separately with a 5% increase.

Robert M. Loper bid A. ₱121,380, B. ₱82,410, C. ₱111,372, or a total of ₱315,162, D. ₱170,-058 14 or a grand total of ₱486,058.14. Mr. Loper's bid called for A. B. C. collectively or none.

A. Moll & Co. bid on supplying materials only. Their bid was for D. ₱159,866.11, duty paid. The "duty paid" is not clear, but it is presumed to mean that they will pay the duty on the goods that they submit.

Messrs. Peabody & Co. bid on D. only, ₱154,-427.36 for English material and ₱155,805.25 for American. The English bid omitted 96 post fire hydrants. They also specified that should the work be awarded to the Manila Construction Company they would reduce the price ₱1.75 per ton on both bids.

Messrs. Findlay & Co., bidding for Robert McClarien & Co., bid ₱157,481.86 on D. providing all pipe and specials could be delivered in one lot instead of two.

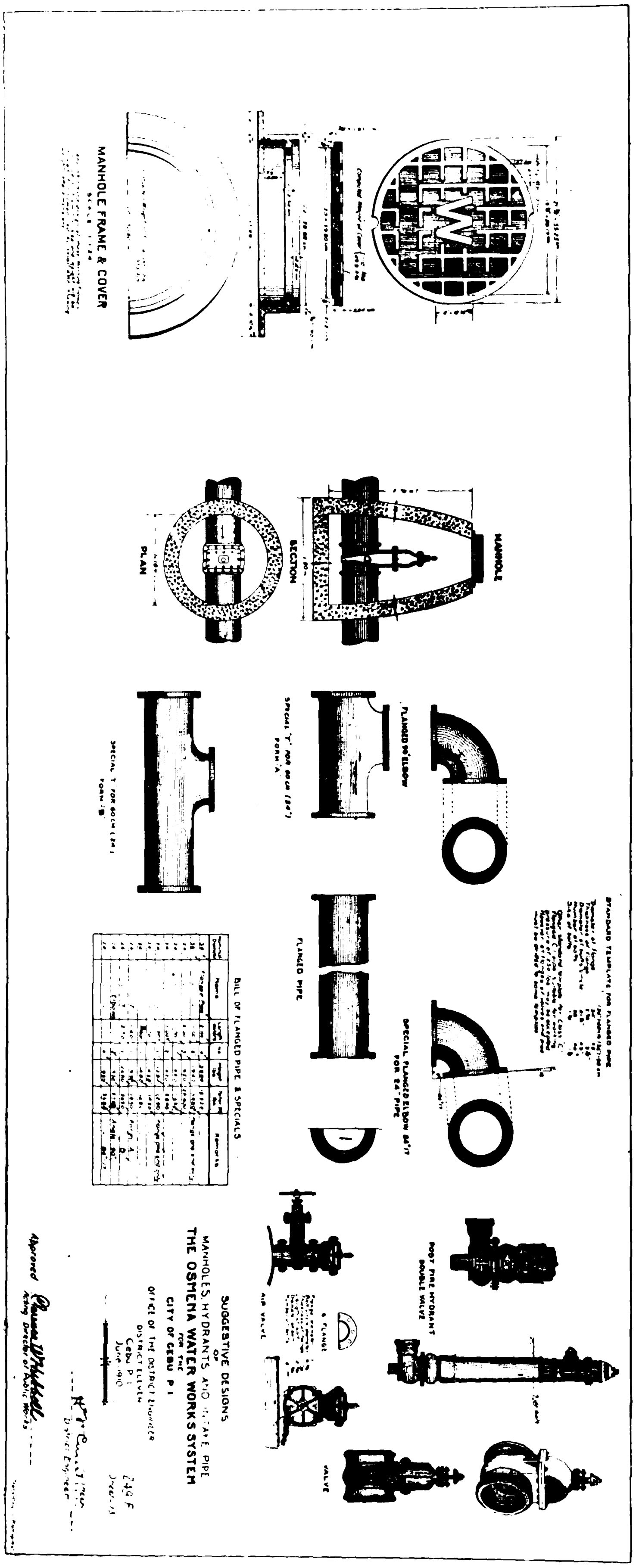
The contract was awarded The Atlantic, Gulf and Pacific Company of Manila for the entire construction. Preliminary operations are already under way and the contract calls for the completion of contracts "A" and "B" by May 1, 1911. Half the material required under contract "D" is to be delivered before March 15, 1911, and the balance by May 1, 1911. Work on Contract "C" will begin April 1, 1911, and the whole is expected completed, November 1, 1911, when the system will be put in operation.

The plans and specifications were prepared by Mr. H. F. Cameron, District Engineer of the Bureau of Public Works, Cebu, and approved by Mr. Clarence W. Hubbell, then acting Director of Public Works. The construction is under the supervision of Mr. Warwicke Greene, Director of the Philippine Bureau of Public Works, on behalf of the Municipality of Cebu. The expenditure is provided for by an issue of municipal bonds by Cebu, authorized by the Insular Government to the amount of ₱250,000; a loan from the insular government to Cebu and local appropriations covering the balance.

The following is an estimate of approximate quantities submitted by the engineer for information of the firms bidding covering work and material:

Contract "A"

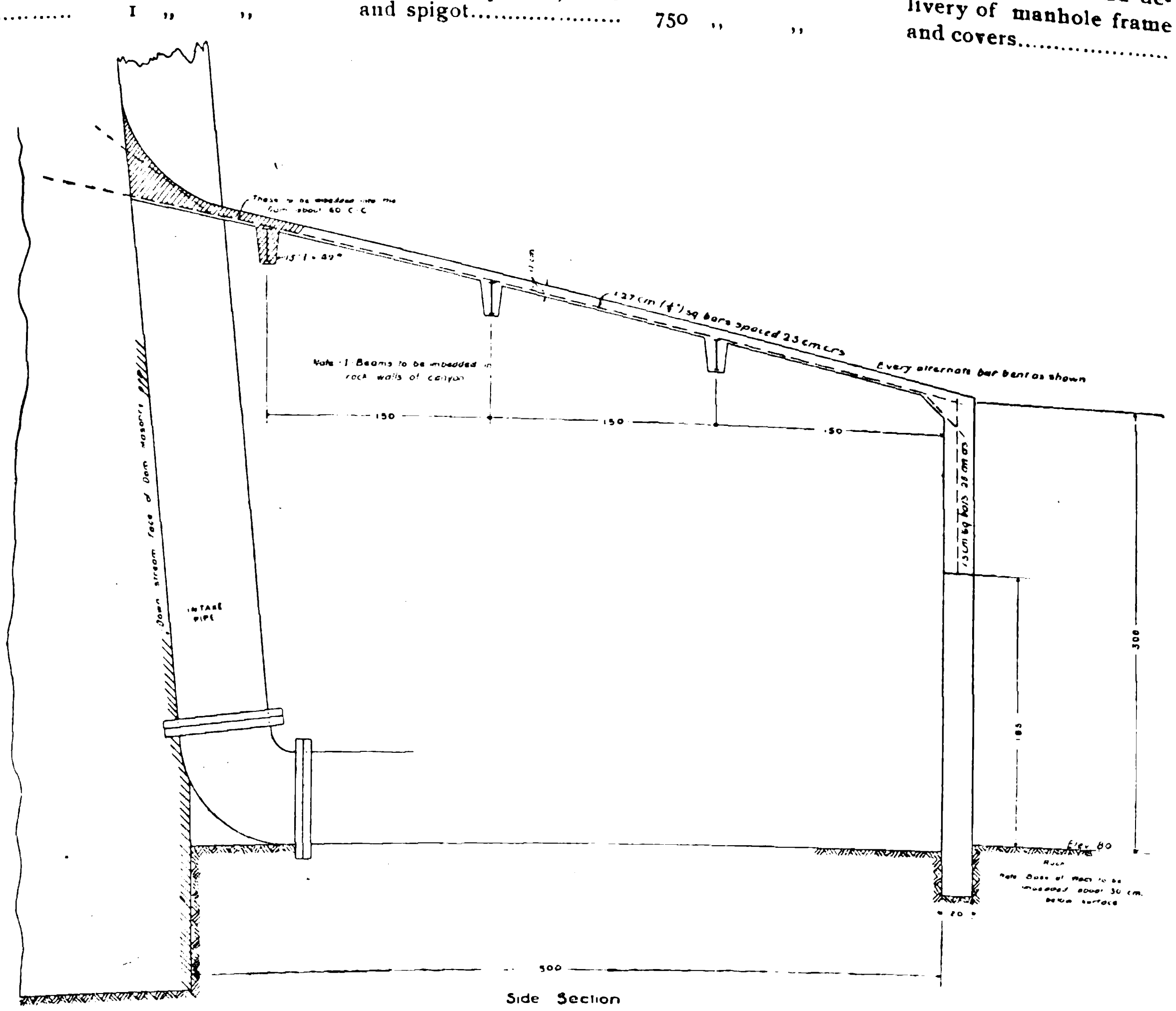
Item 1. Rock excavation, class "A"	400	cubic meters
Item 2. Rock excavation, class "B"	100	,, ,,
Item 3. Portland cement concrete (1:2:4)............	2420	,, ,,
Item 4. Portland cement concrete (1:2-1/2+5)	60	,, ,,
Item 5. Portland cement concrete (1:3:6)..............	60	,, ,,
Item 6. Purchase and delivery steel, etc...............	70	metric tons



Item 7. Purchase and delivery flange pipe and specials............................ 32 metric tons.
Item 8. Purchase and delivery of 24″ flanged gate valves........................ 3 ,, ,,
Item 9. Purchase and delivery of 36″ flanged gate valves........................... 1 ,, ,,

Item 22. Laying 8″ C. I. pipe and specials, hub and spigot.................... 2880 lin. meters.
Item 23. Laying 10″ C. I. pipe and specials, hub and spigot...................... 840 ,, ,,
Item 24. Laying 12″ C. I. pipe and specials, hub and spigot...................... 750 ,, ,,

Item 38. Purchase and delivery of 6″ air valves complete.......................... 7 metric tons.
Item 39. Purchase and delivery of post fire-hydrants............................. 96 " "
Item 40. Purchase and delivery of manhole frame and covers...................... 60 " "



Side Section
INTAKE PIPE, CEBU WATER WORKS

Item 10. Installation of appurtenances.................. 125 metric tons.
Item 11. Extra work, cost plus 15%.

Contract "B"

Item 12. Coral rock excavation............................ 3000 cubic meters.
Item 13. Earth excavation (guiso)......................... 13250 ,, ,,
Item 14. Cement mortar plaster coat (1:1)......... 4000 square ,,
Item 15. Portland cement concrete (1:2-1/2:5)....... 500 cubic meters.
Item 16. Installation of appurtenances.................. 40 metric tons.
Item 17. Extra work, cost plus 15%.

Contract "C"

Item 18. Excavating, backfill, etc............................ 13200 cubic meters.
Item 19. Portland cement concrete (1:2-1/2:5)........ 125 ,, ,,
Item 20. Laying 4″ C. I. pipe and specials, hub and spigot.............. 8400 lin. meters.
Item 21. Laying 6″ C. I. pipe and specials, hub and spigot........................ 7620 ,, ,,

Item 25. Laying 14″ C. I. pipe and specials, hub and spigot..................... 2450 ,, ,,
Item 26. Laying 16″ C. I. pipe and specials, hub and spigot..................... 4200 ,, ,,
Item 27. Installation of post fire-hydrants.......... 96 ,, ,,
Item 28. Extra work, cost plus 15%.

Contract "D"

Item 29. Purchase and delivery cast iron pipe....... 2070 metric tons.
Item 30. Purchase and delivery cast iron specials.. 50 " "
Item 31. Purchase and delivery of 4″ gate valves... 16 " "
Item 32. Purchase and delivery of 6″ gate valves... 16 " "
Item 33. Purchase and delivery of 8″ gate valves... 9 " "
Item 34. Purchase and delivery of 10″ gate valves. 3 " "
Item 35. Purchase and delivery of 12″ gate valves. 5 " "
Item 36. Purchase and delivery of 14″ gate valves. 5 " "
Item 37. Purchase and delivery of 16″ gate valves. 3 " "

Dam and Spillway.—Some idea of the character of the work may be gathered from the specifications involved.

The dam is to be built across the Labangon River about seven kilometers southwest of the City of Cebu, Cebu Province. It is to be of reinforced Portland cement concrete with the ends and base in solid rock. The total quantity of rock to be excavated in preparing the foundations for the dam will depend upon the character of the rock and the number of seams and their defect, which cannot be determined in advance. The quantity of concrete to be used in construction of dam will also vary from that estimated for the same reason. The rock in question is a mineralized porphyry and has every appearance of being free from seams, and the average excavation estimated necessary for ends and base of dam is two meters into this foundation. The dam is to be of the arch type with varying radii ranging from 20 meters at the base to 35 meters at the top. A small gate house forms part of the dam on the down stream side.

The spillway design includes a small Portland Cement concrete gravity dam anchored by bolts into the rock, cement concrete side walls, and a run off on solid rock capped in places by a thin concrete apron. The quantities given for rock excavation and concrete will vary.

The rock to be excavated is largely a mineralized porphyry (andesite flow) and is compact but not extremely hard. Regulations covering excavation in solid rock require that the contractor shall blast the rock with explosives of such power and quantity so placed that they will not crack the rock upon or against which the masonry may be built, and otherwise, by wedging and barring.

Concrete.—All cement used will be of the best grade of imported hydraulic Portland, and shall conform in all respects to the following specifications:

"It shall be of a brand satisfactory to the engineer; packed in strong, well-made barrels, lined with paper, and containing not less than 375 pounds net to each barrel. At least 90% shall pass through a sieve of 100 meshes per lineal inch. Otherwise it shall conform in all respects to the requirements of the United States Army Engineers' specifications for cement. The contractor shall at all times keep in store at the site of the work sufficient quantity of cement to allow time for a 28-day test to be made without delay to the work of construction. Cement shall be stored in a tight building having a dry floor, and shall be so stored as to allow of easy access, inspection, and identification by the engineer. On request of the contractor, cements will be tested in the City of Manila before delivery to the site of the work, but such inspection shall in no way prevent the rejection of such cement after delivery to the site of the work in case of damage, deterioration or subsequently discovered defects."

Concrete masonry shall be made of clean, sound, hard broken stone (for 1:2:4 mixture in main dam) or gravel and sand and cement of qualities specified. The stone shall be of varying sizes, but not greater than 2 inches in maximum dimension. If broken by machinery, the run of the crusher shall be used provided it is clean. The concrete shall be mixed as required in the proportion of one part of cement, two parts of sand, and four parts of broken stone; one part of cement, two and one half parts of sand, and five parts of broken stone or gravel; and one part of cement, three parts of sand, and six parts of broken stone or gravel.

The gate house shall be constructed as part of the dam and shall be of concrete of 1: 2: 4 mixture with steel reinforcing.

Reservoir.—The site of the work is about 5 kilometers southwesterly from the city of Cebu and about 200 meters from the bed of the Labangon River.

The work to be done consists in excavating earth and rock necessary for the construction of the reservoir and its appurtenances and the disposal of excavated materials; building of a valve chamber, and the setting of iron pipes, connections, and all other iron and metal work; construction of walls and embankments, and lining of the entire reservoir.

Under the overlying stratum of coral rock, which is about 60 centimeters thick, it is believed from test pit sunk, that the excavation will be in soft white lime formation easily excavated with pick and shovel.

Water Supply.—Water flows in the Labangon River all the year to within a distance of 400 meters of the reservoir site where it disappears into the gravel foundation. It is believed that a well can be dug in the river 100 meters from reservoir site that will furnish water for concrete during the period when the river does not flow at this point.

Embankments.—The entire embankments as supports to walls are to be built with selected materials deposited in layers not over 4 inches thick, and each layer shall be thoroughly compacted by watering and rolling or ramming. Embankments shall start from a carefully prepared base on the rock. Such embankments as are to be covered with concrete shall be made of an extra width of at least 30 centimeters and afterwards dressed to finished lines.

Masonry.—The entire inner surface of the reservoir shall be lined in the following manner: Over all surfaces in solid rock without defects a plaster coat shall be applied composed of 1 part cement and 1 part sand upon the scored surfaces heretofore described. This plaster coat shall be as thin as possible, flowed and troweled to a smooth and true surface, and shall in surface and appearance be equal to a plasterer finish coat. On all surfaces of embankments, defective rock, or elsewhere a layer of concrete 10 centimeters in thickness shall be placed, and this layer shall be finished with a coating of cement mortar, consisting of 1 part cement and 1 part sand. This skin coat shall in surface and appearance be equal to a plasterer's finish coat. Expansion joints shall be left in all concrete lining.

They shall be formed by the insertion of a wedgeshaped piece of wood 8 centimeters wide and 1.3 centimeters thick at one edge and .3 centimeters thick at the other edge, spaced not more than 6 meters apart in any direction.

After the concrete has set and the plaster coating has been applied, these strips of wood will be removed and the joint filled with an asphaltum compound of suitable consistency, heated to such a temperature as may be necessary to run into and completely fill the joint.

Parapet walls, walks, etc., shall be constructed in the proportions of 1 part of cement, 2-½ of sand and 5 of broken stone or gravel.

Distribution System.—The contractor furnishes all materials, except those specifically to be furnished by the Government, and does everything necessary to complete the work; excavate or dredge all trenches; transport all materials; lay all pipes and specials; set all valves, fire hydrants, and air valves; construct all manholes and set all frames and covers; connect the new work with the existing work; construct all such masonry and timber work as may be required; refill all trenches; restore all streets, highways, channel beds, and all such other structures as may have been damaged due to this work; make all provisions necessary for the safety to traffic by land, furnish all material, tools, implements, labor, and transportation required to build and put in complete working order the entire distribution system for the water supply of the city.

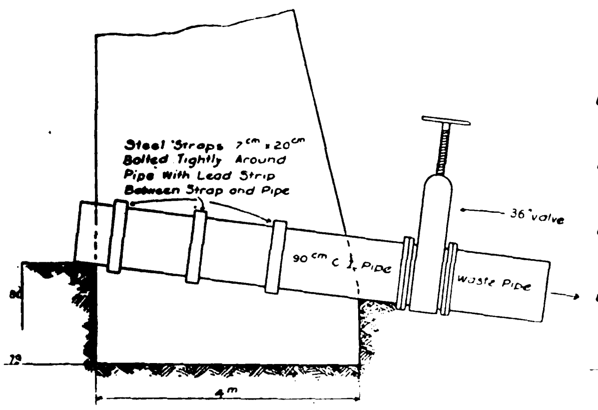
Construction.—Concrete shall be composed of one (1) part, by bulk, of Portland cement, three (3) parts of sand, and six (6) parts of broken stone or gravel.

In mixing, the sand for one batch shall be spread out upon a platform and the cement spread upon the sand. This shall be mixed dry until the whole mass is of a homogenous mixture and uniform in color. Sufficient water shall then be added and the wole mass turned until a uniform stiff paste is produced. The stone or gravel which has been previously wetted shall then be added, and the whole quickly and thoroughly mixed so that every stone is covered with mortar. Water is to be gradually added, if needed, by sprinkling.

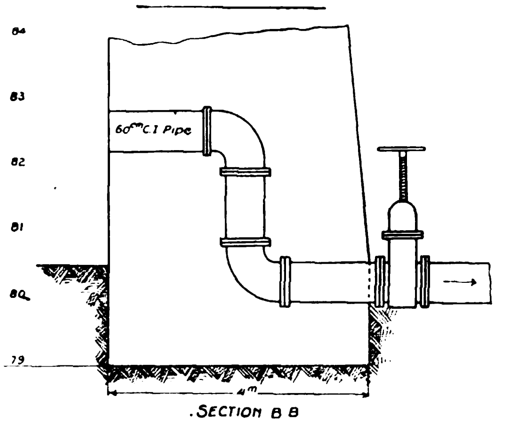
The concrete shall be placed in layers not more than twenty (20) centimeters in thickness, and shall be tamped with light iron tampers until the water appears on the surface, when another layer shall follow the last one as rapidly as possible. Wherever fresh concrete is to be placed in contact with concrete already set, the old surface is to be thoroughly clean from all loose matter and thoroughly washed and wetted before the fresh concrete is deposited. The old surface shall be roughened and a thin layer of fresh mortar spread upon the old surface, to make a good bond between the two surfaces.

Pipe laying.—The trench having been previously prepared, the pipe shall be laid in the trench resting on the ground its full length. A measuring stick of the effective length of pipe shall be provided and the holes for joints dug in advance so as not to interfere with the pipe laying. After the first pipe has been laid and secured, the next pipe shall be shoved home as far as possible, and care taken that the annular space is equally distributed all around the pipe, and the joint shall then be made.

In laying the pipe, the spigots shall be so adjusted in the sockets as to give a uniform space all around. The depth of lead in the joints shall not be less than thirty-eight (38) millimeters, in pipes twelve (12) inches and under, and not less than fifty (50) millimeters for all larger pipes. Packing of clean, sound hemp yarn or jute, braided or twisted, and tightly driven shall be used



SECTION A A
WASTE PIPE
Scale 1:50



SECTION B B
Lower Intake Pipe
Scale 1:50

to pack these joints, and when required, a space of six (6) millimeters shall be left between the contiguous pipes.

The following widths of trench are for computation of quantities for earth excavation for the various sizes of pipe:

	Meters.
For 4 to 6 inch pipe	0.50
For 8 to 10 inch pipe	0.60
For 12 inch pipe	0.70
For 14 inch pipe	0.75
For 16 inch pipe	0.80

Cast Iron Pipes and Specials, Valves, Fire Hydrants, etc.—All gate valves and fire hydrants shall have a clear water way of the full nominal dimensions, shall be of ample strength for the hydraulic pressure specified, and all operating mechanism shall be so designed that the gates may be easily operated when working against the maximum head specified.

All bearing, moving, or wearing parts of valves and fire-hydrants shall be either of solid bronze or faced with bronze, unless otherwise specified. Where bronze facings only are used, they shall be well secured to the iron castings. Gate rings to be of bronze, dove-tailed and riveted. The seat rings to be of bronze and screwed in. All stems shall be of solid bronze.

The seats on the gates shall be composed of a mixture of eighty-five parts copper, five parts tin, and ten parts zinc. All other bronze shall be made of 87 5 parts of copper, 10 parts of tin, 2 parts of zinc and 0 5 parts of lead.

All gate valves shall be subjected to a hydrostatic test of three hundred (300) pounds water pressure on each face, while the other face is exposed. All fire-hydrants shall be tested to three hundred (300) pounds water pressure, and shall prove tight at that pressure.

All gate valves excepting the 24" and 36" sizes shall be of double-hub pattern, the hubs to be of standard size, and large enough in circumference to receive the spigot and of standard pipe and specials.

All valves of a nominal diameter of 12 inches and upward to be provided with indicators to show whether valve is open or shut.

All gate valves shall open to the left, an arrow indicating the direction, and the word "Open" cast on their rim. The screw and operating mechanism shall be inclosed in the casting.

The 14", 16", 24" and 36" valves shall be furnished with handwheels. The 6" flanged valves attached to the airvalves will be in a horizontal position. All other valves will be set vertical. No gearing will be required for any of the valves.

The fire-hydrants called for in the specifications are known as a post fire-hydrant with two (2) 2½ inch nozzles.

All fire hydrants shall be of the hub connection type. The hub shall be large enough to admit the spigot end of a four (4) inch cast-iron pipe or special, of the New England Water Works Association Standard.

The distance from the top of the sidewalk to the bottom of the inlet pipe will be about one and a half (1½) meters.

The Eddy Standard pattern hydrant five foot double discharge, 2½ nozzle, 4 inch hub inlet or like hydrant is designated.

The air valves shall be automatic in their action, designed to let air into or out of the pipe line. Each air valve shall include a six (6) inch flanged gate valve equal in all respects to the valves described above.

The pipes used will be made with hub and spigot joints. They shall be straight and true circles in section, with their inner and outer surfaces concentric, and of the specified dimensions in outside diameter. They shall be at least twelve feet in length, exclusive of socket. For pipes of each size from 4 to 16 inches in diameter there shall be two standards. The inside diameter of each class shall be increased from the nominal size in the manner hereinafter specified, so as to obtain the standard thickness and weight. For pipes from 4 inches to 16 inches in diameter only one class of special castings shall be furnished with all classes of pipes.

All pipes having the same outside diameter shall have the same inside diameter at both ends. The inside diameter of the lighter pipes of each standard outside diameter shall be gradually increased for a distance of six inches from each end of the pipe, so as to obtain the required standard thickness and weight for each size and class of pipe.

Special care shall be taken to have the sockets of the required size. The sockets and spigots will be tested by circular gages. The diameters of the sockets and the outside diameters of the spigot ends of the pipes shall not vary from the standard dimensions by more than .06 of an inch for pipes 16 inches or less in diameter.

For pipes whose standard thickness is less than one inch, the thickness of metal in the body of the pipe shall not be more than .08 of an inch less than the standard thickness, and for pipes whose standard thickness is one inch or more, the variation shall not exceed .10 of an inch, except that for spaces not exceeding eight inches in length in any direction, variations from the standard thickness of .02 of an inch in excess of the allowances above given shall be permitted.

Coating of Pipes.—Every pipe and special casting shall be coated inside and out with coal-tar pitch varnish. The varnish shall be made from coal tar. To this material sufficient oil shall be added to make a smooth coating, tough and tenacious when cold, and without any tendency to scale off.

Each casting shall be heated to a temperature of 300 degrees Fahrenheit immediately before it is dipped, and shall possess not less than this temperature at the time it is put in the vat. The ovens in which the pipes are heated shall be so arranged that all portions of the pipe shall be heated to an even temperature. Each casting shall remain in the bath at least five minutes.

The varnish shall be heated to a temperature of 300 degrees Fahrenheit, and shall be maintained at this temperature during the time that the casting is immersed.

Fresh pitch and oil shall be added when necessary to keep the mixture at the proper consistency, and the vat shall be emptied of its contents and refilled with fresh pitch when pipes shall be carefully drained of the surplus varnish. Any pipe or special casting that is to be recoated shall first be thoroughly scraped and cleaned.

When the coating has become hard, the straight pipes shall be subjected to a proof by hydrostatic pressure, and, if required, they shall also be subjected to a hammer test under this pressure:—

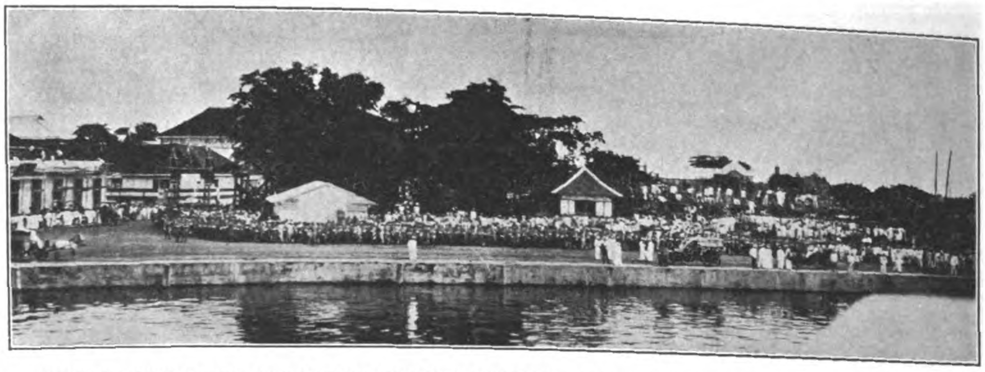
Class of Pipe	20 inch Diameter and larger Pounds per sq.in.	Less than 20 inch Diameter Pounds per sq in.
Class A pipe	150	300
" B "	200	300
" C "	250	300
" D "	300	300
" E to K " inclusive	350	300

ACCOUNT OF CAPTAIN KLAUS LARSEN'S TRIP THROUGH THE WHIRLPOOL RAPIDS

Captain Klaus P. Larsen undoubtedly enjoys the distinction of being the first man to absolutely control the savage Niagara Whirlpool Rapids. Others have gone through it and lived to tell the tale, but with the possible exception of the first Maid of the Mist, which went through in 1861 to avoid seizure, and it was due only to good fortune that they were not dashed to destruction on a rock or sucked down in the terrible maelstrom. The Maid of the Mist, even did she pick her course through the rapids, which is hard to ascertain at this date, was manned by three sailors, while Larsen single handed and alone had the rapids completely under his control.

Leaving the Canadian Maid of the Mist landing, Larsen and his craft, traveling at the rate of about seven miles an hour, reached the Whirlpool Rapids in eleven minutes. Mounting the big waves the motor boat Ferro was lost sight of part of the time during the voyage, at others she shot entirely out of the water, but through the entire trip Larsen held his craft head on, guiding her just right to take the giant waves without being caught broadside or capsized. At Great Wave the boat was shot perhaps twenty feet into the air, but on going back into the water continued head on along its course. At times the craft careened way over on its side, but being of a specially designed type for open sea duty, properly balasted, quickly recovered. Within three minutes from the time she mounted the first big waves, the motor boat Ferro was through the perilous rapids and making for the whirlpool. First newspaper reports had it that Larsen entered the whirlpool, but according to Larsen's own statement, he avoided the treacherous pool entirely.

There is considerable of science in this feat. All other attempts, with the exception of the first Maid of the Mist sent through for commercial reasons, have been entirely sensational, and have relied entirely upon drifting through safely, or upon guiding themselves by means of man-power alone, which is far from being adequate to successfully cope with such a powerful force. Captain Larsen, however, in his



NEW WATERFRONT AT CEBU WHERE DICKINSON'S PARTY LANDED—32 FEET OF WATER ALONGSIDE

*A LIQUID CONCAVE MIRROR

By CLINTON H. HULBERT‡ and R. F. BACON.—(*From the Chemical Laboratory, Bureau of Science.*)

The recent publications of Wood† on liquid mirrors induces us to describe a similar mirror with which one of us has been experimenting for several years.§

The general idea of using centrifugal force on liquids to form perfect paraboloid surfaces seems to be very old, but its practical application is of quite recent date.

The principal problem which we undertook to solve was largely a mechanical one. To obtain a perfect mirror it is obviously necessary that the vessel containing the liquid should rotate at a uniform speed and without vibration. The apparatus which we finally evolved to meet these conditions is shown in Plate I. The mirror proper is formed in the innermost of three cylindrical copper vessels, 22, 30, and 36 centimeters in diameter, respectively. The two smaller vessels have double sides with an air space between the walls to give greater buoyancy. In most of our experiments the liquid used was a heavy, black paraffine oil, and each vessel was filled about one-quarter full with this oil. For most purposes the paraffine oil works quite as well as mercury. The two inner cylinders have at the center of the bottom, double cones of steel which causes these vessels to be held in the exact center of the apparatus by means of the magnetic solenoid A. To rotate the pans, an ordinary laboratory motor of one-eighth horsepower was used. This was equipped with suitable gears to vary the speed of rotation and the power was transmitted to the pans by means of a belt, the whole apparatus being mounted on a heavy wooden board. As the oil used is quite viscous, any vibrations due to mechanical imperfections in the bearings of the largest pan are absorbed by the oil, and not communicated to the other two pans. Similarly, any variations in the speed of the motor are approximately compensated by the time the innermost mirror float is reached, as the two inner vessels are run by a liquid friction drive.

In practice, this apparatus has given very satisfactory results. The images formed by a paraffin oil mirror are quite sharp and the focal length and magnification are very easily regulated by changing the speed of rotation by means of the set of gear wheels shown in the figure. With such an exceedingly simple apparatus we were able to secure good views of the craters of the moon.

Plate II shows the film of an incandescent light bulb as shown by a mirror of 30 centimeters diameter, the rotation being such that the focal length was about two meters and the magnification about four times. It would seem that there would be neither great mechanical difficulty nor great cost in constructing very large mirrors of this type, and as the surface is shaped as a result of molecular forces, it is mechanically perfect, the only possible disturbances being due to vibration or variation in the rotation, both of which factors are practically eliminated by the arrangement of the apparatus used by us.

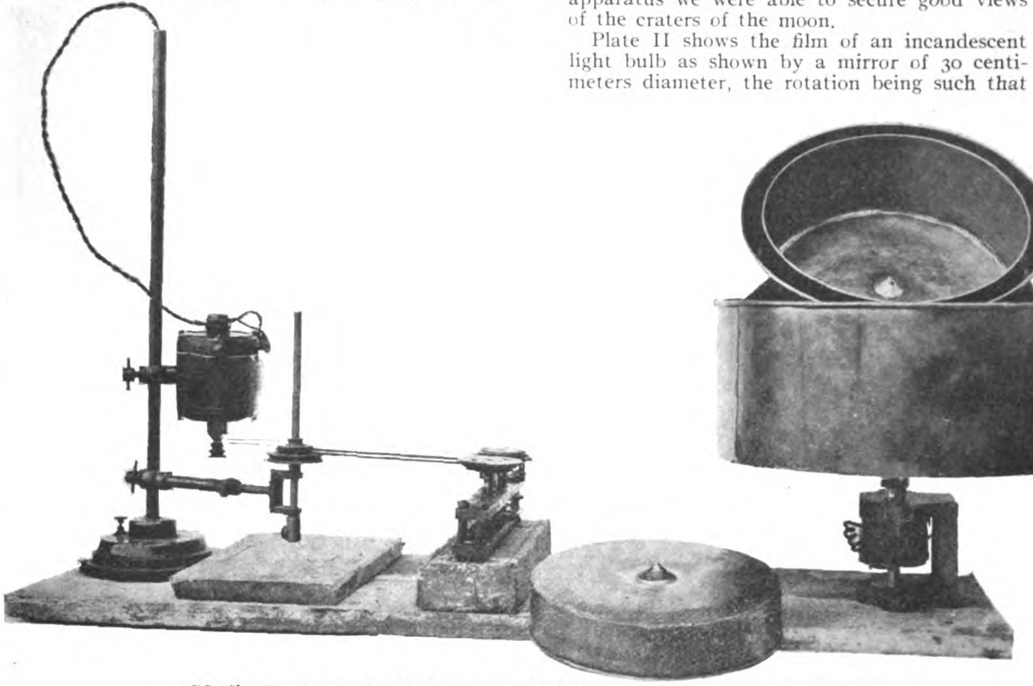


PLATE I. APPARATUS USED IN FORMING A LIQUID CONCAVE MIRROR

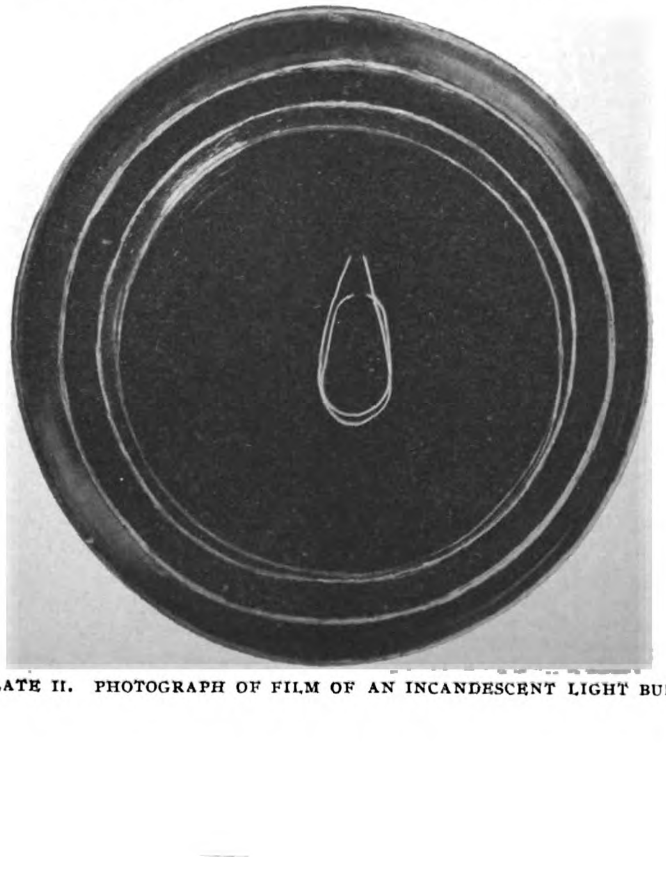


PLATE II. PHOTOGRAPH OF FILM OF AN INCANDESCENT LIGHT BULB

*Reprinted from the Philippine Bureau of Science.

‡Formerly in the Quartermaster's Department, United States Army.

†*Astro Physical Journal* (1909) 29, 165.

§Mr Hulbert first began this work in 1902 and the writer (Bacon) became associated with him early in 1906. A note was published in the Scientific American, 1907, p 103.

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motor boat, with gasoline power, had absolute control of his craft all the way through the rapids, turning this voyage into one of skill, with fortune only a secondary consideration. Captain Larsen seemed to go where he willed, and according to his own statements he followed almost identically the course he had picked beforehand. An old seadog, having followed the seas since he was a lad of twelve and encountering some of the wildest waters in all parts of the world, he knew how rough waters should be navigated. Larsen prepared for this trip. Before taking his boat to Niagara, he visited there especially to look the rapids over and see if he thought them navigable. After arriving with his boat, about one week before his trip, he could be seen every morning going down the river bank, studying the waters. He planned out the journey just as he wanted to go beforehand, and accomplishment shows that he knew how a job of seamanship like this should be done.

Accomplishment shows, also, that engine propelled craft can be navigated and controlled in the worst seas. It is an established fact that no man can possibly go through the rapids without power, with any degree of certainty. Many felt beforehand that power would be of little avail in these swift, onrushing waters. Some thought that the man might as well have left the engine out of the boat, tied his tiller head on, shut his eyes and gone. Power, however, was shown to be necessary to enable a craft to be guided through the rapids, and ordinary motive power, such as is used in the small pleasure craft seen any day "put-putting" around in the placid waters of our bays and harbors at a speed of about eight miles an hour, was shown to be sufficient to master the mad, swift currents of the big rapids, world-famous for their wildness. Captain Larsen, cool headed and nervy, worked the tiller continuously throughout the trip through the rapids, and guided his craft in the course he wanted her to go. The engine worked perfectly all the way through th rapids, and never faltered here, where the skipper's life depended on it.

The boat in which Captain Larsen made the trip was a life boat model especially designed for open sea duty, 18 ft. in length over all and 5 ft. 2 in. beam. It was built by The Cleveland Auto Boat Mfg. Co., Cleveland, O. The boat drew 24 in. of water. The cockpit was decked completely over with the exception of a round hole about 2½ ft. in diameter in which the captain stood, and from the edge of the opening all around, a canvas was stretched, which during the voyage was drawn in tightly around his waist, shedding the waves, and keeping the cockpit as near dry as it could possibly be kept under such high seas, where it was necessary for him to have his head and shoulders outside the craft and free for use. Captain Larsen is the first man to successfully navigate the rapids with his head and upper body unprotected.

The power mechanism of the craft was an American engine, a two cylinder 8 HP. outfit, of the jump spark ignition type built by The Ferro Machine & Foundry Co., Cleveland, O.

FAR EASTERN RAILWAY NEWS

THE CHEKIANG RAILWAY.—The recent removal of the president of this company that raised a storm of protest has been followed by continued agitation for the cancellation of the loan agreement. It will be remembered that a British loan was arranged for this road through the Board of Communications and the control of the money payments was left to the discretion of the Hongkong and Shanghai Banking Corporation. The control of the expenditure was in the hands of Chinese and the bank did not consider the construction methods such as would warrant them in paying over the loan. Indeed it is reported that when an agent of the British Syndicate that advanced the loan made an attempt to investigate the railway accounts the Chekiang Railway people refused to treat with him. According to the agreement between the Ministry of Communications and the railway, the loan agreement should be cancelled if after eighteen months the money was not paid over to the company by the ministry. This time has elapsed and on this ground the company declares that the agreement is forfeited.

Peking claims that had the company conformed to the understanding with the British Syndicate, instead of refusing to deal with its representative, the money would have been turned over, and since the blame rests with the Chekiang people and that all the other parties to the agreement had stood ready to do their share, the agreement would stand.

On the other hand, the Chekiang Railway claims that the only difference had with the British Syndicate was based on the character of construction and that the directors of the railway company had never waived their right to use their own judgment as to the standard of construction.

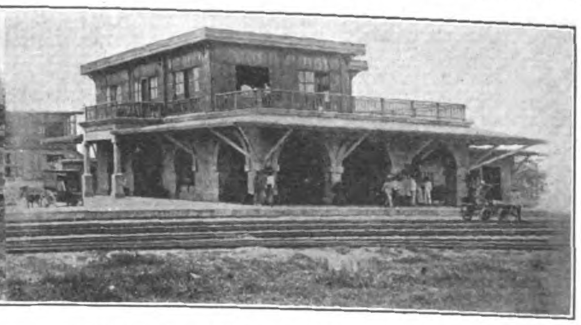
PHILIPPINE RAILWAY PROSPECTS.—The construction of lines of railway through undeveloped areas is a striking charasteristic of modern colonization and perhaps in no instance in recent times has there been more prompt response in returns for traffic than in the Island of Panay where practically an entirely new agricultural empire is being founded. The response in the last three months since the line was completed has exceeded all expectations. The best farming land in the island heretofore inaccessible is being taken up by natives and large producing areas realized which give promise of further expansion. The receipts are steadily increasing and the company is exhausting every effort to encourage the farmer. According to Mr. Goodale, the Supervising Railway Expert, the Panay line is a good railway proposition. The same may be said of the line in Cebu. The advantage of better transportation facilities is appealing to the native farmer and the results are shown in increased receipts. The company has carried out a policy of cooperation with the farmer and businessman that has served to make the line popular. The increased trade at Cebu and Iloilo during the last year has astonished the authorities and railway officials who did not anticipate such substantial progress for some years. The permanent character of the construction of these lines with the ever increasing traffic gives promise that, in a decade, the Philippine Railway will be one of the most valuable properties in the East.

KAIFENG-TSINGTAO EXTENSION.—Negotiations continue between German capitalists and the Ministry of Communications over the proposed extension of the Kaifeng line to Tsingtao via Kaomi.

SAIGON-BANGKOK RAILWAY CONNECTIONS.—Year by year rail communication between those two centers is being advanced on either side of the boundary. On the Bangkok end the line has been advanced to Petriou, while on the Indo-China side a loan has been authorized for 11,500,000 francs to cover the estimate of a line between Mytho and Cantho which when completed will add another section connecting Saigon and Pnompenh. Then there is also the sum of francs 24,000,000 for a railway from Pnompenh to Battanbong. With this construction completed, there will be few gaps to fill to conclude the projected through rail between the two centers. And by the time this is accomplished Bangkok will be connected up with Singapore and probably with Penang.

SUPPLY OF INDIAN RAILWAY MATERIALS AND STOCK.—The Anderston Foundry Company, Limited, England, have a large order from the South Indian Railway for the supply of wrought-iron tie bars and gibs and steel cotters for cast-iron sleepers. Messrs. Guest, Keen and Nettlefold, Limited, London and Birmingham, have a large order from the same railway for the supply of coiled steel keys; and Messrs. Blockow, Vaughan and Company, Limited, for the supply of fishplates for 50lb. steel rails and angle fishplates for 41lb. steel rails. Messrs. Jessop and Company, engineers, have received from the East Indian Railway an order for the supply of ironwork which is required for the strengthening of a large number of iron covered goods wagons and iron open goods wagons. Messrs. John Lang and Sons, Limited, lathe makers, Johnstone, N. B., are supplying two of their universal self-acting lathes to the Burma Railway workshops; and The J. C. Nicholson Tool Company, Limited, a combined welding and forging machine. The Pneumatic Engineering Appliance Company, Limited, have supplied a screen shaker to the Burma Railways Company. Messrs. Cammell, Laird and Company, Limited, Victoria Street, London, S. W., and Proprietors of the Cyclops Steel and Iron Works at Sheffield, have an order for the supply of 4 000 volute springs for rolling-stock to the East Indian Railway; and Messrs. D. Moseley and Sons, Limited, for the supply of one thousand india-rubber buffer draw springs. Messrs. J. Baker and Company, Limited, have a contract for the supply of 200 pairs of wheels and axles for rolling-stock to the East Indian Railway; and Messrs. F. W. Berk and Company, Limited, have supplied 200 gallons of sulphuric acid. Messrs. The Birmingham Railway Carriage and Wagon Company, Limited, have received an order from the East Indian Railway for supply of steel underframes and ironwork, etc., for 42 carriages and ten horse boxes. Messrs. T. Turton and Sons, Limited, Sheaf Works, Sheffield, have an order for the supply of laminated springs for rolling stock to the Assam-Bengal Railway; and Messrs. Sir W. G. Armstrong, Whitworth and Company, Limited, Openshaw Works, Manchester, for a cylinder for a 5-ton accident crane. Messrs. Dorman, Long and Company, Limited, Middlesborough, had a contract for galvanised iron sheets. Messrs. B. and S. Massey, Limited, Openshaw Manchester, are supplying a 5-cwt. pneumatic power hammer to the Bengal Nagpur Railway; and Messrs Dean, Smith and Grace, Limited, Keighley, some light workshop lathes. Messrs. Greenwood and Batley, Limited, Armley Road, Leeds, have an order for the supply of a bolt and nut forging machine. Messrs. Schuchardt and Schutte have a contract for the supply of hobs for a gear-cutting machine. The Electric and Ordnance Accessories Company, Stellite Works, Birmingham, have a large order for the supply of electric motors and switch gear to the Bengal-Nagpur Railway; and the Globe Electric Company, Limited, for the supply of flame arc lamps. Messrs. Dorman, Long and Company, Limited, Structural Engineers, Middlesborough, had an order from the East Indian Railway Company for the supply of 38 bridge girder spans which are required for the Company's new extensions. Messrs. J. Reid and Company, Limited, were supplying 7,200 enamelled labels; and Messrs. Tearne and Sons, Limited, a large quantity of transferables for the East Indian Railway Carriage and Wagon Department. Messrs. Lilleshall and Company, Limited, have supplied one left hand cylinder for a colliery winding engine.—*Railways and Shipping.*

PHILIPPINE RAILWAY CEBU.—TERMINAL DURING CONSTRUCTION



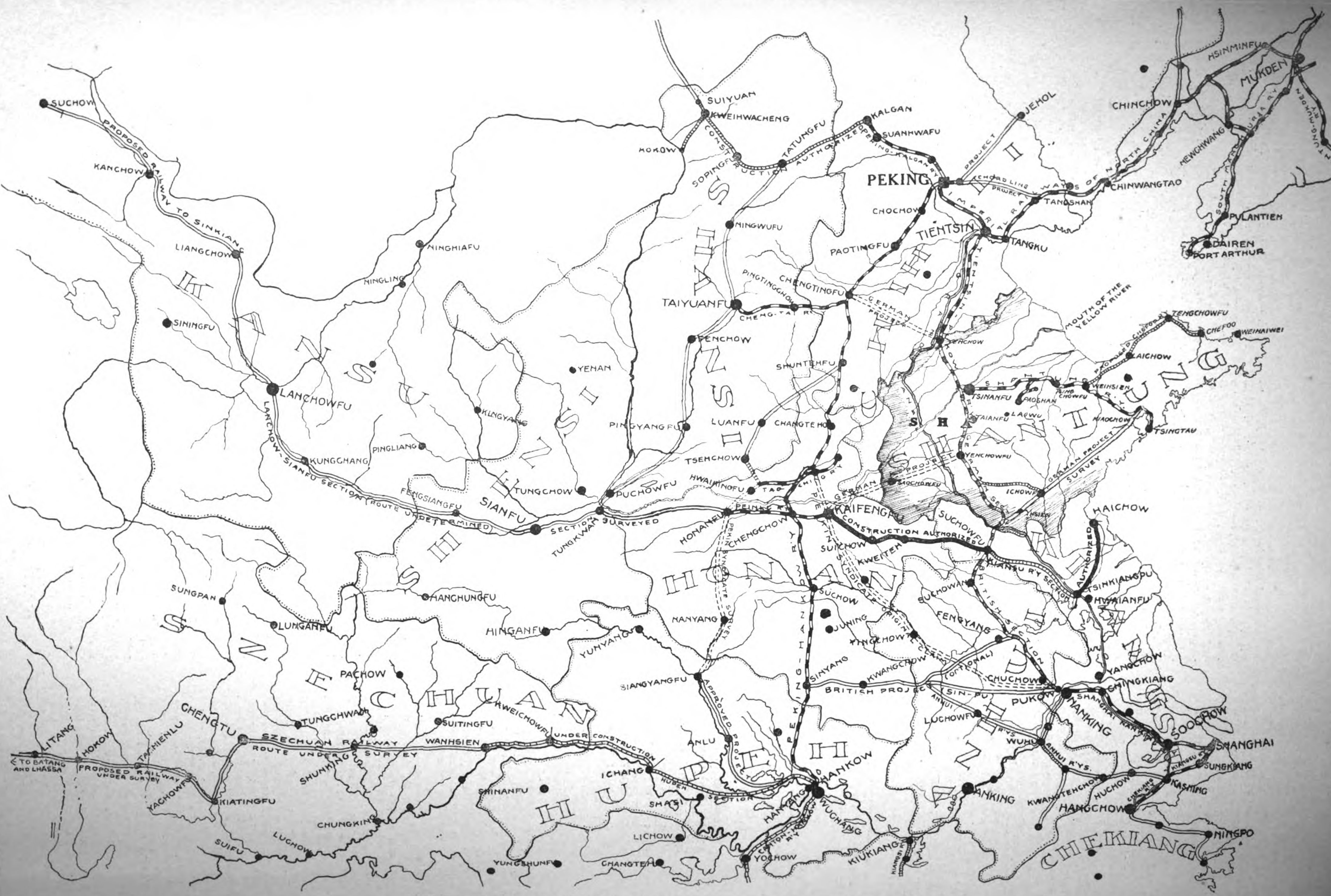
CEBU PASSENGER DEPOT AND OFFICE BUILDING

TIENTSIN-PUKOW-RAILWAY.—Through trains from Tientsin to Taianfu were inaugurated December 20, all the bridges having been completed with the exception of the Yellow River structure which is not expected installed for a year at least. A steam ferry is in operation. The opening of the section between Tsinanfu and Taianfu was celebrated by the laying of the corner stone of the Taianfu Station at the foot of the sacred mountain of Tai Shan.

JAPANESE RAILWAY BOARD PURCHASES FOREIGN ROLLING STOCK.—The following tenders were submitted for the supply of 6,000 pairs of wheels and axles. Messrs. C. Illies & Co.' representing Fried Krupp were the lowest:

Messrs. C. Illies & Co	544,359.00
Mitsui & Co	553,296.00
Okura & Co	572,900 00
A. Cameron & Co	572,250.00
Iida & Co	585,164.90
Takata & Co	591,855.82
Sale & Frazer Co	592,696.00
Hunter & Co	599,200.00
J. Nishizawa & Co	603,547.00

LIENSHAN-MUKDEN RAILWAY.—The *Japan Mail* directs attention to a report appearing in the *Asahi Shimbun* to the effect that a Japanese correspondent from Lienshan states that the land necessary for the new town at Lienshan has been acquired, and that a line of



***THE FAR EASTERN REVIEW'S* SKETCH MAP OF RAILWAYS IN CENTRAL CHINA**

The line of the proposed Kaifengfu-Haichow railway is traced in black, except that portion between Suchowfu and Tsingkiangfu, which is to be constructed by the Kiangse Railway Co., a] Chinese concern. The German sphere of influence in Shantung Province is shaded. The new project of the Chinese Government, as outlined on the map, clearly shows its great political importance and bearing one the ambitions of Germany, and the prospects of the British lines, and also its relation to the great Trans-Asiatic trunk line approved by China. The Peking Syndicate railway claims to an outlet from the mines to the Tientsin-Pukow railway are practically nullified by the new Chinese scheme. The German project to link the Tientsin-Pukow line with Kaifeng via Tsaochowfu is also without value in view of the new road. It will be noted also that Haichow stands in the same relation to the Yangtsze River junk traffic, as does the great port of Shanghai, and much of this can be diverted through the Grand Canal to Tsingkiang-fu and through the Yen River or over the new railroad to the new Port of Haichow.

light railway] will be laid between that place and Mukden by the early part of January. If this be true, and we see no reason to doubt it, a very interesting development is about to take place. But it remains to be seen where funds will be found for the projected work. We presume that what is now being done is a part of the so-called minor scheme recently mapped out by an English engineer. But even that scheme requires an expenditure of 3 million taels, and there has not as yet been any definite information suggesting that such a sum has been procured.

STANDARDIZING JAPAN'S RAILWAYS.—A great deal of space is being given in the Japanese press to this subject and definite information as to the railway policy is included in the following program made public by the Government:

I. The plan for the widening of the gauge shall be defined in details and the order of the work be decided.

II. The construction of the projected lines shall not be delayed by the broad-gauge scheme.

III. Not only shall the construction of the projected lines be not delayed, but the appropriation for the purpose shall be increased as compared with the past three years.

Repair measures shall also be taken with regard to such lines as are to be turned into the broad-gauge system.

IV. A Bill for the subsidies to light railways shall be introduced into the Diet, and at least a sum of 10 million yen shall annually be appropriated for the purpose, with a view to improving the means of communication.

V. Light railways shall be built in Hokkaido and on the main land under the management of the government.

For widening the gauge to standard Yen 230,000,000 will be expended in the next 13 years as follows:

1911	4,449,000
1912	4,500,000
1913	6,000,000
1914	10,000,000
1915	13,000,000
1916	14,000,000
1917	15,000,000
1918	25,000,000
1919	27 000,000
1920	27,000,000
1921	30 000,000
1922	30,000,000
1923	24,051,000

MANILA RAILWAY COMPANY'S ACTIVITY.—Construction on the southern lines is progressing favorably. The Calamba-Santa Cruz, which when completed will be 48 kilometers in length, is now being operated for 18 kilometers, and of 63 kilometers of the Santo Tomas-Lucena, about 12 are completed. These branches are feeders of the Manila-Batangas line and the traffic returns are increasing as the lines extend in a measure most encouraging.

In Northern Luzon the company is busy on a survey of the proposed Baguio branch. Several routes are under consideration. There are 25 kilometers open to traffic on the Panique-Taiyug line which will be 50 kilometers in length when completed. The extension of the main line, from Dagupan north to San Fernando, is expected completed within two years if not at an earlier date. It is believed that the entire program of railroad construction as at present contemplated will be completed within the next three years.

JAPANESE LIGHT RAILWAYS.—According to the *Financial and Economic Monthly*, for December, the light railway lines that have been sanctioned since the promulgation of the Light Railway Law on the 3rd of August are 12 in all, though there are still 10 applications still under examination. Those already sanctioned are the Hiratsuka-Hachiwoji line of 24 miles in Saitama prefecture, the Narita-Kashiwano of 22 miles in Chiba prefecture, the Yoshinoguchi-Kitata of 7 miles in Toyama prefecture, the Atsuta-Tokomani of 19 miles in Aichi prefecture, the Wakayama-Kata of 5 miles in Wakaoka prefecture, the Tsu-Yokkaichi of 21 miles in Miye prefecture, the Fukui-Ono of 21 miles in Fukui prefecture, the Mitsuji Kakegawa of 8 miles in Niigata prefecture, the Tomoi Fukuyama of 7 miles in Fukuyama prefecture, the Tsuyama-Emi of 16 miles in Mimasaka province, the Tokushima-Komatsujima of 7 miles in Tokushima prefecture, and the Harako-Kakegawa of one mile in Chugoku provinces.

PRAISE FOR THE F. M. S. RAILWAY SYSTEM—THE *Pinang Gazette says:*

"Mr. H. Kelway Bamber, M. V. O, late head of the Rolling Stock Department of the East Indian Railway and now London representative to Messrs. the Leeds Forge Co., arrived in Penang on Nov. 25 and left next morning for Rangoon. He is making a study of the rolling stock requirements of present day traffic on the railways of India, Burmah, Malaya, and Ceylon. He is a brother of Mr. Kelway Bamber, the Ceylon agricultural expert. In conversation with a *Pinang Gazette* representative at the E. & O. Hotel, Mr. Bamber expressed himself as having been much struck by the smartness with which traffic is moved over the whole F. M. S. Railway system and also with the excellence of its modern coaching stock."

MINDANAO MILITARY RAILROAD.—General Edwards, Chief of the Bureau of Insular Affairs, in his report, has recommended the construction of this line which as proposed is to be built from Camp Overton to Marahui on Lake Lanao near Camp Keithly. It would be utilized primarily for carrying military supplies, but would prove an important factor in developing the country and putting the Moro in touch with markets for his products.

TECHOU-CHENGTING RAILWAY.—The *China Critic* announces that the German proposal to construct a line connecting these two points when the Northern Section of the Tientsin Pukow is completed has been approved by the Board of Communications. This line will connect the Peking Hankow and the Shantung lines.

BURMA RAILWAY SUPPLIES —The contract for the supply of girders for 10 ten, 10 twenty, and 6 forty foot spans has been placed with the Tee Side Bridge and Engineering Works, Ltd., and an order for 24 water tanks and two meter gauge locomotive turntables has been placed with the Horshay Co., Ltd.

THE FUKIEN RAILWAY.—The Amoy correspondent of the *China Mail* writes that the railway has issued a new time table covering the 12 miles now operating and states that the work is being pushed forward up to the bank of the North River, another ten miles or so from Shih Bee, the present railhead. The embankments are nearly completed and many minor bridges, and culverts are finished, and it is hoped that the line will be open right up to the river side by the end of the year or early in the new year. The final decision as to the future direction of the railway seems uncertain, whether to go direct to Chang-Chow-Fu by a bridge at this point, or whether to continue the line up the north bank of the river and cross at a point higher up where the river is narrower. This would be less costly and would necessitate a branch line to Chang-Chow-Fu. But if they could carry the line 1,000 miles farther along the river side to the City of Lung Yen Chow and tap the extensive coal mines up there, they would soon get remunerative returns for all their outlay. Another branch might also be made into the Ankhoe (An-Ki) county, a mountainous district full of precious metals.

To do all this far more capital is needed, and it is difficult to see how the company as at present constituted can possibly undertake so large a venture. Probably eventually the Government may have to step in and by means of a loan complete the undertaking. This is imperatively needed, soon, if the trade of Amoy is to be revived.

JAPANESE RAILWAY HOSPITALS.—Hospitals at Tokyo, Kobe and Moji for the care of railway employes are being contemplated by the Railway Board.

THE SHANGHAI-HANGCHOW NINGPO RAILWAY.—The *Shanghai Mercury* states that there is a rumor to the effect that at China New Year the Chinese Government contemplates taking over the Kiangsu section of the Shanghai-Hangchow-Ningpo Railway. This comprises about forty miles of the track from the Shanghai end, and while it is a comparatively small portion of the whole scheme this step would probably be a move in the direction of the salvation of the railway. At present work is proceeding slowly on the Hangchow-Ningpo section, the contractors being employed on about fifty miles of the way starting from Ningpo, and though the work has already been in progress some nine months nothing has been done except the embankments and a few small bridges. Between Ningpo and Hangchow a bridge of considerable size has to be constructed, but so far there is no word of a start being made upon it, and in view of the scarcity of funds which now exists it is likely that some development will have to take place in the situation before this can be tackled. In the native telegrams a few weeks ago it was reported that an attempt had been made to obtain the foreign loan for the railway, but this having proved abortive it is likely that the local Chinese authorities may find themselves at a dead stop before long. Though the statement that the Government is to take over part of the railway is still confined to rumour, it has gained considerable currency, and the hope is that it may lead to matters being placed upon a sounder footing.

PEKING RAILWAY SCHOOL.—This school has been established for over nine years and 350 students are accommodated. The staff comprises 32 teachers the majority of whom are Chinese graduates of foreign schools besides several foreign instructors.

THE SOUTH MANCHURIAN RAILWAY COMPANY.—The seventh half-yearly general meeting of the shareholders of the South Manchurian Railway Company was held at the Tokyo Chamber of Commerce, December 19. The chairman stated that the work of reconstruction of the Antung-Mukden has made headway and the Antunghien-Chikuanshan section would be opened to traffic soon and that the gross profits for the term amounted to 632,000 odd yen, a decrease of about 1,000,000 yen against the previous term. The following is the statement submitted:

	yen.
Profits for the term	632,992
Balance brought forward from previous term	2,316,513
Total	2,949,505
Legal reserve	31,649
Dividend to the Government	500,000
Dividend to shareholders (6% per annum)	60,000
Special reserve	500,000
Bonus to officials and society expenses	54,000
Balance carried forward	1,803 855

BAIKAL-PEKING RAILWAY.—The *Frankfurter Zeitung* is responsible for the announcement that Russia and China propose constructing a line through the Gobi Desert to Peking. This line it is claimed will reduce the distance to Berlin to eight and one-half days or about 600 miles. According to this journal Russia will build the line from the lake to Kiatchka and the balance is to be built by Chinese, the whole to be completed by 1913.

THE KIANGSI RAILWAY.—A report from Kiukiang under date of December 25 states that traffic was expected inaugurated the following day between Kiukiang and Huangtomen, a distance of approximately 20 miles, and that construction trains are operating for a further distance of three miles.

(Continued to page 284)

THE FAR EASTERN REVIEW

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CHINESE NAVAL AND MILITARY REORGANIZATION

The announcement was made by cable from Peking early in December that negotiations were under way to conclude a foreign loan of $30,000,000 gold, the proceeds of which were to be utilized in carrying out the preliminary plans of comprehensive reorganization of the Chinese navy. About the same time an Edict issued on this subject which provided substantially for the division of the Board of War and the conversion of the Naval Re-organization Bureau into a Ministry of Marine with a minister and vice minister in charge. This office will have charge of the inauguration of reforms in the navy. Prince Tsi Hsun was appointed Minister of Marine and Tan Hsueh-hing, Vice Minister.

At the same time the Army Reorganization Bureau was converted into a Ministry of War and Minister and Vice Minister created. General Yin Chang was appointed Minister of War and Shon Shun Vice Minister. These edicts abolished the previous posts of presidents, vice-presidents, councillors and secretaries in both the former reorganization bureaus. Later advices state that besides the Minister and Vice-Minister are to be councillors and three secretaries in each ministry. The refusal of Admiral Sah Chen-Ping to accept the position of Vice-Minister of the Ministry of Marine came as a surprise in view of his long brilliant career and the fact that he was closely associated with the work of preparation of plans for reorganization. He accepted the appointment as admiral of the Yangtze squadron and is reported to have said that he preferred the latter position under the circumstances as he would now be in a position to put his training to practical use. He declared his loyalty to the Ministry and pledged his hearty support. Admiral Sah, it will be remembered, did not support the scheme for the creation of the Naval Ministry believing that it involved much unnecessary expenditure. Tan Hsueh-heng, late director of the Naval Department who was appointed to the position of vice minister, is fully in accord with Prince Tsi Hsun's plans. The immediate program, as nearly as we can ascertain, includes the construction of three first class cruisers, two gun-boats and a torpedo boat flotilla. It is understood that two of the cruisers were ordered constructed from English yards, and one in America, while the two gunboats have been ordered contracted in Japan and the torpedo boats in Germany. These vessels will be the first additions made to the Chinese navy and are not expected completed until the end of 1912.

The question of finance enters largely into the success or failure of the naval scheme and it is for the purpose of covering the expenses of the program for the first term that the $30,000,000 loan has been proposed. In the meantime appropriations have been made for schools, arsenals and improvement of naval ports. The success of the program outlined will be measured by the facility with which the necessary funds are secured.

It was announced, the latter part of December, that Admiral Sah Chen-ping would arrange for a general reorganization of the arsenals in Fokien and Hupeh.

The Army reorganization under the direction of General Yin Chang as Minister of War is looked forward to with interest. It is recognized that the General will spare no effort in carrying out his plans. Already he has declared the administration of the provincial arsenals defective and inaugurated reforms. Arrangements have been made for extensive army maneuvers at Chochow in Chihli next autumn and it is expected that all the new army divisions in that military district will participate.

The original plan of reorganizing the Chinese Army provided for the organization of 36 divisions, two divisions representing the quota from each of 18 provinces. We now understand that General Ying Chang has memorialized the throne to have the number of divisions increased to 64 with three divisions from each of the 21 provinces and another from Pechili. We understand that these additional divisions are for future consideration and are to be taken up after the organization of the 36 divisions is consummated with the exception of the three divisions each in the Manchurian provinces. However, there can be little doubt that China is in earnest in her purpose to develop her national naval and military strength to a degree that will enable her to enforce respect abroad.

It is understood that the admission of 18 cadets to Japan's military schools has been requested and a large number will be sent to other countries. General Ying Chang favors the German military system which will be largely copied in the organization although features that recommend themselves in other armies will be adopted. China will thus follow Japan's example in this respect.

THE CHINESE SENATE AND THE GRAND COUNCIL

The news from Peking refer occasionally to a serious "crisis," but this is always followed by more confident dispatches. A layer of pessimism laid on one day concealed by a layer of optimism the next characterizes the general trend of Peking news and the unknown quantity is the capacity of the Tzucheng Yuan to start the Empire on a well defined road leading to constitutional government. As a whole the members of that body have not made more mistakes than were predicted on the one hand, nor as few as promised on the other, and all in all the initial session has not been a failure.

It must be remembered that the powers of this body are very limited, so that no matter what revolutionary proposal found expression the members had the assurance that it would not do any serious harm. Indeed, we venture to say that if the Yuan had the authority to put into effect legislation without restriction, there would have been a dearth of fireworks. Responsibility has a marked sobering effect, and if the members of the Yuan showed a radical disposition it was largely due to their limited authority.

Perhaps the most characteristic radical expression of that body was the Memorial presented to the Prince Regent impeaching the Grand Council. The gist of it was to the effect that "the Grand Council does not understand its duties and responsibilities, and is therefore not competent to help the Throne. The members of the Grand Council are afraid of being behind others in getting rewards, while in taking responsibilities they are afraid of being before others. That is the first of their offences. Nominally, they are in control of the affairs of the State, but really they are not helping the Throne in the administration of the Government. That is the second of their offences. At the conferences on State Affairs they talk nonsense, and they regard the reading of memorials and other state papers as something of no importance. They try to get rewards and protect their position. They work for their own ends and disregard the interests of the public. Thus the Prince Regent is worried and anxious, thereby offending against those above them, and the people are poor, thereby making the lot of those below them harder. It is sincerely hoped that His Majesty will decide in his omnipotence to issue an Edict supplementing that of the 3rd of the 10th moon ordering the Grand Council to take full responsibility of the administration of the Government before the establishment of a cabinet."

Back came an Edict putting the Yuan in its place and the result was called a "crisis"—so called in the press dispatches. The *North China Daily News* correspondent wired on December 18 as follows:

"An Edict states that the Grand Councillors have resigned *en bloc*, on the plea that they are incapable of rectifying the country's critical condition. The Throne, the Edict continues, recognizes that the Ministers are faithful and able, and their resignation is, therefore, not accepted. The National Assembly had sent a Memorial pointing out that the Grand Council was not a responsible body. This was a matter beyond the scope of the Assembly. The appointment of officials, according to the laws of China, was a prerogative of the Throne.

The inauguration of a Cabinet was also a matter for the Throne to decide; consequently the members of the Assembly should not interfere. The Memorial was rejected.

"The Assembly will discuss the Edict tomorrow and the keenest interest attaches to the debate."

Well, the Yuan was very angry and made all kinds of threats. Long editorials were written commenting on the serious situation. However, since then the situation has brightened. Other matters projected themselves affording sufficient interest to cheer up the pessimist. The Yuan is still in session and no serious calamity has occurred up to the hour of writing. God rules and the Government at Peking still lives.

The reactionary in Peking takes the journalist into a secluded corner and suggests to him a soft place to fall on when the empire goes to the damnation bow-wows through the instrumentality of the Yuan, and the gentleman from Nanking, who is enjoying his first experience as a national legislator who cannot legislate, declares that the dismantled Empire he is trying to navigate against the current of vicious machination of the reactionaries is going on the rocks because the Prince Regent does not recognize sound advice when it is offered. To arrive at creditable conclusions in such an atmosphere is rather difficult and so the conversative correspondent at Peking may well be excused if he refuses to commit himself unreservedly.

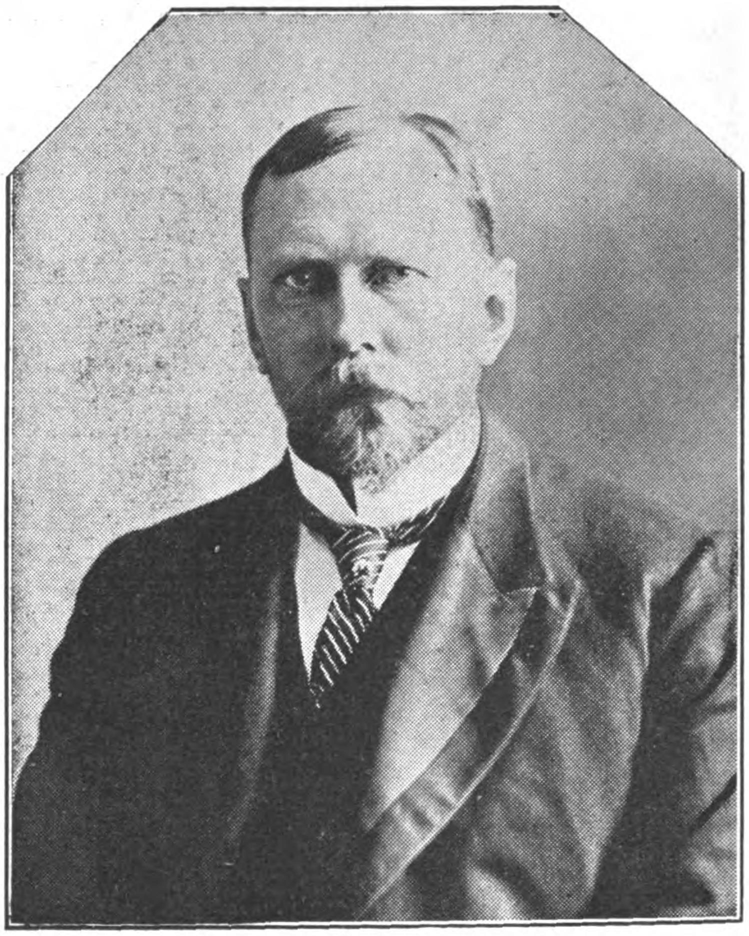
We believe the Yuan has passed through its initial session with much to its credit, and that before the real parliament opens, that permanent body will be more fully prepared to give an account of themselves. It will be more confident, better informed, and last but not least, it will be held responsible by those it represents for its every action. We have confidence that ultimatly it will make good.

THE PHILIPPINE FRIAR LAND INQUIRY

While the direction of the Philippine Government has been generally immune to political machinations, the very vague conception of local Philippine conditions and the character of the administration program prevailing among the great majority of the American people, offer a fair field for reckless political propaganda, to the prejudice and injury of faithful officials. And as is generally true of libels everywhere, the truth, when later forced to the fore, is not given the measure of publicity accorded the original misleading sensation. Of these unwarranted attacks, perhaps none have been more vicious than that put in circulation by representative Martin of Colorado for a political purpose, on the floor of the House of Representatives, last July, when he took advantage of his privilege as a member of congress to perpetrate a libel that would have subjected him to serious criminal proceedings, had the statements been made under other circumstances. Substantially, he charged President Taft, General Edwards, Chief of the Bureau of Insular Affairs, and others with being parties to a conspiracy to open up the Philippine Friar Lands for exploitation by the Sugar Trust, and then proceeded to attack Secretary Worcester, of the Department of the Interior, the Hon. Frank W. Carpenter, Executive Secretary of the Philippines, and Captain Sleeper, Director of the Bureau of Lands, with practically malfeasance of office in connection with the sale and lease of several tracts of these lands. A searching investigation by Secretary Dickinson on the ground, and later in Washington by a congressional committee, failed to develop an iota of evidence in support of the charges and the officials whose names have been so bandied about by irresponsible politicians have been fully exonerated.

Among the charges against Secretary Worcester was one allegation to the effect that he had improperly approved the leasing of friar lands to his nephew; that the natives had been prevented by his department through the Bureau of Lands from purchasing public land; that he was a party, through his official control of these lands, to exploit them in connection with the general charge involving the whole Washington administration, and in a general way practically accused Mr. Worcester of corrupt and immoral conduct and malfeasance of office.

Not one of the charges has been substantiated, nor has the investigation developed the slightest basis for reflection on Mr. Worcester's



THE HON. DEAN C. WORCESTER

SECRETARY OF THE INTERIOR, PHILIPPINE ISLANDS, WHO IS WINNING HALF A MILLION HILLMEN FROM SAVAGERY AND WHO IS RESPONSIBLE FOR ERADICATING EPIDEMICS FROM THE ISLANDS. AN OFFICIAL OF THE HIGHEST INTEGRITY

character and conduct. Nor has there been any evidence developed involving the Director of the Bureau of Lands which is under the Department of the Interior. Indeed, every charge fell flat.

The charges against Executive Secretary Carpenter were equally unfounded and malicious. Mr. Martin accused him of securing a lease of land of the Tala estate under improper conditions, intimating that the course involved collusion with the Director of Lands to the prejudice of native tenants and at a preferential price. The records show that there was no secret about Mr. Carpenter's interest in the Tala estate, that permission was granted him in the usual manner by the Governor General in January, 1908, to lease or purchase friar land. Before he interested himself in this land, he discussed it with native and American officials and members of the press. An agreement was entered into in the usual course to lease unoccupied and undeveloped lands on the estate and such lands as might thereafter become vacant, paying for the waste land thirty centavos rent per hectare and one peso and fifty centavos on these lands when under crop, and that for land under cultivation and vacated by tenants he should pay the same rate as charged former occupants. An agreement to cultivate certain areas of the wild lands annually was also included. Mr. Martin specifically charged that tenants were evicted by the Director of the Bureau of Lands in order to assist Mr. Carpenter to acquire their land. This charge was proven absolutely false by the records which show that not one tenant on this estate had been ejected from his holding for any reason and that instead of Mr. Carpenter being the land grabber charged, he acquiesced to the wishes of would-be tenants of the wild lands guaranteed to him under legitimate agreement and very kindly waived in their favor his right to rent any or all of the unoccupied land. Every applicant was allowed to acquire such amount of it as he wished with the result that Mr. Carpenter gave up his right in 8,958 acres and without remuneration. Later the would-be tenants refused to accept the terms agreed to by Mr. Carpenter on this land and for this very land that all the row was kicked up about the Bureau of Lands finally acquiesced and the rate they demanded was given without obligation to cultivate and with permission to select the land as against the rate agreed to by Mr. Carpenter under obligation to cultivate and without the privilege of selection.

The charge against Secretary Worcester of irregularity in connection with the leasing of lands to his nephew, E. L. Worcester, was probably the most vicious for the reason that there was not an iota of evidence to sustain it. When Mr. E. L. Worcester made application to lease public lands he conformed to the provisions of law approved by Congress and the whole proceeding in the matter was identical with that required of any other applieant. The application in its nat-

ural course reached Secretary Worcester, who, in view of the fact that his nephew was the applicant, instructed the Director of Lands to refer the matter to the Governor General, but the Director raised the point that the Governor General could not act for the Secretary of the Interior. The result was that Secretary Worcester forwarded all the papers to the Executive in order that full publicity might be given the transaction. In this agreement the prices were those provided by law which no one could possibly change. It might also be remarked that the land involved was not friar land, as charged, but public land. Mr. E. L. Worcester complied with the law in every respect and had Secretary Worcester refused his approval he might then have been accused of failing to do his full duty. However, he protected himself by giving the matter special publicity from just such vicious and unwarranted assaults as that made by representative Martin. A full and comprehensive report on every feature of these charges was prepared by the Governor General, Secretary Worcester and Executive Secretary Carpenter in which each and every one of them were refuted by quotations from the official records. They went to prove that the agreements entered into with the Mindoro Development Company, the Calamba Company, and the lease to Attorney Edward D. Bruce of the unoccupied lands of the Isabela Estate were all regular, legal, and on the same basis as friar lands offered to anyone desirous of leasing or purchasing. The lease granted Mr. Bruce was for one year and for the purpose of making experiments relative to the soil capacity for raising tobacco, and included the privilege of purchase by December 31, 1910, at a price to reimburse the government for its outlay as is the basis of all sales of Friar lands.

And so the tempest in the teapot subsided as quickly as it started. True, many of those who read Mr. Martin's sensation will remain in ignorance of its vicious and unfounded character, and few will realize the measure of injustice done patriotic and upright officials in the Philippines to make a "Roman holiday." We have, however, additional important and convincing testimony offered by a leading Democrat, a gentleman respected and honored throughout the United States, who came with an open mind to the Philippines and made an independent investigation on the ground. We refer to the Hon. J. M. Dickinson, Secretary of War, and his special report to the President. From this illuminating document we quote:

"Much notoriety has been given in Congress and in the public press to recent sales of the friar lands. These lands amounted in all to 392,000 acres. Of these 260,000 are near Manila, 25,000 are in Cebu, and 107,000 are in the provinces of Mindoro and Isabela. Six million nine hundred and thirty thousand four hundred and sixty-two dollars and seventy cents were paid for the lands, and the price was considered large. It was anticipated at the time that in disposing of them there would be loss to the Government. The purchase was made, not as a speculation nor for the purpose of distributing the lands, but as stated by you in your report, 'on political grounds and for the purpose of bringing on tranquillity.'

"The question of distribution was only incidental to the sale and reimbursement. The main reason for the purchase was to eliminate the friars as landholders. Inasmuch as the Philippine government had burdened itself with a bonded debt drawing interest to get rid of these pernicious landholders, it seemed perfectly plain that it would be following the dictates of common sense to dispose of the unoccupied lands as soon as possible on the most advantageous terms. When the proposal was made to purchase the Mindoro estate at a figure fully reimbursing the government for the cost of the land, with interest and cost of survey and administration added, I could see no good reason why the sale should not be made. I shall not go into the question of the legality of the sale. The opinion of the Attorney-General certainly was sufficient to warrant the administration in making the sale. The island of Mindoro contains 3,851 square miles and 28,361 inhabitants, which is less than 8 persons to the square mile. It is practically undeveloped. There was no demand by any inhabitants there for these lands. It is not probable that they would have been taken up by any inhabitants at any time in the near future. There are hundreds of thousands of other acres of wild lands in the island of Mindoro just as valuable and fully as capable of being used for the culture of cane as are these lands. Lands can be gotten there from the government for a price cheaper than that paid for the Mindoro estate. There are over 20,000,000 acres of public lands fit for agriculture in the islands and inducements upon the most favorable terms are offered to the inhabitants to take them up.

"Unless the Mindoro estate had been sold as a whole to people capable of handling and developing it, it is not probable that the land could have been disposed of at any time in the near future. At the rate of interest the bonds draw, the cost of the lands would in thirty years, when the bonds mature, have represented more than treble the original cost. The Philippine government needs its resources for internal improvements, and it would have been poor financiering to pay interest on the bonds and finally the principal and continue to hold these lands until they would be taken up by inhabitants of the islands, which would mean in the remote future.

"The main opposition to the sale of these friar lands in large bodies in the Philippines

THE HON. FRANK W. CARPENTER

EXECUTIVE SECRETARY PHILIPPINE ISLAND, WHOSE SPLENDID PUBLIC SERVICES IN THE PHILIPPINES IS ATTRACTING WIDE ATTENTION

is based upon opposition to the investment of any foreign capital, and especially American capital, in the islands. The opinion is held by those who mainly voice this opposition that the investing of foreign capital, and especially American capital, in the Philippines will in time develop such a demand for the continuance of American control as will tend to postpone, if not effectually destroy, the realization of Philippine independence.

"Inasmuch as the charges publicly made in Congress and in the public prints involved, besides the general question of sale, the conduct of certain officers in the Philippines, I made an investigation in respect to these, feeling that I had a duty to perform independent of any action of Congress, and that if these officers had been guilty of any misconduct it was not only the right but the duty of the administration to deal with them without waiting for congressional action. These charges involved F. W. Carpenter, Executive Secretary, and Dean C. Worcester, one of the Commissioners. I called upon Governor-General Forbes, Mr. Carpenter, and Mr. Worcester for a statement of the facts, and sought in other ways, and especially by calling on Filipinos who were opposed to the sale of the Mindoro and Isabela estates, for information as to any official misconduct on the part of either Mr. Worcester or Mr. Carpenter.

"I learned nothing whatever detrimental to the character of either of these men. I found that there was considerable opposition to Mr. Worcester, growing mainly out of an abruptness of manner in official relations. In this way he had offended some people and aroused their opposition. Several of such people spoke to me of this, but upon being asked the direct question they said that they knew of nothing affecting the integrity of his action.

"Ordinarily it is invidious to single out some officials for commendation, but in view of the attack which has been made upon these men, I feel that it is right to give the result of my inquiry.

"I refrained from any close association with, and reserved judgment as to, them, until I had exhausted all sources of information. Based on all that I could learn, my judgment is that they are honest, faithful, capable men, devoted to their work, and that it would be a loss to the Government if anything should withdraw them from the public service. Mr. Worcester has a more general and more exact knowledge of the Philippine Islands, their fauna, flora, resources, and inhabitants, than any other man, without exception. He is a mine of useful and practical information, which he is constantly turning to account for the benefit of the Islands. Having a liberal education and a technical education, he has applied himself with great industry and devotion to a study of the Philippine Islands. He has seriously impaired his health in this work. While he has cultivated the *fortiter in re*, rather than the *suaviter in modo*, and thus has made for himself opposition, the real good accomplished by him so far outweighs any objections that might be raised to his somewhat aggressive ways, that the latter are far outweighed in the general account. Though not directly stated, the inference was drawn from the charges made that he as secretary of the interior had approved an unlawful sale of some of the friar lands to his nephew, E. L. Worcester. Mr. E. L. Worcester never purchased an acre of the friar lands. He did lease some public lands, but in the amount authorized by law and at the prices paid for such lands by other people. He had a right to lease these lands and his uncle had no right as secretary of the interior to deprive him of the right to lease them. I found no evidence that Secretary Worcester is interested directly or indirectly in these islands. He stated positively that he was not. I did not hear anyone in the Philippines say that he was. When the application to lease these lands was made, the fact was brought to the attention of Governor Smith. There was no secrecy whatever about it. I found no complaint among Filipinos as to the lease of these lands. Their complaints applied to the sale of the friar lands, and especially the Isabela and Mindoro estates, but not to that part of the friar lands purchased by Mr. Carpenter. The purchase was made by Mr. Carpenter not only with the knowledge but at the instance of the Governor-General. He paid the full price provided for under the law. He has not dispossessed any Filipino. On the contrary, after his contract was made, he permitted Filipinos to come in and participate in his purchase. None of his official duties were in any way connected with the administration or sale of these lands. I do not favor public officials from America in the Philippines purchasing public lands, but I find that it has hitherto been the policy of the administration to encourage investments by employees in the islands. So far from finding any ojections on the part of Filipinos to the purchase by Mr. Carpenter, everyone with whom I spoke in regard to it, and I spoke with many of the leading men, entirely approved of it. In such conversations they took occasion to voluntarily bear testimony to the high character and standing of Mr. Carpenter, their confidence in his integrity, his usefulness in the public service, and to the valuable offices which he had performed in maintaining good relations between Filipinos and Americans. Upon the question of his purchase, I received a letter from Hon. Manuel Quezon, Resident Commissioner, as follows:

Manila, August 12, 1910.

MR. SECRETARY:

I have read carefully Mr. Frank W. Carpenter's reply to the allegations made against him in Congress recently in regard to the lease and purchase by him of friar lands, and, complying with your request for an expression of opinion as to the truth of Mr. Carpenter's statements, I beg to say that I am convinced that they are true.

Furthermore, I beg to confirm all I have stated orally to you regarding the confidence and respect in which the Filipino people hold Mr. Carpenter, officially and personally.

Respectfully yours,

MANUEL QUEZON,
Resident Commissioner to the United States for the Philippines.

To the honorable the SECRETARY OF WAR,
Manila, P. I.

"The following letter from Mr. Osmeña, the speaker of the Assembly, indicates Mr. Carpenter's standing with the Filipinos:

THE GOVERNMENT OF THE PHILIPPINE ISLANDS, OFFICE OF THE SPEAKER, PHILIPPINE ASSEMBLY,

Manila, August 30, 1910.

SIR: I have the honor of confirming, by the present, the information that, replying to your inquiries, I have personally given you with reference to the conduct, character and reputation of Mr. Frank W. Carpenter, Executive Secretary.

Mr. Carpenter enjoys the highest esteem and confidence among the Filipinos. As an official and as a gentleman he has responded at all times to the best hopes and while he has sustained, and does sustain now, close relations with the Filipinos, his conduct as an official may be presented as a model of intelligence, integrity and zeal. It is known of all that Mr. Carpenter devotes to public affairs time and attention much greater than are customarily given to such matters, not failing to work for a number of hours on legal holidays. His official bearing with all those who in whatever way have had any connection with his office has heightened the regard for him as a man of rare penetration and activity and have gained for him, and with reason, those active sympathies which beyond respect are given to persons who, on compliance with a duty, do it with the generous interest which can only be felt by those who, entirely devoted to their public offices, find a satisfaction in remembering that they are servants of the public and that they must conduct themselves as such.

With respect to the public and private morality of Mr. Carpenter, I do not believe there is anyone, among Filipinos at least, that has not the highest concept of him. Filipinos have complete confidence in Mr. Carpenter and his fruitful labor of the present, which can only be compared with his distinguished past service, constitutes a legitimate and elevated record of honesty, efficiency and patriotism.

Permit me, Mr. Secretary, to be,

Very respectfully yours,

SERGIO OSMEÑA,
Speaker, Philippine Assembly.

Hon. JACOB MCG. DICKINSON,
Secretary of War.

"On January 1, 1910, Commissioner Worcester, secretary of the interior, approved the lease of approximately 47,000 acres of the Isabela estate, with option to purchase this estate, to Edward B. Bruce, of Manila. This estate consisted of approximately 49,500 acres. The scale price fixed was ₱422,500, Philippine currency, together with interest thereon at the rate of 4 per cent per annum from and including the 1st day of January, 1910, the payment of the purchase price or installments thereof, together with all interests accruing thereon, to be made in accordance with the provisions of the friar-land act as amended. This sale price included the cost to the Government together with all charges for interest and administration.

"This Isabela estate is one of the practically unoccupied estates purchased from the friars, and is situated in a sparsely settled part of the center of the island of Luzon.

"At the time the contracts were made for sales in large amounts of these friar lands it was not supposed that objection would be raised thereto. The idea was to handle this, in so far as vacant lands were concerned, as a business proposition."

The Hon. Dean C. Worcester, Secretary of the Interior, has been associated with the Philippine Government practically since 1898. Previous to that time he had visited almost every section of the islands as a naturalist and his knowledge of the people and conditions has made his services invaluable to the government. During all his official service, he has shown unusual executive ability and besides his successful campaign of sanitation, that would alone have won for him the highest honors in the service of any other country, his wonderful accomplishment in winning the wild hillmen to ways of peace will place his name to the fore among administrators of alien and backward races. He is a hater of cant, as are all strong men, and for lying and deceit he has an aversion that has made enemies among a class who love the darkness rather than the light. That he has a "straight tongue" is true. His word is law among the hills and this respect is entirely due to the personality of the man and his absolute sincerity in word and deed. He is the same straightforward man and official in the more civilized sections, and it would appear that the only enemies he has made are those to whom sincerity and frankness are embarrassing.

The Hon. Frank W. Carpenter, Executive Secretary, is a modest, hardworking official, who has been associated with the military and civil government since the early days of American occupation and is probably more closely in touch with conditions affecting every department throughout the islands than any other American. Besides the high testimonial of Secretary Dickinson we have to offer the following:

Governor-General James F. Smith said of him:

"With the exception of the Governor-General, the Executive Secretary comes in more intimate contact with the people of the Philippine Islands than any other official in the Government, and upon his tact, firmness, kindli-

ness, fairness, and comprehensive knowledge of the powers and duties of the Executive Departments and Bureaus of the Government depend the tactful training of newly elected officers, the correction without friction of mistakes made by inexperienced provincial and municipal officials and the smooth working of provincial and municipal governments.

"If it be impossible to make the Executive Secretary ex officio a member of the Commission, nevertheless I strongly recommend Carpenter, the present Executive Secretary, for the office of Commissioner. During the last eleven years he has rendered very valuable services both to the military and civil régime in the Philippines, and it may be said with absolute certainty that there is no man in the service better acquainted with the Philippine situation and its idiosyncracies than is the present Executive Secretary. Carpenter is not a mere machine turning out governmental work as a pure matter of routine. He has constructive ability of a very high order, and to his energy and intelligent intervention the creation of a pronounced public sentiment in favor of public betterments and the placing of provincial and municipal finances on a sound basis are largely attributable. Municipalities without sufficient money to build bridges, public buildings, markets, etc., frittered away their small annual balances for temporary makeshifts and for extravagant salaries to useless officials and functionaries. Carpenter asked the Commission to set aside a sum to be loaned to municipalities for the carrying on of revenue-producing public works, such as markets, toll bridges, ferries, etc., and the small municipal balances have been used at the end of each year, in accordance with his suggestion, to pay the interest on the loans, and revenue derived from the new improvements has been set apart as a sinking fund to pay off the indebtedness in installments. I consider Carpenter is entitled to promotion by reason of his ability, his popularity, and the length and efficiency of his service."

The following is what Governor-General Forbes had to say of him in the same connection:

"In regard to places on Commission, Frank W. Carpenter for ability, services rendered, and standing, deserves first consideration, and believe he should be given an opportunity decide whether he wishes to lead the life of a Commissioner, giving up money-making enterprises, in case such objected to by the President. His appointment would be particularly well received by Filipinos."

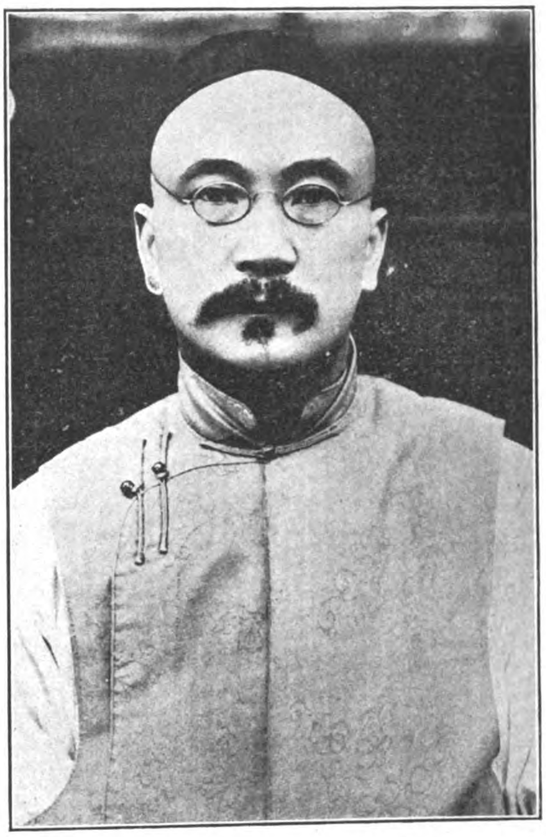
The following is an excerpt from a letter written by Colonel Frank McIntyre, U. S. A., Acting Chief Bureau of Insular Affairs to the Hon. M. E. Olmstead, Chairman, Committee on Insular Affairs, which fully presents Mr. Carpenter's position:

"The reference to money-making enterprises had to do with the purchase and management of a hacienda pertaining to the Tala friar estate. President Taft, while at the head of the Philippine Commission, took the position that the members of the Commission, who were made a legislative as well as an executive body by direction of President McKinley, which action was later confirmed by Congress in the Philippine Organic Act, should not engage in any enterprise in the Islands. Mr. Carpenter, therefore, is not a member of the legislative body, but, as stated in the quotation from Judge Smith, he does occupy one of the most important and influential offices in the Philippines.

"Before investing in the hacienda, Mr. Carpenter discussed the matter with the Governor-General of the Philippines, and the investment was made with the full knowledge of his superiors, and was, of course, a matter well known publicly in the Islands.

"This is not a case of the use of official power to obtain something for the purchase of which there is competition. This hacienda, leased with the object of its possible ultimate purchase by Mr. Carpenter, is land which was not desired by anyone, and he has stood in the way of no purchaser; even those who presented themselves subsequently as desiring parts of this land have been given the right to lease or purchase.

"I have gone into this matter to a considerable extent because I wish you to know exactly how Mr. Carpenter is regarded by the Filipino people and by the people who have dealt directly with him. Mr. Carpenter is a man who has risen in the service. He has been an enlisted man and a noncommissioned officer in the Army, and has been a clerk under the military and under the civil government. Our understanding here, and this is borne out by Governor-General Forbes and former Governor-General Smith, is that in investing his savings in the Philippine Islands Mr. Carpenter had given up all ambition for promotion to the Philippine Commission. In making the particular investment which is under discussion—that is, in friar lands—Mr. Carpenter simply accepted a proposition which was going begging in the Islands."



His Excellency TANG SHAO-YI,
PRESIDENT OF THE BOARD OF POSTS AND COMMUNICATIONS WHO RECENTLY OFFERED HIS RESIGNATION ON ACCOUNT OF ILL HEALTH

FRICTION OVER CHINESE EXCLUSION

That the operation of exemption clauses of the Exclusion Law should be marked by friction between Chinese and American authorities is a matter of sincere regret by all who are anxious to advance friendly relations between the two countries. For some time, this subject has been receiving a larger measure of intelligent attention on both sides of the Pacific with the purpose in view of guaranteeing to the Chinese exempted by the law respectful treatment at the hands of the American immigration officials at the ports of entry.

It has been recognized that in order that the spirit of the law may be fulfilled in its enforcement the cooperation of the authorities in China and America is necessary. President Dollar in a speech at Canton emphasized this point and the American Association of China has been active as evidenced by a resolution recently adopted by that body.

It is realized that at one time the American immigration official had occasion to mistrust almost every Chinese claiming exemption and the just and the unjust alike were subjected to the most rigid examination and for the very good reason that a profitable trade had been carried on in South China in the issuance of false certificates. And it was only natural that serious abuses followed.

Were the members of the exempt class provided with such undisputable documentary authority before leaving China, that even the immigration and health officials would be obliged to recognize it, the great source of the present friction would be overcome. This cannot be done without the sincere cooperation of the Chinese authorities who should see to it that no abuse of the exempt provisions was perpetrated by Chinese of the excluded class. Then, with proper health certificates, there could be no ground for friction at the port of entry. But so long as the provisions of the Exclusion Act are disregarded and no effort made on behalf of the Chinese authorities to prevent fraud, just so long will the innocent member of the privileged class be subject to embarrassment.

It would seem that some organization representing the Chinese exempt class who are the only sufferers would take this matter up for self protection, but so far nothing along this line has been accomplished. It would seem that they would have the greatest interest in seeing that fraud was made impossible and we are certain that such a movement would be welcomed by the Washington authorities who have always evidenced their desire to live up to the spirit of the regulations.

The following resolution was recently adopted at the meeting of the American Association of China which reflects the attitude of leading Americans in the Empire:

"Resolved: That the Secretary of the Association be instructed to enter into correspondence with the proper authorities in Washington, through our Minister in Peking and our Consul-General in Shanghai, to enlist their active interest in procuring relief in the matter of harsh treatment accorded the

exempt classes of Chinese seeking to enter or to leave the United States and also that the U. S. Marine Hospital surgeons in China and Hongkong shall have authority to issue final health certificates to intending emigrants from China to the United States."

In the discussion Dr. Fearn said: "Quite often a young man or woman who had every right to enter America went to the trouble and expense of going all the way to America, only to find upon arrival that they could not enter. Formerly Dr. Ransom had authority to issue certificates, but the speaker knew of a case where his certificate was not upheld by the authorities in San Francisco. This would appeal to anyone as being very unfair and unjust, and it was also very humiliating to men who were compelled to return."

Chinese, generally, may feel that the provisions of the Exclusion Act are too rigid, but it will not mend matters if their violation be encouraged. The only hope, however, is of more liberal legislation through better understanding based on sincere cooperation in an effort to make the best of this unpopular legislation that offers such a wide field for misunderstanding and friction.

THE MANILA CIGAR TRADE

Perhaps nowhere in the world has the cigar manufacturing industry advanced to the degree of perfection that has featured its development in the Philippine Islands. The reputation of the Manila cigar was established in Europe many years ago and this has been maintained with its high standard of excellence continuously up to the present writing.

Following American occupation an adjustment of the industry to meet changed conditions became necessary and while the domestic demand increased in large measure due to military occupation, up until the passage of the Payne Bill which provided limited free entry of cigars and cigarettes into the United States, the prospects for the industry were far from bright.

In the year ended June 30, 1909, there were exported 116,278,000 cigars and 53,614,000 cigarettes. The Payne Bill went into effect early in the fiscal year, 1910, with the result that at its close, 196,592,000 cigars were exported of which 83,931,000 went to the United States as against 2,696,000 in 1909, while the export to all foreign countries was practically maintained, the figures for 1909 being 113,582,000 and 1910, 112,661,000. This goes to prove that the reputation of and the demand for Manila cigars in foreign countries have been maintained after many years of trial and is especially appreciable as evidence of the high standard of excellence of the product. This should guarantee an increasing stable market in America under favorable trade conditions.

However, notwithstanding the enviable reputation abroad that the Manila cigar has enjoyed, a well organized campaign has been directed against its good name during the past six months by the predatory tobacco trust in the United States that practically control the distribution of cigars and the cigar situation generally throughout that country. The methods employed are not very commendable since they are based on vicious misrepresentation designed to prejudice the consumer and hamper the independent retailer by trade duress, the weapon of the Trust when other means fail. The ramifications of this almost perfect organization, now attempting to kill the sale of Manila cigars in the United States, are so extensive that the effect of their campaign is already being felt and unless some concerted effort is made by the Manila manufacturers to combat its influence the damage will be immeasurable.

The organization of the Manila Tobacco Association is a movement in the right direction. Through it, the export may be regulated so that at least one of the many weapons used by the enemy will be taken out of its hands, viz the opportunity of misrepresenting cheap and inferior cigars, manufactured by small Chinese factories, to the American consumer, as a Standard Manila Cigar.

Only by organizing and centralizing the control of export to the United States may this be accomplished and soon the members of the association would realize that in union there is real strength. Effort of individual interests directed against such a solid, effective organization as the enemy enjoys would prove futile. Inconsistencies and conflict in propaganda, among the well meaning Manila interests, could not be avoided working separately, and this would add to the confusion and ineffectiveness. This might be entirely eliminated by cooperation, by pulling together and carrying out a well ordered program.

Once organized and their efforts concentrated, the Association should not neglect a comprehensive publicity campaign in the United States. There should be a well directed advertising propaganda to interest the consumers on the one hand, and the jobbers and retailers on the other.

Had organization been effected and a publicity campaign inaugurated in anticipation of the malicious propaganda of the Trust, the situation would have been easily controlled, but now that the enemy has entrenched itself and will have to be routed out, greater effort and expense will necessarily be involved.

First organize to control the export and see that no inferior product is permitted to damn us, and that the American market is not glutted to the disgust of friendly retailers, start in on the publicity campaign simultaneously, have patience, pull together, and we believe that 1911 would yet prove a banner year. The very news that Manila cigar interests had consummated such an arrangement would be the most comforting news in the way of publicity that our friends in the United States could wish.

GOVERNOR GUERITZ OF BORNEO

After six years of activity in the advancing the interests of British North Borneo, His Excellency, E. P. Gueritz, takes a well-earned leave and the expression of the high regard in which he and Mrs. Gueritz are held by all classes is evidenced by the many addresses presented to him on the eve of his departure, copies of which appeared in a recent number of the "British North Borneo Herald."

Governor Gueritz is the guardian of the most Eastern British frontier, and the progress made in the development of the wealth of this island empire is largely due to his initiative, sympathy and encouragement. We are well aware of the measure of neglect to which out of the way areas are subjected by the sovereign country, and British North Borneo is not an exception, but it is a matter of congratulation that the stalworth pioneers of British North Borneo have had for a Governor one who never faltered in his belief in Borneo's future and applied himself diligently to overcoming the impossible. Governor Gueritz will not be idle during his sojourn in England. He will be found spreading some of his enthusiasm about Borneo where it will do the most good.

FAR EASTERN RAILWAY NEWS

(Continued from page 278.)

KILIN-CHANGCHUN RAILWAY.—According to the *Japan Times* the prospect for early completion of this line is not so bright as former reports indicated, that only 15 miles from Changchun could be expected completed at the end of the year and states that the remainder will have to be carried over into next year, thoughwork will be brought within 30 per cent. of completion before January. The delay is attributed to two causes. One is inclement weather; the other, diminution of the number of Chinese navvies employed, which diminution was effected by the Chinese contractors for the sake of economy. There are now about 600 navvies at work, and they will be reduced to one half when the extreme cold sets in. The 15th of the eleventh month, according to the Chinese almanack, is fixed for opening the 15-mile section, a date which corresponds to about the middle of December. It appears that a difficulty has arisen in connection with a question of boundaries. An American citizen owns a plot of land measuring 500 *tsubo*, through one corner of which the railway was planned to pass. This American not unnaturally refuses to sell a small bit of his land, the area being already of petty dimensions. But he asks 80,000 *yen* for the 500 *tsubo*, and that price is considered excessive. The plea advanced for such a demand is that the American citizen holds the plot as security for a loan of 90,000 *yen* made to its original Chinese owner. In the circumstances the Japanese Railway Authorities have decided to deflect the route so as to avoid passing through this land.

SUPPLY OF INDIAN RAILWAY MATERILS.—Popes, Electric Lamp Company, Limited, England, supplied 560 Incandesent Electric lamps to the East Indian Railway Electrical Department. The British Insulated and Helsby Cables, Limited, Prescot, Lancashiere, have supplied the same railway with a quantity of electric cables and accessories. Mssrs. Pritchetts and Gold, Limited, have an order for the supply of 600 accumulator cells to the East Indian Railway Electrical Department which will be shipped from England next month. The Burma Railway Company have ordered the consolidated Brake and Engineering Company, Limited, London, for the supply of Vacuum brake fittings. Messrs. W. Beardmore and Company, Limited, Glasgow, are supplying the Bengal-Nagpur Railway Company with steel wheels and axles for rolling stock. The Leeds Forge Company, Limited, Leeds, have an order for the supply of twenty open high-sided goods wagons on the Sheffield-Twinberrow principle or grid system, to the East Indian Railway, delivery at home to be completed next month. The South Indian Railway Company have placed an order with Messrs. The Gloucester Railway Carriage and Wagon Company for the supply of 18 sets of steel underframes and material for passenger carriage stock. The Patent Shaft and Axle Tree Company are also supplying them with 52 pairs of disc wheels and axles, and Messrs. Craven with 100 pairs of spoke wheels and axles. Messrs. Nasmyth Wilson and Company, Manchester, had a large order for locomotive boilers. Messrs. Orenstein and Arthur Koppel have an order from the Chief Engineer, Lower Ganges Bridge, to supply 110 of their standard double side tipping wagons, and 24 set of points and crossings.—*Railway and Shipping.*

THE ACKLEY BRAKE ENTERPRISE.—The Ackley Brake Company, New York City, represented in the Far East by Frank L. Strong, Manila; China General Engineering Co., Shanghai, China; and Sale & Frazar, Ltd., Tokyo, Yokohama, and Kobe, writes that the Havana Electric Railways, Havana, Cuba, have been supplied with 514 Ackley Adjustable Brakes, sufficient to equip all their cars. Several hundreds of Ackley Brakes have recently been placed with roads in China and Japan, and the Ackley brake is also well introduced throughout Australasia where the above company is represented by R. W. Cameron & Co. of Sydney, Melbourne and Wellington. The American licensors for the Ackley Brake have recently shipped an order to the Honolulu, (Hawaii), Rapid Transit Co., who has adopted the Ackley Brake as standard, and has already been supplied with 70 brakes.

An order for 50 Ackley brakes from the New York office of Sale & Frazar to be shipped to Japan, and additional orders from Australia are reported from New York.

Mr. Ackley sailed from New York for Buenos Aires on November 19, and is now in South America where he is placing agencies for his Brake.

CONTRACTING NEWS

BIDS OPENED, MUNICIPALITY OF SHANGHAI.—Supply of 10,700 carbon filament lamps and 15,000 metallic filament lamps.—Contract for former awarded Messrs. Ditmar Brunner Bros, Ltd., at £202, and Messrs. Arnhold Karberg & Co. for the latter at £1,434. The other tenders follow:

(i) 10,700 Carbon Filament Lamps.

	£
Siemssen & Co.	192
Ditmar, Brunner Bros., Ltd.	206
Molnar & Greiner	206
A. Schweiger & Co. Ltd.	209
Melchers & Co.	215
Arnhold, Karberg & Co.	219
Jardine Matheson & Co. Ld.	229
Dickeson, Jones & Co.	245
Anderson, Meyer & Co.	266
Brighten, Malcolm & King	269
Innis & Riddle	275
Samuel, McGregor & Co. Ld.	275
Shewan, Tomes & Co.	280
Andersen, Meyer & Co.	312
Shanghai Electric & Asbestos Co. Ld.	314
Rose, Downs & Thompson	326
Siemens China Elect. Eng. Co.	326
Ilbert & Co.	330
Andersen, Meyer & Co.	340

(ii) 15,000 Metallic Filament Lamps.

	£
Shewan, Tomes & Co.	1145
Melchers & Co.	1352
Ditmar Brünner Bros., Ld.	1360
Phillips Metallic Glow Lamp Works	1387
A. Schweiger & Co. Ld.	1400
Siemens China Elect. Eng. Co.	1508
Molnar and Grenier	1572
Siemssen & Co.	1590
Holland China Trading Co.	1687
Ditmar, Brünner Bros, Ld.	1729
Samuel, McGregor & Co. Ld.	1820
P. Muller	1873
Jardine Matheson & Co. Ld.	1906
Inniss and Riddle	1910
Dickeson, Jones & Co.	1910
Shanghai Electric and Asbestos Co. Ld.	2044
Brighten, Malcolm and King	2189
Ilbert & Co.	2224
Rose, Downs and Thompson	2330
Andersen, Meyer & Co.	2472
do do	2502

MUNICIPALITY OF SHANGHAI.—Erection and completion of steel superstructure of the Seward Road Bridge—Awarded The New Engineering and Shipbuilding Works, Ltd., at Tls. 3,350, completion within two months. The other tenders follow:

New Engineering & Shipbuilding Works (material supplied by the Cleveland Bridge Co.), delivery 5 months, Tls. 3,100.

Silby & Evans, delivery 1 ½ months, Tls. 3,375.

Vulcan Iron Works, delivery 1½ months, Tls. 3,950.

Shanghai Dock & Engineering Co., delivery 1½ moths, Tls. 4,270.

MUNICIPALITY OF SHANGHAI.—Supply of a motor car for police department-tender of The Shanghai Horse Bazaar, Ltd., of Berliet 12-14 h. p. car at Tls 3,400 was accepted with following quotation in the Municipal Gazette from Police Report:

"The main reason I have for recommending "the acceptance of the Horse Bazaar tender "for a 'Berliet' 12/14 power car is that by "adoption of this class of car the Council is "certain of proper technical care in its upkeep. "The want of this has in the past cost the "Council very considerable sums in repair "work.

"The 'Berliet' car will also fulfill another "requirement in any Police car, namely, that "it can, if necessary, and in the event of "trouble in the Settlement, carry 6 or 7 Con-"stables in an emergency to any distant spot."

The remaining tenders follow:—

FIRM	MAKE	H.P.	COST
L. Aubert & Co.	Panhard	12/15	Tls. 7,200
Walter Scharff & Co.	Daimler Mercedes	10/20	,, 5,500
Von Düring, Wibel & Co.	Thornycroft	18	,, 5,524
C. W. Ure	Ariel	40	,, 4,446
J. W. Gaude & Co.	Argyll	16/20	,, 4,000
Jardine, Matheson & Co., Ld.	Arrol-Johnston	15/9	,, 3,840
	Humber	12	,, 3,047
	Star	15	,, 3,007
Eastern Trading Co. Ld.	Rover	15	,, 3,800
	do.	12	,, 2,950
Shanghai Horse Bazaar Co., Ld.	Swift	14/18	,, 3,600
Olivier Import & Export Co.	Cadillac	28.9/33	,, 3,500
E. S. Little	Scout	18/22	,, 3,400
Sennet Fréres	Brasier	12/16	,, 3,400
	do.	10/12	,, 3,000
	do.	10/12	,, 2,500
The Motor House.	Renault	9/12	,, 3,300
H. S. Honigsberg & Co.	Studebaker	30	,, 3,000
Arnhold, Karberg & Co.	N. A. G.	12/15	,, 2,361
Siemssen & Co.	do.	12/14	,, 2,345

BIDS OPENED.—Philippine Bureau of Public Works.—Six Cattle Sheds, Pandacan. Manila Saw Mill ₱11,500.00, each, total ₱69,000.00, 220 working days; M. Manadé & Co., ₱53,656,00, 180 calendar days; Coleman & Goodman, 57,170 00, 240 calendar days; Manila Construction Co., ₱47,750.00, 150 working days; John Gordon, ₱6,950.00, 180 calendar days per shed; Atlantic, Gulf & Pacific Co., ₱6,666.66, 180 calendar days each.

PHILIPPINE BUREAU OF PUBLIC WORKS.—Addition, Bureau of Science. Coleman & Goodman: 1. ₱72,000.00, (a) extra concrete ₱30.00, (b) extra concrete reinforced ₱34.00, (c) extra concrete below grade line ₱40.00; 2. Complete 12 bays ₱77,480.00, 240 calendar days; John Gordon: 1. ₱70,900.00, (a) ₱23 50, (b) ₱29 00, (c) ₱31 00; 2. Complete 12 bays ₱75,800 00, 260 calendar days; S. C. Choy: 1. ₱84,850 00, (a) ₱28.00, (b) ₱35 00, (c) ₱40.00, 2. Complete 12 bays. ₱88,740 00, 250 working days; M. Manadé & Co, 1. ₱76,750.00, (a) ₱29.00, (b) 33.00, (c) ₱37 00; 2. Complete 12 bays ₱82,710.00, 240 calendar, days.

PROPOSALS INVITED

BUREAU OF PHILIPPINE CONSTABULARY.—Shoes—Sealed proposals in triplicate will be received at the office of the Chief Supply Officer, Bureau of Constabulary, Old Oriente Building, Manila, until ten a. m., February 17, 1911, and then opened in the presence of attending bidders, for furnishing the Bureau of Constabulary 10,000 pairs of shoes.

Bids must be accompanied by samples.

Time for delivery to be stated in proposal and to be considered in awarding contract.

Samples may be seen and blank proposals obtained at the office of the Property Officer, Bureau of Constabulary, Old Oriente Building, Manila.

PROPOSALS FOR FRESH VEGETABLES.—Headquarters Philippines Division, Office Chief Commissary, Manila, P. I., December 15, 1910. Sealed proposals in triplicate, subject to usual conditions, will be received at this office until 11 o'clock a. m., February 1, 1911, at which time and place they will be opened in the presence of attending bidders for furnishing and delivering to the Subsistence Department, U. S. Army, Manila, P. I., such quantities of fresh potatoes and onions as may be required from time to time during period from March 1, to June 30, 1911. About 600,000 pounds potatoes and 120,000 pounds onions will be required per month. Each proposal must be accompanied with a bidder's guaranty in the amount of $5,000.00 or with certified check for that amount on a bank of approved standing in Manila. The bidder to whom award is made will be required to give bond, the penalty of which will be fixed by the Chief Commissary. Blank forms, specifications and all necessary information can be obtained on application to this office. Envelopes containing proposals should be marked "Proposals for Fresh Vegetables to be opened February 1, 1911," and addressed to the undersigned.—D. L. Brainard, Lieut. Col., D. C. G., U. S. Army, Chief Com'y.

Sealed proposals in triplicate, subject to the usual conditions, will be received at the office of the Chief Supply Officer, Bureau of Constabulary, Old Oriente Building, Manila, until ten a. m., April 10, 1911, and then opened in the presence of attending bidders, for furnishing the Bureau of Constabulary 35,000 pairs of cotton socks.

Blank proposals may be obtained at the office of the Property Officer, Bureau of Constabulary, Old Oriente Building, Manila.

PROPOSALS FOR FROZEN FRESH BEEF AND MUTTON—Headquarters Philippines Division Office Chief Commissary, Manila, P. I., December 31, 1910.—Sealed proposals, in triplicate, subject to usual conditions, will be received at this office until 11 o'clock a. m. April 5, 1911, at which time and place they will be opened in the presence of attending bidders, for furnishing and delivering about six million six hundred thousand (6,600,000) pounds of frozen fresh beef and two hundred thousand (200 000), pounds of frozen fresh mutton to the Subsistence Department, U. S. Army, at Manila. P. I., during year ending June 30, 1912. The contractor will be required to pay all customs duties. The United States reserves the right to decrease the amount advertised for, upon reasonable notice to the contractor, or to increase the amount with his consent. Each proposal must be accompanied with a bidder's guaranty in the amount of $20,000 or with certified check for that sum on a bank of approved standing in Manila. The bidder to whom the contract is awarded will be required to give bond. Blanks and full information furnished on application to this office or to nearest United States Consul. Envelopes containing proposals must be marked: "Proposals for frozen fresh beef and mutton for fiscal year 1912, to be opened April 5, 1911", and addressed to the undersigned.—D. L. BRAINARD. Lieut. Col., D. C. G., U. S. Army, Chief Commissary.

SHANGHAI MUNICIPALITY—The Council is prepared to receive tenders for the supply of:—14 Electric motors from 5 to 20 h. p.

Specifications may be obtained upon application to the Electrical Engineer, Mr. T. H. U. Aldridge, at the Electricity Works, 31 Fearon Road, upon payment of Tls. 26 deposit, which will be returned upon the receipt of of a bona fide tender.

Sealed tenders must be forwarded to the undersigned not later than noon on Tuesday, January 31, 1911.

PHILIPPINE BUREAU OF PUBLIC WORKS.—Sealed proposals plainly marked "Proposals for Eleven Reinforced Concrete Bridges and Culverts, Province of Capiz," will be received at this office, at the office of the District Engineer, Iloilo, P. I., or at the office of the Provincial Treasurer, Capiz, Capiz, P. I., until 11 a. m., January 20, 1911, and then publicly opened for furnishing all material, labor and plant, and constructing complete, eleven reinforced concrete bridges and culverts, located on the Macato-Tangalan Road, Province of Capiz, P. I., in the manner and on the conditions set forth in the form of proposals, plans and specifications, copies of which with other information may be obtained at any of the above-mentioned offices.

PHILIPPINE BUREAU OF SUPPLY.—Proposals Invited for Electric Hoist and Trolley Equipped with motors for Hoisting and Travel on

"I" beam. (For Government wharves of the Manila Custom House.) *Specifications*—The system is intended to handle, as rapidly as practicable, general cargo and boxes (single lift not to exceed one ton), from floor to cart or truck, or to transport cargo from one end of wharf to the other in a straight line.

A line of "I" beams will be fastened to the girder of the roof truss, to run longitudinally on each side of the warehouse shed on each wharf (two lines to each shed), on which will be supported and carried the travelling hoists, each travelling hoist to have electric motors; one motion to hoist the load from the floor of the wharf and another motion to cause the hoist to travel on the "I" beam in either direction.

The bidder must submit a drawing showing how "I" beam is to be arranged, by curve or otherwise, at one end of the wharf so that trolleys can run from one side of wharf to the other.

No special machinery is desired, but up-to-date, standard equipment, representing the best practice is what is wanted.

Wharves.—The shed on wharf "A" is 600 feet long and the shed of wharf "B" is 550 feet long, approximately, requiring 1200 and 1100 feet of straight "I" beams respectfully.

Local Conditions.—Electric current available is alternating, 60 cycles, two phase, four wire, 220 volts, or direct current, 200 volts. Any bending of "I" beams will be done locally, all of it being shipped straight.

Equipment and Supplies to be Furnished by Bidder—Standard "I" beam of weight and shape required for travel of electric hoists, in lengths of 25 ft. 2300 ft. plus the additional length required for a connection from one line of "I" beams to the other on the same wharf, for each wharf.

Number of travelling hoists required	10
Capacity of lift, each	2240 lbs.
Approximate hoisting speed per minute	50 ft.
Approximate trolley travel per minute	250 ft.
Head room, floor to truss	22 ft.
Length of travel on each wharf respectively	550 and 600 ft.
Distance between "I" beam supports	25 ft.

(building columns and trusses center to center.)

Bidder to quote separately on electrical fittings and supplies, including electrical wire or copper rods, brackets, hangers, insulators, etc., including all material inside shed and warehouse.

Bidder to *show in detail* what electrical fittings and supplies will be furnished.

Bidder to show method of supporting conductors, whether on "I" beam or on column or truss of warehouse.

Bidder to state whether single or two phase (four wire) motors will be furnished and give ratings of motors; also names of manufacturers when bids are submitted. Bidder also to give prices on direct current motors, specifying voltages.

Bidder to quote separately on the standard "I" beam, in 25 ft. lengths. State size and weight of "I" beams.

Bidder to quote on hoists and trolleys fitted with drop cords for operation of controllers from floor.

Bidder to state weight of hoist and trolley, and length of wheel base of trolley.

Approximate speeds only are specified for hoist and travel. Nothing special is required. Standard apparatus is preferred. Bidder to state speeds for hoists and travel. Bidder to state minimum radius curve around which trolley will travel.

Motors to be equipped with any automatic stops which are considered essential. Bidder to state what automatic stops will be furnished with equipment. If possible, trolleys to be equipped with automatic stops to prevent any two hoists coming within twenty-five feet of each other.

Bidder to furnish catalogue and description of apparatus.

Shipping Directions.—Material to be F.O.B. ship, New York, and to be packed in strong cases. Packing to be well done.

Guarantee.—Bidder to state what guarantee he will give on the equipment, performance, durability, efficiency, etc.

Proposal—To be submitted in such shape that, if necessary, order can be placed by cablegram.

To be addressed to

WM. S. NOLTING,
Acting Purchasing Agent.

Proposals will be received Apr. 1, 1911.

PHILIPPINE BUREAU OF SUPPLY.—Proposals invited for Electric Locomotive Cranes.

Specifications.—The crane is intended to travel on "T" rails of a gauge of 4 feet 8½ inches on the wharves. The approximate speeds called for are low as the service is intermittent and rapid hoisting and transporting along the wharves is not essential. The bidder must submit drawing, showing how trolley will be supported. Nothing special is required; standard apparatus wanted which must be capable of lifting ordinary ship cargo from floor of wharf to ordinary truck (say 4 feet.)

Wharves.—Wharf "A" is 650 feet long and wharf "B" 600 feet long.

Local Conditions.—Alternating current available, 60-cycle, two phase, four-wire, 220 volts, or direct current 200 volts.

Equipment and Supplies to be Furnished by Bidder.—Only one crane to be bought, but price given for

Capacity lift	5 tons.
Capacity lift	7-½ tons.
Track gauge (Trail)	4 ft. 8-½ inches.
Approximate hoisting speed per minute	10 ft.
Approximate track speed per minute	250 to 300 feet.
Slow speed (can be slow. To be specified by bidder.)	
Track grade	level.
Track curves (as shown by print). Long radius.	
Boom, maximum clearance from edge of locomotive crane, to hoisting cable to be eight feet. (8 ft.)	
Height of lift. About four feet (4 ft.) bidder to specify height of hoisting hook (top position above floor when boom has clearance of 8 ft. as specified above.)	
Head room, floor to truss	22 ft.

Bidder to quote separately on necessary trolley wire, insulators, hangers, electrical supplies, etc, including all material inside shed or warehouse and specifying same in detail.

Bidder to state whether single or two phase (four-wire) motors will be furnished and give rating of motors and names of manufacturers when bids are submitted. Bidder to give also prices on direct current motors specifying voltage.

Bidder to state weight of locomotive crane and speed of hoists, travel and slowing. Also state the length of wheel base.

Crane to be equipped with any automatic stops which are considered essential. Bidder to state what automatic stops are to be furnished with equipment, also weight of crane complete.

Bidder to furnish catalogue and description of apparatus.

Shipping Directions.—Crane to be F. O. B. ship, New York, and to be packed in strong cases.

Guarantee.—Bidder to state what guarantee he will give on the equipment, performance, durability, efficiency, etc.

Proposal.—To be submitted in such shape that, if necessary, order can be placed by cablegram.

To be addressed:

WM. S. NOLTING,
Acting Purchasing Agent.

Proposals will be received April 1, 1911.

PROPOSALS FOR COAL:—Headquarters Philippines Division, Office of Chief Quartermaster, Manila, P. I., January 7, 1911. Sealed proposals, in triplicate, subject to the usual conditions, for furnishing approximately 65,000 tons of coal to the Quartermaster's Department, U. S. Army, during the Fiscal Year 1912, will be received here until 11:00 A. M. May 8, 1911, and then opened. Information and blank forms furnished upon application. F. G. HODGSON, Assistant Quartermaster General, U. S. Army, Chief Quartermaster.

PROPOSALS FOR INTER-ISLAND TRANSPORT:—Headquarters Philippines Division, Office of Chief Quartermaster, Manila, P. I., November 28th, 1910. Sealed proposals, in triplicate, subject to the usual conditions, for furnishing this Department with one Ocean Going Steamer, suitable for Inter-Island Traffic, will be received here until 11:00 A. M., March 2nd, 1911, and then publicly opened. Information and blank forms furnished upon application. F. G. HODGSON, Assistant Quartermaster General, U. S. Army, Chief Quartermaster.

THE NEGROS PHILIPPINE LUMBER CO.

This company was recently incorporated in Wyoming with a capital of $1,000,000 to take over a twenty year concession covering an area of 50 square miles in the northern part of the Island of Negros and containing, according to forestry estimates, 600,000,000 feet of hardwood timber including apitong, almon, balacbacan, lauan-bagtican, lauan-dulog and red lauan. The company began mill operations October 1, with a plant capacity of 30,000 feet b. m. ten hours run in hardwood or approximately half the output sawing soft woods. This unit of the proposed mill capacity was installed by the Filer & Stowell Company of Milwaukee. A railway is being built from the harbor of Cadiz, a distance of six miles into the forest, and will be completed fully equipped by the middle of December.

A complete modern logging equipment supplied by the Washington Iron Works of Seattle is in operation. The erection of docks, storehouses, houses for employes, etc., has been in progress and the output of the mill utilized entirely for supplying material. It is proposed to add units to the present capacity as the operations expand.

The officers of the company are:—president, Frank W. Broad, Denber, Colo.; vice-president, James H. Ramey, Los Angeles, Cal.; general manager, J. Clayton Nichols, former superintendent Insular Lumber Co., and secretary-treasurer, W. D. Lee, Denver, Colo.

OFFICIAL GUIDE AND HANDBOOK OF THE PHILIPPINE ISLANDS

Captain R. A. Duckworth-Ford, A. D. C. to Secretary of Commerce and Police, advises us that owing to the non-availability of funds at the present time, and to the fact that its scope has been somewhat enlarged over what was at first planned, the *Official Guide & Handbook* of the Philippine Islands will not be ready for sale at the forthcoming Carnival, as was originally intended. The reading matter of the Guidebook is almost completed, and consists of some 30,000 words; and as soon as the necessary appropriation becomes available it will be turned over to the Bureau of Printing, together with a large number of selected photographs illustrative of the text.

The Guidebooks will in all probability be ready for sale and distribution in May or June next.

Valuable contributions and suggestions have been received from the Bureaus of Forestry, Agriculture, Science, Constabulary, and from the Government of the Moro Province, as well as from various individual authorities on special subjects, so that there is every reason to believe that the compilation will "fill a long felt want."

PHILIPPINE MINING NEWS

SURVEY OF PHILIPPINE COAL MEASURERS—Mr. E. Randolf Hix, a coal expert from Pennsylvania, is making a tour of the islands in company with Dr. Warren D. Smith, chief of the Division of Mines, under the direction of the Philippine Bureau of Science, for the purpose of making a complete survey of the deposits of coal with a view to ascertaining the heating qualities of the different deposits by exhaustive tests and to secure the maximum in results. This work will aid greatly in solving the best method of utilizing the Philippine product. The itinerary will include the provinces of Cagayan, Masbate, Camarines, Albay, Sorsogon, Tayabas, Cebu, Infanta, Surigao, and other sections of Mindanao as well as British North Borneo. Previous to visiting the Philippines, he investigated the Japanese coal measures, so that, when he completes this two months trip, he will be in possession of a vast amount of important data on this subject. He is also interested in the making of briquettes. Mr. Hiz has been favorably impressed with the samples of coal that he has seen and believes the deposits will prove one of the most important sources of wealth in the archipelago when developed.

Among the points visited will be the properties of the East Batan Coal Mining Company and of the Federal Government.

SURIGAO PLACER.—It is understood that a company has been formed for the purpose of developing some rich mining property in the province of Surigao. The land is owned by Messrs. Robinson and Urquardt and Messrs. McCullough and Parker of Zamboanga are reported to have purchased a control for $50,000. It is proposed to instal a modern dredge.

MASBATE MINING DISTRICT. —The reports from Masbate indicate the usual activity in development work. The 20 stamp mill of the Colorado Mining Company is being erected. It will probably be six months before it commences operation, but from the most reliable reports available, once it is started, there will be ample ore available to keep it going steadily. This company has to its credit the greatest amount of consistent development work of any company in the islands. It has been most conservative and judicious in its expenditure with the result that its future looks very bright. Besides this property there are the Keystone and the Syndicate mines, the former advanced to a stage where a small mill is contemplated. The Syndicate mine is considered a low grade proposition, but one in which a large body of ore has been uncovered. We are informed that capital has already been interested in this property and when a certain measure of development work confirms present indications and the ore available is sufficient to warrant investment, a forty stamp mill will be installed.

THE PARACALE GOLD DREDGING CO.—Advices from Paracale are to the effect that this company is taking out 400 ounces monthly and that the Huntington Mill secured to crush large boulders will make a test run this month.

THE PARACALE EXTENSION.—Mr. R. Y. Hanlon, who has been in Paracale testing this property, returned to Manila early this month and is preparing his report. He was favorably impressed with the district, but stated that more effective development work would have to be carried on before capital would look with favor upon a number of properties.

NUEVA ECIJA PLACERS.—Captain Hartman of Sydney, a well known Australian expert, arrived in Manila early this month for the purpose of testing properties in this district with a view to active development. We understand that he represents a large amount of capital. The Captain is well and favorably known among mining men in the Philippines having made extensive investigations of the different districts before proceeding to Australia last fall. While very conservative, he has faith in the future of placer mining in the islands under wise direction.

THE RIO CHICO MINING CO.—We are informed that a contract has been entered into with Australian capitalists by this company whereby the latter engage to transfer their ten claims to the former and receive in return a percentage of stock in a company formed with sufficient capital to instal ten modern dredges, or one dredge on each claim that indicates working values. We understand that the capitalization per claim is £13000, of wich £3,000 in stock is set aside to reimburse the owners, pay for promotion expenses, etc., and the balance of £10,000 covers cost of dredge. This vicinity has shown paying values, but the final tests have not been made. Mr. R. Y. Hanlon has been engaged to expert the ground.

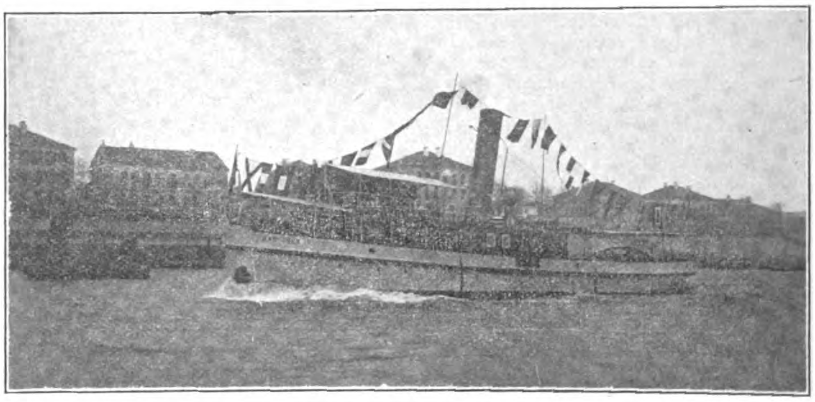
THE HEADQUARTERS MINING CO.—The installation of the plant of this company is progressing favorably and the company expects to begin active operations by the end of April.

THE BENGUET CONSOLIDATED.—A shipment of 93 ounces was received during the month.

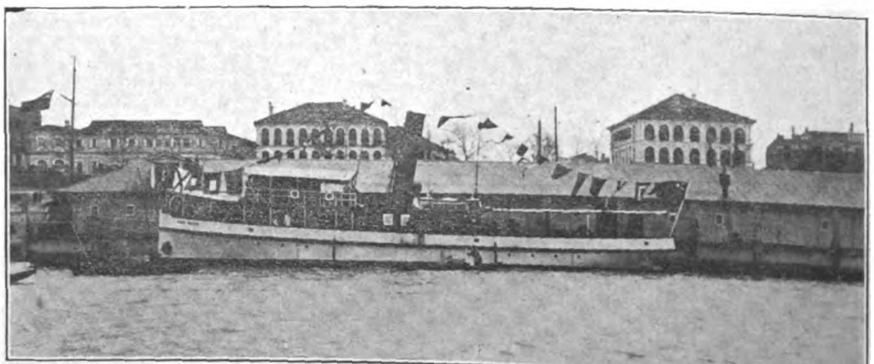
CALIFORNIA GOLD DREDGING BULLETIN.—A publication has just been issued from the California State Mining Bureau, that is of general and local interest, dealing in detail with the remarkable development of the gold dredging industry in California, and taking into consideration the collateral topics of reclamation and debris. The work was compiled under the direction of State Mineralogist Aubury. In an introduction to the bulletin, Aubury has written as follows:

"The construction of the first practical gold dredge in California, in 1898, marks the beginning of a new era in gold mining, which branch of the industry has probably, since its inception, assumed greater proportions in this State than elsewhere. With the rapid advance made in gold dredging and the gradual increase of gold output, have likewise come improvements and enlarged construction, which make the California gold dredge today the model after which other countries pattern.

"The gold industry of this State has received a new impetus, and the production advanced approximately three and one half million dollars above the average output of two years ago. Should other forms of gold mining maintain their average two years from now, California will probably again recover its rank as the leading gold producing State in the Union, and will undoubtedly maintain its lead for many years to come.



THE HAN SHUN UNDER WAY



VIEWS OF THE STEAM TUG HAN SHUN BUILT BY THE YANGTZE ENGINEERING WORKS FOR THE HANYANG IRON & STEEL WORKS.

THE "HAN SHUN"

The Steam Tug "Han Shun" is a steel vessel, 120'0" long x 21'0" beam x 12'0" deep, propelled by one set of Compound Surface Condensing Engines with an indicated Horse Power of about 500. Her boiler is of the Cylindrical Multitubular type constructed to Board of Trade Rules for a working pressure of 120 lbs. per square inch. The Han Shun is specially designed and strongly built for towing purposes, her speed when light being 11 knots and with a tow of 1,000 tons, 7 miles per hour. The vessel has been running satisfactorily since the 15th March, 1910, when she was handed over by the builders, The Yangtse Engineering Works, Hankow, to the owners, The Hanyang Iron & Steel Works, Hanyang. The designer is the General Manager of the Yangtse Engineering Works, Mr. Wong Kwong, M. I. N. A., M. I Mech. E., &c.

"Sufficient area has already been proven in the gold dredging fields to warrant this conclusion. While it has been contended in some quarters that the limits of the dredging areas have already been fairly well defined, and that the large interests and consolidations have a large portion of the fields controlled, new companies are continually being organized for the purpose of exploiting tracts which have been passed over, or others which were prospected a few years ago and turned down, as being too low grade to operate profitably. With the advent of the modern dredge, handling 250,000 to 300,000 cubic yards of gravel per month, at a cost of from 2½ to 3 cents per cubic yard, conditions have changed materially. The same evolution with dredge mining has occurred as with gold quartz mining in this State, and the question has resolved itself into one of capacity. The present dredge—large as it is—has apparently not reached its limit."

"The dredging industry in California, while adding annually millions of dollars worth of gold to our State's products, at the same time dispenses immense sums to the various channels of trade, and adds materially to our prosperity. It will continue to do this for at least the next decade, and as actual conditions affecting the industry become more generally known, and proper restrictions are maintained, it will be more appreciated and the objections which have been raised will disappear."

In the preparation of the Gold dredging bulletin, a vast amount of material has been accumulated, dealing with gold dredging in California and elsewhere. In the book there are 239 illustrations and a number of maps. The illustrations deal with the process of gold dredging, with geological formations and several pages are devoted to picturing eucalyptus growing on unleveled dredge tailings in the Oroville district.

In the dredging book it is reported that there are operating 63 gold dredges in the State, representing an investment of $8,995,000. The following paragraph will attract attention.

"There is, perhaps, no branch of mining which has come to the front in so short a time as gold dredging, which from 1898 to 1908 produced over $25,000,000 worth of placer gold in California. On account of hydraulic mining being prohibited in many counties, the output of placer gold in California would have shown a marked decrease, in late years, had it not been for dredge mining."

The gold dredging bulletin can be obtained from the Librarian of the State Mining Bureau, Ferry Building, San Francisco, for the sum of $1.50 with 15 cents additional for mailing. Bound copies of the bulletin $2.00 with 20 cents postage.

DANGERS FROM LUBRICATING OILS.—A fertile source of fire in manufacturing, power and similar industrial establishments is oil—not illuminating oil but that used for lubricating purposes. The impossibility of absolutely confining oil within any but the most exquisitely ground type of bearing results in a goodly amount of oil dripping or splashing out of the bearing and on to the floor. If the latter is of concrete, the oil saturates it, thereby weaking the mass and making the floor unsafe. If the floor is of wood, the dripping oil renders it highly inflammable. Only a spark is needed to start combustion. That fire insurance companies recognize this fact is evidenced by the higher rate charged on buildings containing oil-lubricated machinery than on buildings housing machinery lubricated with plastic lubricants, grease, for instance. The ability of grease to "stay where it is put," to use an apt phrase employed by Adam Cook's Sons, manufacturers of "Albany Grease," prevents either splashing or dripping of the lubricant. Consequently, the fire risk is considerably decreased, to say nothing of the considerably increased cleanliness secured. One of the reasons for the widespread use of "Albany Grease" is the recognition by thoughtful engineers of the freedom from fire risk that its use insures.

FAR EASTERN ENGINEERING, CONSTRUCTION, FINANCIAL AND COMMERCIAL NEWS

ELECTRIC RAILWAYS, LIGHT, POWER, TELEGRAPHS, TELEPHONES, AEROPLANES, AUTOMOBILES, ETC.

MANILA ELECTRIC R. R. EXPANSION.—The Governor General has approved the application of this company for an extension of its franchise to include a line on Taft Avenue running from Bagumbayan to Calle Herran.

BANGKOK TRAMWAYS.—The Siam Electricity Company has secured several modern coaches for its system and will probably add a number more in the near future.

ELECTRIC RAILWAY FOR CEBU.—A franchise for the installation of an electric street car system in Cebu is now being considered by the Philippine Government. The proposal was submitted by Simplicio Rolis of Cebu and the proposal is for a concession covering a period of fifty years with the privilege of repurchase by the municipality after 25 years at a price to be fixed by the Philippine Supreme Court, sitting as a board of arbitrators.

The application defines the street lines as follows:

Main line—from Pardo to Tupas, Magallanes, Morga and Martires. Branch line—from Morga to the waterfront through North America and Colon Street connecting at Martires street. The concessionaire also asks for permission to double track the proposed lines, with the exception of Lopez Jaena in Cebu and Padilla in the San Nicolas district.

The applicant agrees to provide cars with first and second class compartments and carry passengers at 12 and 10 centavos respectively from any one point to another one way on its lines including transfers. The motive power will be electricity and 50 pound rails will be used. A deposit of ₱10,000 is made. The applicant also agrees if the franchise is granted that he will pay two per cent of the gross receipts to the provincial treasurer of Cebu. He also undertakes to complete the installation of the system within a period of six months after the end of the year in which the franchise is granted.

A bill approving the franchise has passed the first reading in the assembly and will soon go before the commission. It is understood, however, that the Commission will require that bids be advertised for and the franchise go to the most favorable tender.

AVIATORS IN SAIGON.—Marquis de Villeneuve, the well known French aviator, and Van de Born of Belgium fame have arrived in Saigon with Bleriot and Farmin machines. It is understood that these gentlemen will visit other ports in the Orient.

CHINESE WIRELESS.—Plans are being considered by the Imperial Government to extend its wireless system so as to connect the principal ports in the Empire with the capital. It is understood that about a dozen stations along the coast will be installed, with one at Hankow and another at Nanking. After these installations are operating satisfactorily the system will be extended. The principal wireless companies will be invited to make demonstration before the final adoption of any system.

MANILA CARNIVAL ATTRACTIONS.—An electrical, tower, approximately 150 feet in height, crowned with several large searchlights and a mass of electric lights, will be one feature of the Carnival in February. The construction will be in charge of the Manila Electric Railway.

MUNICIPALIZATION OF YOKOHAMA TRAMWAY.—A report from Yokohama is to the effect that the Investigation Committee has recommended that a municipal loan of Yen 9,950,000 be raised for expenses and additional construction.

THE ANGLO-JAPANESE HYDRO-ELECTRIC CO.—The latest on this proposed company is the retirement of the British capitalists and the decision of the original Japanese projectors to carry out the installation. The latter have organized the Oigawa Hydro-Electric Company with a capital of yen 1,200,000 and arranged for the purchase of the Hamamatsu Electric Company. The original project was the harnessing of the river Oi and supplying power to Tokyo, but was abandoned when the Tokyo Railway entered into a contract with the Kenugawa Hydro-Electric Co.

INDO-CHINE WIRELESS AND AEROPLANES.—The French military department has decided to instal a system of wireless stations to connect Cochin-China, Annam, Tonkin and Laos. Stations will be installed at Vienniane, Tourane, Saigon and Luang-Pralang. The cost is estimated at $50,000 and the work will be completed early this year. We also understand that a fleet of airships is to be organized for the colony.

JAPANESE TEST AEROPLANES.—The Japanese military have been making extensive experiments with the Farman biplane and the Guieder monoplane. The latter machine made a successful flight after several accidents as also the Farman machine.

THE BANGKOK AVIATION WEEK.—The *Bangkok Daily Mail* announces the conclusion of preliminary arrangements by the Société d'Aviation d'Extreme Orient for an aviation week at Bangkok the first week in February.

H. R. H. Prince Nakon Chaisee is a patron of the meet and will make a flight himself in the Farman biplane in charge of Mr. Van den Born. The promotors claim that three princes besides three private persons, including a lady, have been booked for "promenade" flights. The grounds of the Sport Club of Bangkok has been placed at the disposal of the promoters.

THE KINAGAWA HYDRO ELECTRIC CO.—This company recently distributed yen 33,100 as interest on paid up capital amounting yen 3,375,000.

SWETTENHAM WHARF TELEPHONE ACCOMMODATION.—The *Penang Gazette* announces that telephonic communication, between the Penang Telephone Exchange and any steamer coming alongside Swettenham Wharf, can now be established in a couple of minutes. The wires run from a sub-exchange, in the little corner office at the approach to the wharf, to one of the lattice electric arc light standards. A flexible twin wire connects a plug on the standard to the portable telephone on board the vessel. This line was used for the first time on Dec. 13, when the B. I. steamer *Taroba* was linked up with the telephonic system. Next year, when the telephonic communication is established, it will be possible to talk to Kedah and Perlis from the deck of a steamer in Penang Harbor.

CURTISS' AEROPLANE FOR MANILA CARNIVAL.—Arrangements have been made for the appearance of a Curtiss machine in Manila during carnival week. Mr. Curtiss has started an aviation school at Los Angeles and offers to train a corps of American naval officers in the art of flying. Mr. J. R. Mars, the winner of the Belmont Park prizes, will probably make the flight in Manila.

PRESIDENT OF WESTERN UNION RESIGNS.—After fifty years service in the telegraph business, Mr. Robert C. Clowry handed in his resignation to the directors in November. Theodore N. Vail, president of the American Telephone and Telegraph Co., succeeds him. Newcomb Carlton of The British Westinghouse Co. was elected vice-president.

Kashing Electric Light.—A company has been formed by local capitalists for the purpose of installing an electric lighting system, according to the Kashing correspondent of the *North China Daily News*. One thousand subscribers have been secured, and the company advertises that it will put lights on main street and bridges without cost if shops, schools, and homes are liberal with their patronage.

Osaka Electric Railways.—The British Consul at Osaka, referring to the extension of the electric railway accommodation, states that considerable progress has been made during the year with the extension of the municipally owned electric railway. Within three months of the beginning of 1910 two new electric railways are to be opened to traffic. The first of these connects Osaka with Kyoto and has a total length of 29½ miles. The other runs from Osaka to Takaradzuka, a summer resort about 16 miles from Osaka. The latter line is subsequently to be extended from Takaradzuka—the present terminus—to Arima and also to Nishinomiya, a town of considerable size on the coast half way between Kobé and Osaka. A further extension from Nishinomiya to Kobé is also contemplated. It is probable that the two lines above mentioned will shortly be linked up with the City Electric Railway and also with the Hanshin Electric Railway, which has been running for the last five years between Osaka and Kobé. In addition to these lines shortly to be opened there have been since the commencement of the year numerous schemes brought forward for the construction of electric railways to various places in the neighbourhood.

Chinese Aviators—In the Na Yuan Parade Ground in Peking a temporary building has been erected by Messrs. Li Pao-Chun and Lim Tso-Chen, who propose to pursue experiments in aeroplanes.

Telephone Anniversary in Japan—The twentieth anniversary of the establishment of telephone communication in the empire was celebrated last month by the Communications Association of which Baron Gato is president.

Baguio Electrical Development—The authorization of a franchise for the installation of a hydro-electric plant on the Agno River for the purpose of supplying light and power to the mines of the province passed its third reading. It will be sold to the highest bidder.

Wireless Station at Cocos Islands—A license has been granted for the installation of a station on these islands, situated about 700 miles south-west of Sumatra.

Baguio Electric Plant—The Philippine Commission has appropriated ₱30,000 for the establishment of a plant at the summer capital and arrangements have been made to purchase the present plant of the Baguio Electric Light & Power Co.

Electric Equipment for Manila Wharves—The Bureau of Supply have prepared plans for the installation of an electric hoist and trolley equipped with motors for hoisting and travel on an "I" beam at the Government wharves for the handling of cargo.

Manila Automobile Club.—This club has been organized for the purpose of the encouragement and regulation of the use of automobiles for recreation and business and the development and betterment of roads and highways in the Philippines. The incorporators are:

Vice Governor Newton W. Gilbert, Major Thomas L. Hartigan, F. W. Dudley, Conrad P. Hatheway, Governor General W. Cameron Forbes, A. R. Roxas, José de Garchitorena, E. Zobel, Leopoldo Kahn, Wm. Swan, Secretary C. B. Elliott, Vicente Singson, Martin Egan, E. B. Bruce, Percy Warner Tinan.

The following are included with the above in the charter membership: Chas. C. Cohn, Ellis Cromwell, Fred C. Fisher, Isauro Gabaldon, Col. James G. Harbord, H. L. Higgins, M. F. Loewenstein, José Robles Lahesa, Frank R. White, Dr. Zitelman.

PUBLIC WORKS, DOCKS, WHARVES, BUILDING, ETC.

The Tanjong Pagar Dock Board.—The report for the half year shows a credit balance of $894,365. The following is a comparative statement from the half yearly report:

			Wharf $	Docks $	Total $
1905	2nd	half	1,364,971	969,760	2,334,731
1906	1st	,,	1,491,341	1,016,067	2,507,408
	2nd	,,	1,453.823	854,626	2,308,449
1907	1st	,,	1,547,028	1,000,594	2,547,622
	2nd	,,	1,479.684	1,057,645	2,502,572
1908	1st	,,	1,516,291	986,281	2,502,572
	2nd	,,	1,258,291	961,646	2,219,937
1909	1st	,,	1,364,689	1,070,734	2,435,423
	2nd	,,	1,366,511	953,406	2,319,917
1910	1st	,,	1,490,561	1,046,886	2,537,447

The balances for the same period have been as follows:—

1905......	2nd	half-year	... 663,319
1906......	1st	,,	... 702,713
	2nd	,,	... 817,642
1907......	1st	,,	... 803,944
	2nd	,,	... 857,158
1908......	1st	,,	... 804,772
	2nd	,,	... 746 324
1909......	1st	,,	... 826,843
	2nd	,,	... 754,422
1910......	1st	,,	... 894,365

Prye River Dock section shows a profit of $28,354.

The Whangpoo Conservancy—The reorganization of this board has been announced. It will be known as the Conservancy Board and comprise the Shanghai Taotai, the Shanghai Custom's Commissioner and the Coast Inspector. This Board receives its authority direct from the Imperial Government and will be independent of provincial officials. The authority of the board is defined and it will control the expenditure of the annual grant of Tls. 400,000 and their duties shall be primarily to maintain the present conservancy in effective condition and to carry out new works as it deems necessary.

Shanghai Sewer Extensions—According to the engineer's report for November Tls. 22,000 were expended in relaying sewers in Kaifing, Jehol and North Tibet Roads. This work was made necessary by the closing of the outlet of the Haining Road Sewer in 1908 by the Chinese authorities.

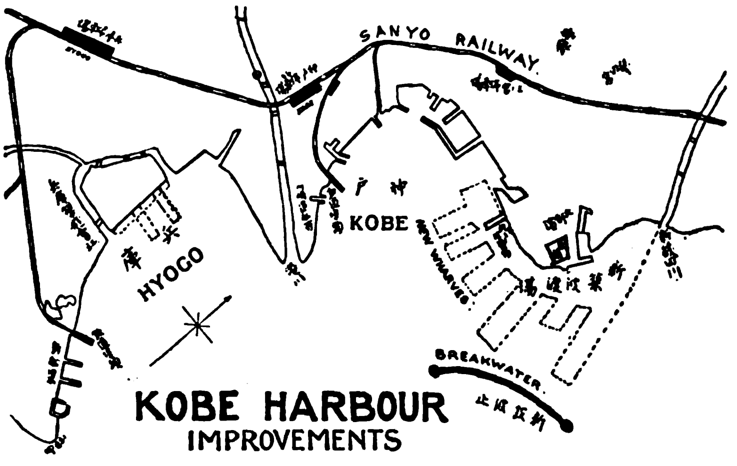
A Million for Municipal Markets.—A bill has been submitted the Philippines Assembly providing for an appropriation of ₱1,000,000 for the construction of modern municipal markets throughout the islands in pueblos that show a total market income of over ₱2,500, and no municipality should receive aid to exceed ₱8,000.

Kobe Harbor Works.—The plans outlined provided for the expenditure in ten years ending 1917 aggregating yen 16,740,000, and of this up to the end of 1909 aboutyen 3,000,000 was spent. According to the report of Mr. Consul General Layard, there are to be four piers, three of which are to be double. The total length of quay accommodation will thus be 2,800 yards, capable of accommodating 19 vessels. The piers will have a depth of water alongside ranging from 30 to 36 ft., capable of accommodating vessels of very large tonnage.

It has now been decided to construct the quay walls with ferro-concrete caissons. The laying of solid concrete blocks is rendered difficult by the bad weather which at times prevails at the entrance to the harbour, and it is mainly with a view to obviating this difficulty that the said new scheme has been put into practice. The staging necessary for the construction of the caissons has been erected, and one caisson is practically complete. The dimensions of each will be as follows:—Length 120 ft., width 24 ft. and depth 30 ft. The floating dock for transporting these caissons to the site of the piers has been constructed at the Kawasaki dockyard at a cost of 250,000 yen (£25,520). Altogether about 80 caissons will be required. The quay walls are to be built up on the foundations thus formed, and the intervening spaces then filled up with sand, rubble, &c. Dredging is now being carried out at the spots where the caissons are to be placed. The weight of each caisson before filling will be 2,500 tons, and after filling 7,000 tons.

The eastern breakwater, on which a sum of 3,600,593 yen (£367,561) was spent in 1906, is to be used as one of walls of the eastern pier. The blocks for this breakwater have mostly been completed, but have not yet all been placed in position. Altogether about 8,000 blocks will be required, each weighing about 7½ tons.

The scheme upon which work is now being carried out makes no provision for a breakwater outside the harbour, without which shipping will always be liable to serious inconvenience in high winds from the south. A scheme of breakwaters has been approved by the Harbour Investigation Committee of the Home



Sketch of Kobe Harbour.

Department. It is a modification of the many that have already been advanced and will include a breakwater starting 500 yards from the end of the eastern pier and extending in a slight curve southwards and westwards towards Wada Point. The idea is to complete a distance of 1,200 yards of this break-water (about one-fourth of the whole) at the same time as the harbour works, and work is to be commenced as soon as the scheme is sanctioned by the Diet.

The stone jetty for passenger launch traffic at the western side of the harbour is now in course of extension.

The Kailin Canal Company.—The project to construct a canal along the foreshore from Yokohama to Tokyo being promoted by this company is to be carried out on a new plan. The Company proposes to reclaim a large area at Shinagawa by utilizing the earth excavated in constructing the water way and thus reimburse itself by the sale of the reclaimed portion. The total estimates for both works proceeding simultaneously amount to approximately 15,-000,000 yen.

JAPAN HARBORS.—The harbors of Yokohama, Kobe, and Moji have been recommended controlled by the Imperial Government and Imperial aid is proposed for Tokyo, Bay, Nagasaki, Yokkaichi, Saka, Tsuruga, Aomori, Funakawa, Shiogama, Hakodate, Otaru, etc., and the balance to be maintained by the prefectural government.

PEKING SENATE HOUSE.—A report from Peking is to the effect that a tender has been received from a German firm for construction of this building and the contract price is reported to be Tls. 2,000,000.

PHILIPPINE ISLANDS DEFENSE WORKS.—According to the report of the Chief of the U. S Engineer Corps, the estimates submitted for the insular fortifications * amounted to $1,160,000, which, it is believed, will complete the works as at present projected. In addition to this amount, $248,823 was provided for electrical installations for Philippine fortifications.

THE SWATOW WATERWORKS.—Work is under way on this construction, the contract having been let to a Hongkong firm. The water will be carried about six miles along the Chow-Chow-fu Railway.

OSAKA HARBOR WORKS.—The following is an excerpt from the report of the British consul at this port:

"The harbour at Osaka, which was constructed some years ago by the municipality with the idea of attracting foreign trade to the port, suffers greatly from lack of warehouse accommodation and from the fact that the main pier (which has a length of 1,500 ft. and is capable of accommodating six vessels at a time), has no railway connection with the city. As a result all cargo, except that which is carried in small vessels of shallow draught which can be brought up the river for a distance of about 3 miles to wharves in the city, has to be discharged into lighters for distribution to the numerous warehouses in the city. In this respect, moreover, Osaka has exceptional advantages owing to the network of rivers and canals which intersect the city in all directions and which can be navigated by tugs and lighters of considerable size. The necessity of railway connection between the main harbour and the city, however, is becoming more and more apparent and the relative merits of the northern route of 6½ miles from Umeda station on the Tokaido Railway and the southern route of 4½ miles from Imamiya station on the Kwansia Railway have formed the subject of much discussion in the local Press during the year. The question is still under consideration by the Government, but until it is decided and the line constructed it is hardly to be expected that foreign shipping will be attracted to the port to any great extent."

PRIESTMAN AWARDED "GRAND PRIX" AT BUENOS AIRES.—The modern Grab-Dredger, Excavator and Elevator, which has been so successfully operated in almost every climate had its merits recognized in a substantial way at the Buenos Aires Exposition where it was awarded the "Grand Prix" in competition with the machinery of the leading manufacturers of the world.

SHIPBUILDING, GENERAL MARINE AND FISHERIES

MANILA SHIPPING INCREASE.—The number of foreign vessels cleared during the year 1910 was 734, an increase of 146 over the previous year. The largest showing for any previous year was in 1905 when 699 vessels cleared for foreign ports. Custom House records show 4,069 entries from foreign ports in excess of the number for 1909.

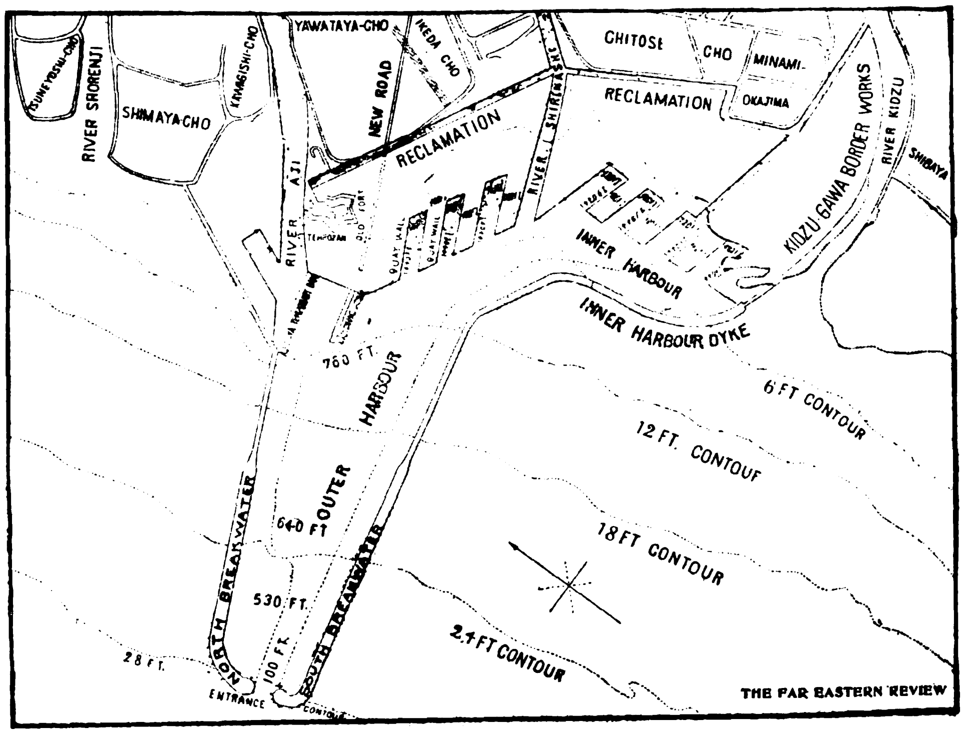
CUT RATES FOR MANILA CARNIVAL.—Return ticket from Japanese ports good from February 1 to leave Manila March 15 for return passage has been arranged by the Pacific Mail and the Nippon Yusen Kaisha. The Philippine S. S. Co. has a flat rate from Hongkong of P50 to Manila and return.

NIPPON YUSEN KAISHA REDUCES RATES.—Beginning with the first of the year this company announced round the world trips at $525 gold via New York and also by way of Canada, $515 gold, where it was formerly $535 and $525 respectively.

THE MITSUBISHI COMPANY REORGANIZES.—This company has increased the number of its departments from four to seven for increased efficiency. As now arranged there are the departments of domestic affairs, shipbuilding, mining, banking, land, general affairs, and business. Mr. Toyokawa has succeeded to the position of Manager vice Mr. Shoda, retired, and Mr. Mimura has succeeded to the position of assistant manager formerly occupied by Manager Toyokawa.

THE HAMBURG-AMERICA LINE.—Besides the leviathan of 60,000 tons being constructed for the Atlantic this company is constructing four freighters of 12,000 tons each for the East Asiatic trade.

THE NIPPON YUSAN KAISHA.—The profits for the half year ended Sept. 30 amounted to Yen 4,298,742 compared with yen 3,703,391 for the previous term. A special reserve fund was established to cover the amount of annual reduction in subsidies and the sum yen 1,073,431 was set aside for this purpose and yen 117,404 added to General Reserve bringing it up to yen 2,980,860 besides paying a dividend of 10% per annum and carrying forward yen 856,400 to next account. The company's capital liabilities amount to yen 22,000,000 and its assets. yen 53,750,000. Its fleet comprises 69 steamers with an aggregate displacement of 281,223 tons and a value of yen 28,561,000.



PLAN OF THE OSAKA HARBOR IMPROVEMENTS

CANADA'S NAVY.—Preliminary expenses to the amount of $3,000,000 has been appropriated for the preliminary expenses of establishing the Canadian Navy Department and the first vessel of the new navy to fly the flag in the Pacific will be the Rainbow which will serve as a training ship on the British Columbian coast and have some practice in running down poachers. Four cruisers and six destroyers will be the nucleus of the navy. They will be built in Canada. Docks have been subsidized for the purpose. The Pacific naval station of the Canadian government is at Esquimaux. The navy is entirely under the control of the Canadian Government.

SALVING AND WRECKING BY W. C. JACKS.—Several interesting lectures on this subject were given by Mr. Jacks before the Institute of Engineers and Shipbuilders covering the lecturer's experience in the raising of the French Cruiser "Sully" in Eastern waters and the sunken Spanish warships in Manila Bay.

THE HONGKONG AND SOUTH CHINA STEAM FISHERIES CO.—At the statutory meeting of this company held last month the charman reported that the new steam trawler ordered from Messrs. Smiths Dock Co. in Middlesborough last August would arrive and begin operations by March, 1911. The vessel will be known as the Hoi Fung. It is the purpose of the company to increase the number of trawlers as the business develops.

HONGKONG STEAM TRAWLER REGULATIONS.—Provision has been made by the Government whereby steam trawlers may elect to pay monthly rates in lieu of light dues as follows: Less than 50 tons net register, $180 per annum; 50 to 100, $270; 100 to 150, $450, 150 to 200, $630; 200 to 250, $810; 250 to 300, $1,000. They are prohibited from operating within the three mile limit.

THE YOKOHAMA DOCK COMPANY.—A third drydock added to this company's plant was opened the latter part of November. It cost yen 430,000. The dimensions are: length 481 feet; entrance width, 68 feet; depth on blocks 22 feet. Two large pumps and one small pump were installed.

THE SABATH STEAMSHIP CO., LTD.—This company showed a profit of $7,596.29 for the year ended June 30, 1910, and at the meeting held November 29 a dividend of 7.5% was ordered paid and a balance of $96 carried forward. This company is capitalized at $100,000 and owns a fleet of four vessels operating in the Borneo trade. The South Philippines S. S. Co. also paid a dividend of 7.5%.

THE PENINSULAR AND ORIENTAL S. N. CO. LTD.—This company announced a dividend for the six months of 5% on preferred, 6.5% on deferred and a bonus of 3% making a total for the term of 13% on deferred stock and a distribution of 9% on paid up capital for the year.

THE CHINO-SIAM S. N. Co. LTD.—The first year's operations of this company show a loss of Ticals 271,778. The capital stock of this company is Ticals 3,000,000 with Ticals 1,077,400 paid up.

A GERMAN LEVIATHAN.—The Stettin Vulcan Works of Hamburg is constructing for the German-American company the largest vessel in the world. Its dimensions follow:

Length, 881 ft.; beam, 100 ft.; gross tonnage, 60,000.

CHINA-JAPAN S. S. Co.—This company declared its first dividend of 6% per annum for the half year last month. The vessels have been engaged in the Yangtze carrying trade for four years.

NEW VESSELS FOR BANK LINE—The steamer Luveric of 11,000 tons displacement, one of the two new steamers for the Oriental trade, sailed from New York in December. Her sister ship, the Elleric, will be launched this month from Russel & Co.'s yards in Glasgow. These vessels are 475 feet long, 57 feet beam, and have a depth of 29 feet. They have first class accommodation for 25 and steerage 500.

MINES, MINERALS AND THE METAL, TRADE, MACHINERY, ETC.

SUGAR MILL FOR FORMOSA.—The Dyer Company of Cleveland is reported to have secured the contract for the installation of a plant for the Taihoku Sugar Co.

BURMA OIL Co.—This company declared an interim dividend of 10% on ordinary shares.

F. M. S. TIN.—Tin was quoted at $86.40 St. Cur. in Singapore last month. The export for the eleven months ended November amounted to 638,500 piculs, excluding Perak and Pahang, as against 698,000 for 1909.

RAUB REPORT.—The total output for the four weeks ended December 3rd was 528 ounces from 4,674 tons of ore crushed.

THE TONGKAH HARBOR TIN DREDGING CO.—The sum paid the Government of Siam for the relinquishment of the requirement to make a channel in the harbor is reported to be £35,000.

THE BURMA MINES LTD.—The total output of lead produced in October was 1,507 tons containing 6,784 ounces of silver.

THE RASA TIN MINING CO. LTD.—This company has been formed with a capital of $250,000, Straits Currency, to purchase and develop the deposits included in a dredging concession on the Selangor River near Rasa. The sum of $105,000 was paid the owners.

THE SIAMESE TIN SYNDICATE.—This company owns two promising properties, the Bandon and the Ngnow, the former having been tested and a dredge ordered for the latter. A dredge is in contemplation for the Bandon property.

RAWANG COAL SYNDICATE.—A company has been organized for £25,000 to develop deposits referred to in previous issues.

GOPENG TIN CO.—The profit for last year amounted to £28,730 out of which 7s. in dividends and bonus per share have been paid.

KINTA TIN MINES, LTD.—The report for the year ended June 30, 1910, shows a net profit of £30,340. A final dividend of 1s. per share has been paid making 30% for the year and leaving £5,049 to carry forward.

REDHILLS TIN MINING CO.—The profits for the year ended March 31, 1910, amounted to £4,562.

ULU PIAH TIN MINES, LTD.—The directors have announced an interim dividend of 10% and promise a final of 15%.

COMMERCIAL, FINANCIAL AND MISCELLANEOUS

JAPAN'S NATIONAL DEBT.—According to official reports the total outstanding is yen 2,620,709,000 of which 1,175,000,000 represents domestic and 1,445,700,000 foreign loans, the total being an increase of 38,000,000 compared with the previous year.

ILOILO'S INCREASE TRADE.—For the six months ended December 31, the total customs receipts amounted to ₱851,267 as against ₱764,563 during the corresponding period 1909.

SIAMESE BUDGET FOR 1910-11.—The estimates submitted call for a revenue of 64,250,000 Ticals and approximately the same expenditure. This is an increase of over Ticals 1,000,000 compared with 1909-10 although there was a balance over from the previous year of 71,079, while the estimates for 1911 allow for a balance of Ticals 558.

THE EWO COTTON SPINNING AND WEAVING Co.—This company has declared a dividend of Tls. 4 per share on ordinary shares and carried forward Tls. 8,914 from a total credit to profit and loss of Tls. 68,914.00.

PHILIPPINE SOCIETY OF ENGINEERS.—The following officers were elected for 1911:

President, C. G. Wrentmore; Vice-Psesident, H. P. Lennell; Secretary, E. R. Frisby; Treasurer, S. O. Scudder; and Trustee, L. F. Goodale for three years, H. L. Higgins for two years and Warren D. Smith for one year.

CHINA'S BANK NOTES.—The Taching Bank has been instructed to enter into a contract with the American Bank Note Company for the printing and notes of $100, $50, $10 and $1 denominations for early circulation.

CHINESE-AMERICAN UNDERTAKING.—According to the Chinese press, arrangements have been under way to establish a Chinese-American bank, a Chinese-American museum and a Chinese-American S. S. Co. with joint American and Chinese capital.

THE SHANGHAI CENSUS.—The total population, according to the latest official census, is 501,541, of which 13,536 are foreigners. This is an increase in foreign population of 2039, and Chinese of 35,289 compared with 1905. The numbers of Britishers are 4,465 an increase of 752; Americans, 940, a falling off of 50; Japanese, 3,361, an increase of 1,204; Portuguese, 1,495, an increase of 164; and Germans, 811, an increase of 26; French, 330, a falling off of 63 and also a falling off in the Russian, Spanish, Italian, Danish, Austro-Hungarian, Norwegian and an increase in the Swedish of 57.

FORMOSAN PINEAPPLE INDUSTRY.—The total output of the two canneries operating in Central Formosa will reach 100,000 tins this year. Two crops are grown annually.

THE ZAMBOANGA FAIR.—Great preparations are being made for the exposition to be held from February 7 to February 14. This is an effort to make a comprehensive presentation of Mindanao development.

RUBBER DIVIDENDS.—Highlands and Lowlands have declared a third interim dividend of 10%; Ceylon Land and Produce paid a final of 22.5% making 30% for the year. The Seking Rubber Co. paid its first dividend of 6%.

THE UNITED ASBESTOS ORIENTAL AGENCY.—The balance to the credit of the profit and loss account at the end of the year was $8,411.43. Of this $342.54 was brought forward from last year's account. The dividend of 15 per cent will absorb $5,940.00. The General Managers receive $2,00,00, and $471.43 carried over to the new account.

NEW FORMOSAN TEA COMPANY.—The Japan-Formosa Tea Company, capital $500,000 gold, has been formed by Japanese to grow black tea for the eastern Russia market. The Formosan government has donated to it the tea experimental plantation at Ampingchin, given it a $15,000 annual subsidy, and guarantees 6 per cent interest on the part of the capital paid up ($125,000) for seven years.

CHINA TEA TRADE.—According to Customs report, China exported in 1909 tea of all kinds to the weight of 1,498,443 piculs. This compares with the following figures for nine previous years:—1,384,324 piculs in 1900; 1,157,993 in 1901; 1,519,211 in 1902; 1,677,530 in 1903; 1,451,429 in 1904; 1,369,298 in 1905; 1,404,128 in 1906; 1,610,125 in 1907; and 1,576,136 in 1908.

Of the tea exported in 1909 the largest quantity found its way to Russian Pacific ports—521,289 piculs. No less than 249,786 piculs were exported to Russia and Siberia by the land frontier, while the United States (including Hawaii) was the next biggest customer, taking 211,983 piculs. Hongkong claimed 103,287 piculs and Great Britain 87,239.

JAPAN'S SILK TRADE.—Altogether 55,178 bales of raw silk were exported from Yokohama to various foreign countries during the past six months from January 1 to June 30 this year says the *Commerce Journal*. Of the figures 38,286 bales were carried by American vessels, 2,227 bales by British vessels, 8,615 bales by French vessels and 60,500 bales by German vessels. The largest quantity handled by the export merchants was 11,836 bales for America by the Mitsui Bussan Kaisha, followed by 10,280 bales for America, Germany and France by the Kiito Gomei Kaisha. The shipments of waste silk from Yokohama during the first half of this year amounted to 12,659 bales. During the term, all the shipments of waste silk were made.

LONDON METAL MARKET

The following are (December 9) prices of metals:—

	£	s.	d.		£	s.	d
COPPER.							
*Tough cake and ingot	60	10	0	..	61	0	0
*Best selected	60	10	0	..	61	0	0
*Electrolytic	61	10	0	..	62	0	0
*Sheets and sheathing	72	0	0	..	—		
*Flat bottoms	75	0	0	..	—		
STANDARD †Cash	56	17	6	..	—		
STANDARD †Three Months	57	12	6	..	—		
*Copper tubes, seamless per lb.	0	0	8¼	..	—		
*Lake	62	0	0	..	63	0	0
* Less 3½ per cent. † Net.							
ALLOYS.							
BRASS: Wire	0	0	6¼	..	—		
,, Tubes (solid drawn)	0	0	6¼	..	—		
,, Sheets	0	0	7	..	—		
TIN.							
English ingots, f. o. b.	174	0	0	..	175	0	0
,, bars	175	0	0	..	176	0	0
,, refined	176	0	0	..	177	0	0
Straits... Cash	174	15	0	..	—		
Straits... Three months	175	0	0	..	—		
Australian spot	—			..	—		
Banka (in Holland) Cash	175	0	0	..	—		
Banka (in Holland) Three months	174	16	8	..	—		
LEAD.							
Spanish or soft foreign	£13	3	9	..	13	5	0
English pig, common	13	6	3	..	13	8	9
,, L. B.	13	15	0	..	—		
,, sheet and bar lead	14	15	0	..	—		
,, pipe	15	5	0	..	—		
,, red	15	15	0	..	—		
,, white	18	5	0	..	—		
,, patent shot	16	5	0	..	—		
SPELTER.							
Silesian ordinary brands	23	17	6	..	24	0	0
,, special brands	24	0	6	..	24	10	0
English Swansea	25	0	0	..	25	10	0
Sheet zinc	29	5	0	..	—		
ANTIMONY.							
Antimony	27	0	0	..	29	0	0
,, Crude	12	0	0	..	13	10	0
,, Ore (basis 50%)	7	0	0	..	8	0	0
QUICKSILVER.							
Flasks, 75 lbs. warrants	8	0	0	..	—		
ALUMINIUM.	Per ton.				Per ton.		
98-99 per cent.	69	0	0	..	70	0	0
NICKEL.	Per ton.				Per ton.		
98-99 per cent. guaranteed	167	10	0	..	171	0	0

PLATINUM.

Per oz. Troy, 160s.; nominal and subject to negotiation.

The Mining Journal.

FAR EASTERN STOCKS AND QUOTATIONS

Courtesy of Messrs. Kadoorie & Co., Hongkong, December 30, 1910.

STOCK.	WHEN ESTABLISHED	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	AT WORKING ACCOUNT	DATE	LAST DIVIDEND	Approximate Yield per cent per annum at Present Quotation	CLOSING QUOTATIONS
BANKS.											
Hongkong & Shanghai Banking Corporation	1865	$15,000,000	120,000	$125	$125	g £1,500,000 s $16,000,000 i $250,000	$2,029,390	31-6-10	£2. for first half year ending 30-6-10, @ ex 1/9⅜ = $22.456	5%	$900 sales £86/-
National Bank of China, Ld.	1891	£699,475	10) 99,925	£7	£6	e £4,099 $400,000	$34,167	31-12-09	$2 (London 3/6) for 1903	....	$80 buyers
MARINE INSURANCES.											
Canton Insurance Office, Ld.	1881	$2,500,000	10,000	$250	$50	$1,600,000 j $268,696 u $305,181	Nil.	31-12-08	$15 for 1909	8½%	$185 sales
North China Insurance Co., Ld.	1903	£150,000	10,000	£15	£5	g £125,000 s Tls. 225,000 u Tls. 368,644 f Tls. 137,308	Tls. 205,719	30-6-10	Final dividend of 7½% for 1909 making 15% in all....	5%	Tls. 140 sales
Union Ins. Society of Canton, Ld.	1867	$3,100,000	12,400	$250	$100	s $3,000,000 g £90,000 f $287,984 j $1,449,735 u $713,985	2,552,545	31-12-09	Final of $20 per share, making in all $50 per share for 1908, and an int. div. of $30 per share for 1909	6%	$827½
Yangtsze Ins. Association, Ld.	1889	$1,200,000	12,000	$100	$60	$1,000,000 j $371,802 £169,861	$797,602	31-12-09	$12 for year ending 31-12-08 and interim of $3 on account of 1909	7¾	$19[illegible]
FIRE INSURANCES.											
China Fire Ins. Co., Ld.	1870	$2,000,000	20,000	$100	$20	$1,000,000 s $550,348 f $61,168	$438,406	31-12-09	$6 and bonus $2 for 1908	7%	$118 buyers
Hongkong Fire Ins. Co., Ld.	1868	$2,000,000	8,000	$250	$50	$1,460,000 j 81,153	$426,218	31-12-09	$27 for 1908	8%	$362½ buyers
SHIPPING.											
China & Manila Steamship Co., Ld.	1882	$750,000	1) 30,000	$25	$25	i $57,734	Dr $3,777	31-12-09	$4% for 1906	....	$8 sellers
Douglas Steamship Co., Ld.	1883	$1,000,000	20,000	$50	$50	$230,000 i $100,589	Nil.	30-6-10	$2½ for year ending 30-6-1908	....	$20 sellers
Hongkong, Canton & Macao Steamboat Co., Ld.	1865	$1,200,000	80,000	$15	$15	s $250,000 d. i. $630,000 f $130,545 $ 19,106	$18,026	30-6-10	Dividend of $1½ for half year ending 30.6.1910	8½%	$30 sales
Indo-China Steam Navigation Co., Ld. (Preferred) Do. Do. (Deferred)	1882	m £600,000	2) 60,000 2) 60,000	£5	£5	i £138,100	£15,162	31-12-08	3% = 3/- on Preferred shares only for 1910	....	$56 sellers
"Shell" Transport & Trading Co., Ld.	1898	£ 2,000,000	2,000,000	£1	£1	£120,000 i £1,000,000	£205,868	31-12-09	Final div. of 2/6 per share (coupon 14) making in all 4/6 per share for 1909, and an int. div. of 1s. per share on % for 1910	5%	81/- sellers £11 buyers
"Star" Ferry Co., Ld.	1898 1900	$200,000	10,000 10,000	$10 $10	$10 $5	$6,500 i $55,830	$1,159	30-4-10	A dividend of 7% and bonus of 5% making 12% for year ending 30.4.1910	5% 6%	$23 $12½
REFINERIES.											
China Sugar Refining Co., Ld.	1878	$2,000,000	20,000	$100	$100	e $520,000 r $83,620	Dr. $8,090	31-12-09	$5 for half year ending 30-6-1910.	6%	$124 sellers
Luzon Sugar Refining Co., Ld.	1882	$700,000	7,000	$100	$100	none	Dr. $101,851	31-12-09	$3 for 1897	—	$122 sellers
MINING.											
Chinese Engineering & Mining Co., Ld.	1901	£1,000,000	1,000,000	£1	£1	d £215,000 h £12,289	....	..	Final div. of 1/6 for the year 1910 making 15% (coupon 15)	9%	Tls. 15
Headwaters Mining Co.	1908	₱600,000	28) 600,000	₱10	₱10				First year		₱10
Raub Australian Gold Mining Co., Ld	1892	£200,000	150,000 50,000	£1 £1	18-10 £1	£4,873	Dr.	..	1/2 per share, 13th div.	5%	$3
Oriental Consolidated Mining Co. Ld.	....	g $5,000,000	500,000	g $10	$10	none	....	..	Final of gold $0.65 for 1909 in all g. $1.15	..	32/6
DOCKS, WHARVES AND GODOWNS											
Fenwick (Geo.), & Co., Ld.	1889	$450,000	s 18,000	$25	$25	$25,275	Dr $8,460	31-12-09	$1½ for year ending 31-12-06	....	$5
Hongkong & Kowloon Wharf & Godown Co., Ld.	1886	$3,000,000	60,000	$50	$50	$550,000 t $31,993 s $40,000	$4,848	31-12-09	$2½ for 1909	4½%	$52½ buyers
Hongkong & Whampoa Dock Co., Ld.	1866	$2,500,000	50,000	$50	$50	i $88,214 v $221,000	$148,940	30-6-10	3% for half year ended 30-6-1909 Final of Tls. 3½ making Tls. 6 in all for year 30-4-1910	.. 8%	$53 Tls. 68
Shanghai Dock & Engin'g Co., Ld.	1906	Tls. 5,570,000	13) 55,700	Tls. 100	Tls. 100	Tls. 1,000,000	....	..			
Shanghai & Hongkew Wharf Co., Ld.	1902	Tls. 3,600,000	36,000	Tls. 100	Tls. 100	b Tls. 697,257 r Tls. 50,000 e Tls. 125,000	....	..	Interim of Tls. 3 for 1910	7	Tls. 95
LANDS, HOTELS AND BUILDINGS.											
Anglo-French Land Investment Co., Ld.	1906	Tls. 2,500,000	8) 25,000	Tls. 100	Tls. 100	Tls. 35,000	Tls. 4,314	29-2-09	Tls. 6 for year ending 29-2-10	5½	Tls. 97
Central Stores, Ld.	—	$751,845	16) 50,123	$15	$15	n. $1,000	$1,000	31-12-08	8% for 1909	....	$11 sellers
Hongkong Hotel Co., Ld.	1866	$600,000 $400,000	12,000 8,000	$50 $50	$50 $25	$648,975 r $20,000	$21,477	30-6-10	$3 on old shares, $1.50 on new shares, for half year ending 30-6-10	5½%	$99 $65 sellers
Hongkong Land Investment & Agency Co., Ld.	1889	$5,000,000	50,000	$100	$100	e $250,000	$27,971	31-12-09	Interim of 3½ for 1910	7%	$99½ sellers
Humphreys' Estate & Finance Co., Ld.	1887	$1,500,000	150,000	$10	$10	i $226,945 20) $25,856	$5,471	31-12-09	45 cents for 1909	5½%	$6½ buyers
Kowloon Land & Bldg. Co., Ld.	1889	$300,000	6,000	$50	$30	none	$269	31-12-09	$2½ for 1909	8%	$33½
Shanghai Land Investment Co., Ld.	1888	Tls. 8,900,000	78,000	Tls. 50	Tls. 50	Tls. 1,523,045 e Tls. 300,000	Tls. 63,969	31-12-09	Interim of Tls. 3 for 1910	6½	Tls. 100
West Point Bldg. Co., Ld.	1889	$625,000	12,500	$50	$50	none	$1,958	31-10-09	Interim of $1.80 for 1910	8½	$39 buyers
COTTON MILLS.											
Ewo Cotton Spinning & Weaving Co., Ld.	1895	Tls. 1,000,000	5) 20,000	Tls. 50	Tls. 50	Tls. 250,000	Tls. 10,991	31-10-09	Tls. 11 for year ended 31-10-09	8½	Tls. 85
Hongkong Cotton Spinning, Weaving & Dyeing Co., Ld.	1901	$1,250,000	125,000	$10	$10	e 20,000	$26,297	30-7-09	50 cents for year ending 31-7-08	—	$4½ buyers

FAR EASTERN STOCKS AND QUOTATIONS—(Continued.)

STOCK.	WHEN ESTABLISHED	CAPITAL.	NO. OF SHARES.	VALUE	PAID UP.	RESERVE	AT WORKING ACCOUNT.	DATE.	LAST DIVIDEND.	Approximate Yield per cent. per annum at Present Quotation.	CLOSING QUOTATIONS
International Cotton Manufacturing Co., Ld.	1895	Tls. 750,000	6) 10,000	Tls. 75	Tls. 75	Tls. 175,000	Tls. 8,372	30-9-09	Tls. 7½ for year end. 30-9-09 (10%)	10%	Tls. 46
Laou-kung-mow Cotton Spinning & Weaving Co., Ld.	1895	Tls. 800,000	8,000	Tls. 100	Tls. 100	none	Tls. 4,829	31-12-08	Tls. 6 for 1909	10%	Tls. 48½
Soy Chee Cotton Spinning Co., Ld	1895	Tls. 1,000,000	2,000	Tls. 500	Tls. 500	f Tls. 31,173	Tls. 31,173		Tls. 35 for 1909	17%	Tls. 245
MISCELLANEOUS											
Bell's Asbestos Eastern Agency, Ld.	1895	£5,377.10s.	11) 8,604	12/6	12/6	£1,500	£797	31-12-09	15% for 1909		$8 sellers
China-Borneo Co., Ld.	1903	$720,000	8) 60,000	$12	$12	$40,000	Nil.	31-12-08	5% for 1909	6½	$9 sellers
China Light & Power Co., Ld. Do. do. Special Shares	1901 1907	$300,000	50,000 17) 50,000	$5 $1	$5 $1	none	$50,242	31-7-10	60 cents for year ending 28-2-06		95 cts. buyers
China Provident Loan & Mortgage Co., Ld.	1898	a $1,250,000	7) 125,000	$10	$10	$80,000	$2,602	31-12-09	80 cents for 1909	10%	$7 buyers
Dairy Farm Co., Ld.	1896	$300,000	40,000	$7½	$6	l $10,000 $10,000	$1,850	31-7-09	$1.20 for year ending 31-7-09	%	$17¾
Green Island Cement Co., Ld.	1897	$4,000,000	400,000	$10	$10	$14,000	$4,290	31-12-09	Interim of 15 cts. per share for 1910	15	$3 buyers
H. Price & Co., Ld.	1907	$120,000	19) 15,000	$10	$10	none	$1,923.87	31-12-09	14% viz $1.40 for 1909	12%	$12
Hongkong Electric Co., Ld.	1889	$600,000	60,000	$10	$10	none	$11,798	28-2-10	A dividend of $1.20 per share and a bonus of 10 cts. per share for year end. 28-2-10.	6½	$20
Hongkong Ice Co., Ld.	1881	$125,000	5,000	$25	$25	k $150,000	$12,662	31-12-09	Interim of $2 pershare for 1910	....	$120 buyers
Hongkong Rope Manufacturing Co., Ld.	1883	$600,000	$60,000	$10	$10	$40,000	$9,176	31-12-09	Interim of $1 per share for 1910	9	$18 sellerss
Maatschappij tot Mijn-, Bosch- en Landbouwexploitatie in Langkat.	1902	Gs. 2,500,000	25,000	Glds. 10	Glds. 10	21 Tls. 547,500 Tls. 547,500 f Tls. 63,914	Tls. 316,682	31-12-08	3rd Interim Div. of Tls. 15 making in all Tls. 37½ for 1910	5	Tls. 100
Peak Tramways Co., Ld. Do. (New)	1907	$750,000	25,000 50,000	$10 $10	$10 $10	$20,000	$3,014	30-4-10	80 cents on fully paid shares & 8 cents on $1 paid shares for year ending 30-4-10	5¼ 5	$13 sellers $1½ sellers
Philippine Co., Ld.	1904	$750,000	75,000	$10	$10	none	Ps. 2,875	31-12-09	None	....	$8
Robinson Piano Co., Ltd.	1900	$200,000	22) 4 000	$50	$50	$5,000	$61,138	31-8-08	6% for ½ year ending 30.9.07	....	$50
Shanghai-Sumatra Tobacco Co., Ld.	1902	Tls. 600,000	9) 30,000	Tls. 20	Tls. 20	Tls. 24,820 w Tls. 100,000	Tls. 5,250	31-10-08	No dividend this year	2	Tls. 102½
South China Morning Post, Ld.	1903	$150,000	6,000	$25	$25	none	Dr. $31,096	31-8-09	None	....	$25
Steam Laundry Co., Ld.	1902	$100,000	20,000	$5	$5	none	$127,86	31-5-10	50 cents for year ending 30-5-10	8	$5½ buyers
Union Waterboat Co., Ltd.	1905	$500,000	15) 50,000	$10	$10	w $11,956	..	31-12-08	60 cents for year-end. 31-12-1908	6¼	$6¼ b. and sales
United Asbestos Oriental Agency, Ld.	1896	$100,000	10,000	$10	$4	$46,000	$471	31-5-10	15% per ordinary share for year ended 31-5-10	5	$11½ sellers
Watkins, Ltd.	1899	$100,000	10,000	$10	$10	none	$19,41	31-12-09	3½ for 1909		$3 sellers
Watson (A. S.) & Co., Ld.	1886	$900,000	90,000	$10	$10	e) $300,000 $25,000	$1,776	31-12-09	3% for 1909	—	$6
Weismann Limited	1904	$30,000	3,000	$10	$10	$12,250	$67	31-7-10	10 per cent for year endg. 31.7.10.	10%	$12 buyers
William Powell, Ld.	1901	$105,000	15,000	$7	$7	none	$782	30-6-09	30 cents making 80 cents for year ending June 30th 1906	....	$2½
Societe des Pulpes et Papeteries du Tonkin		660,000	13,200	50 Haiphong	35 Currency	....	..	....	First year	....	$36 (Hk.Cy.) sel
RUBBERS											
Allagar Rubber Estates, Ltd.	1909	£85,000	29) 750,000	2/-	2/-	....	....	....		....	5/-
Anglo-Malay Rubber Co., Ltd.	1905	£150,000	1,500,000	2/-	2/-	....	....	....	25% interim	....	24
Balgownie Rubber Estate, Ltd.	1905	†† $200,000	‡‡ 20,000	†† $1	†† $1	$7,400	$11,205	31-3-09	40% interim	....	$10¾ [Singapore]
Castlefield Rub. Ld., [fully pd.]	1906	£35,000	27) 32,650	£1	£1	none	....	....		....	119
Damansara (Selangor) Rub. Co.	1906	£110,000	25 110,000	£1	£1	nil.	£2,220	31-12-08	50% for 1909	....	152/6
Golconda Malay Rubber Co.	1907	£80 000	26 80,000	£1	£1	nil.	nil.	—	25% interim	....	102/6
Highland & Lnd. Para R. Co. Do Do. [fully paid] Do. Do. [partly paid]	1906	£310,000	=181,454 123,546	£1 £1	£1 15/-	£8,784	....	....	35% for 1909	....	107/6
Kamuning (Perak) Rb. & Tin Co. do do A Shares do do B Shares	1909	£200,000	950,000 105,000	2/- £1	1/- £1	nil.	nil.	....		....	5/- prem.
Kuala Lumpur Rubber Co., Ltd.	1906	£180,000	180,000	£1	£1	£4,000	1,82	....	75% interim	....	165/-
Linggi Plantations, Ltd. (ord.) Do. Do. (7% pref.)	1895 Reconst	£100,000	×900,000 10,000	2/- £1	2/- £1	....	....	....	150% interim 7% for 1909	....	47/3
Ledbury Rubber Estates Ltd. Do. Do. (contrib.)	1908	£125,000	§§ 60,000 §§ 40.000	£1 £1	£1 7/6	....	....	....	17½% for 1909	....	65/-
Sagga Rubber Co. Ld.	1903	£20,000	24) 2,000	£1	£1	nil.	nil.	....	25% interim	....	270/-
Sandycroft Rubber Co.	1904	$100,000	50,000	$2	$2	$20,000	$1,275	31.1.08	100% interim	....	$26
Sekong Rubber Co., Ld.	1908	£80,000	27) 80,000	£1	12/6	nil.	nil.	....		....	11/3 prem.
Shelford Rubber State Ld.	1906	£65,000	65,000	£1	£1	nil.	£836	31.12.08	7½% for 1909	....	73/9
Singapore & Johore Rb. Co., Ld.	1903	$250,000	2,500	$2	$2	nil.	nil.	....	25% interim	....	$13
Sungei Choh. Rb. State Co., Ld.	1907	£45,000	45,000	£1	£1	nil.	nil.	....		....	92/6
Sungei Kapar Rubber Co.	1906	£110,000	23) 110,000	£1	£1	nil.	£3,448	31.12.08	37½% for 1909	....	14/-
Toerangie Rubber Co.	1910	30) £100,000	51,000	£1	7/6	....	....	....	First year	....	par.

LOANS AND DEBENTURES.	AGENTS FOR THE LOAN.	AMOUNT OF LOAN.	PAR VALUE.	OUTSTANDING BONDS.	WHEN PAYABLE.	CLOSING QUOTATIONS.
China Government, 7 per cent. Silver Loan 1886 E	Hongkong & Shanghai Banking Corporation.	Tls. 767,200	Tls. 250	1914	Mar. 31st and Sept. 30th each year until Mar. 31st, 1917	par. Plus interest
Hongkong Hotel Company, Ltd., 6 per cent. Mortgage Debentures of 1899 ‡	Hongkong & Shanghai Banking Corporation.	$750,000	$500	§ all	Half yearly, June 30th and December 31st	par
Shanghai & Hongkew Wharf Company, Ltd., 6 per cent. Debentures of 1902	Hongkong & Shanghai Banking Corporation.	Tls. 543,900	Tls. 100	....	Half yearly, June 30th and December 31st	Tls. 103½
Astor House Hotel Company, Ltd., 8 per cent. Debentures of 1903	Hongkong & Shanghai Banking Corporation.	Tls. 500,000	Tls. 100	....	Half yearly, January 1st and July 1st	102½
Chinese Engineering & Mining Co., Ltd., 6 per cent. Debentures of 1903 †	....	£500,000	¶	£431,960	Half yearly, June 30th and December 31st	par.
International Cotton Manufacturing Co., Ltd. 7% Debentures of 1901	Russo Chinese Bank	Tls. 500,000	Tls. 100	‖	Half yearly, March 31st and Sept. 30th	Tls. 97½.

a Authorized capital $2,000,000.
b Building Reserve Account.
c Capital Reserve Fund.
d Depreciation Fund.
e Equalization of Dividend Fund.
f Exchange and Investment Fluctuation Account.
g Gold Reserve Fund
h Exchange and Reserve Account.
i Insurance Fund.
j Reinsurance Fund.
k Contingencies Account.
l Legal Reserve Fund.
m Authorized Capital
n Sinking Fund.
o Raw Sugar Reserve Account.
p Premium on New Issue.
q Boiler Repairs and Renewals Account
r Repairs and Renewals Account.
s Silver Reserve Fund.
t Depreciation and Repair Account
u Underwriting Suspense Account.
v Special account
w Special Works Fund.
x Extra Reserve Fund.
y 72,560 owned by the Company.
z 7,200 shares unissued.
1 4,000 shares unissued.
2 First issue of 60,000, of which 10,411 unallotted.
3 5,000 shares unissued.
4 4,480 shares unissued.
5 5,000 shares unallotted.
6 1,616 shares unallotted.
7 75,000 shares unissued.
8 14,000 shares unissued
9 17,000 shares unissued.
10 40,453 shares actually issued.
11 7,688 shares actually issued.
12 4,200 shares unissued.
13 500 shares unissued.
14 399 shares unissued.
15 22,277 shares unissued.
16 10,000 shares unissued.
17 Special shares are entitled to half of the profits.
18 Capital contributed by Chinese Government-Kuping Tls. 50,000.00.
19 12,000 issued only.
20 Typhoon and Floods Insurance Fund.
21 Special Cash Reserve.
22 1000 shares unissued.
23 10,000 shares unissued.
24 4595 part paid shares.
25 7,500 shares unissued.
26 10,000 shares unissued.
27 2,350 shares unissued.
28 25,000 shares unissued,
29 10,000 shares unissued.
30) 3,700 fully paid vendor shares and an option of 5,000 shares at par for 5 years granted to option holders.
*Based on last year's dividend.
** Based on present dividend.
§ 216 held by the Company.
‖ Only Tls. 134,000 taken up.
¶ In certificates of £20 and £100.
‡ Redeemable in 10 years, or at option of Comp., the Company giving 6 months notice.
† Redeemable at par at rate of £10,000 per annum from 31st December 1903 to 31st December 95.
*** Redeemable at par on 30th June, 1915.
Dr. Deficit.
†† Singapore dollars.
‡‡ 4,880 shares unissued.
× 16,756 shares unissued.
§§ 25,000 shares unissued.
4140 shares unissued.

ADDITIONAL SHANGHAI SHARE QUOTATIONS

December 30, 1910

STOCK	CLOSING QUOTATIONS	HIGHEST AND LOWEST PRICES DURING THE WEEK	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	LAST DIVIDEND	WHEN PAID
Vulcan Iron Works, Limited....	Tls. 10		Tls. 500,000	1,000	Tls. 500	Tls. 500	—	Tls. 50 for year ended 31.8.06......	Nov. 1, 1906
Yangtsze Wharf & Godown Co. Limited........................	Tls. 195		Tls. 250,000	2,500	Tls. 100	Tls. 100	Tls. 50,000	Tls. 15 for 1909........................	April 1, 1910
Wei-hai-wei Land & Building Co., Limited....................	Tls. 8 nominal		Tls. 91,850	3,674	Tls. 25	Tls. 25	—	Interim of $2.00 for 1909............	Aug. 8, 1909
Anglo-German Brewing Co., Limited........................	$80 sellers		$100,000	4,000	$100	$100	none	5% for 1909	Mar. 12, 1910
Butler Tile Works, Limited.....	Tls. 23		Tls. 60,000	1,200	Tls. 50	Tls. 50	—	Tls. 3 for year ending 31.3.09......	June 8, 1909
Major Bros., Limited	Tls. 40		Tls. 300,000	6,000	Tls. 50	Tls. 50	—	——	—
Oriental Ice Company, Limited.	Tls. 25		Tls. 130,000	2,600	Tls. 50	Tls. 50	—	First year	—
Scharffs Oil and Bone Mills, Ltd.	Tls. 40		Tls. 200,000	4,000	Tls. 50	Tls. 50	—	First year	—
Shanghai Ice Company, Limited.	Tls. 13		Tls. 200,000	8,000	Tls. 25		—	6 for 1909..........................	Mar. 14, 1910
Dunning & Company, Limited..	$33 sales		$100,000	2,000	$50	$50	—	$5 year ending 28.2.08......	Apr. 15, 1908
J. Llewellyn & Co., Limited.....	$60 nominal		$72,000	1,200	$60	$60	—	7.20 for 1909	May 1, 1910
Lane, Crawford & Company ..	$120		$250,000	2,500	$100	$100	—	10% for year 1909....................	Apr. 28, 1910
S. Moutrie & Company, Limited.	$20		$250,000	5,000	$50	$50	—	$2 for year ended March 31, 1909.	June 18, 1909
Weeks & Company, Limited ...	$23		$400,000	20,000	$20	$20	$40,000	Final of 6% making 10% for 1909..	June 1, 1910
Dominion Rubber Co., Limited.	Tls. 30		Tls. 225,000	22,500	Tls. 10	Tls. 4	—	First year..........................	—
Senawang Rubber Estates Company, Limited.................	Tls. 50		Tls. 250,000	2,500	Tls. 100 Tls. 100	Tls. 100 Tls. 75	—	20% for year ending May 31 1910 ...	May 9, 1910
Tebong Rubber and Tapioca Estate, Limited...................	Tls. 20		£76,000	76,000	£1	£1	—	50 cents for 1909....................	Sept 2, 1910
Shanghai Mercury, Limited	Tls. 55		Tls. 105,500	2,100	Tls. 50	Tls. 50	—	Final of 6% making 16% year 1909.	June 22, 1910
Shanghai Mutual Telephone Co., Limited	Tls. 64		Tls. 675,000	13,500	Tls. 50	Tls. 50	—	Tls. 8 for 1907........................	June 28, 1909
China Export, Import & Lumber Company, Limited...........	Tls. 75 sales		Tls. 350,000	500	Tls. 100	Tls. 50	—	5 p. c. for 1909........................	May 1, 1910
China Printing Co., Limited.....	Tls. 60		Tls. 750,000	1,500	Tls. 50	Tls. 50	—	7% 1908..................................	Apr. 18, 1909
Hirano Mineral Water Co., Ltd.	Y. 10		Y. 125,000	5,000	Y. 25	Y. 25	—	10%=yen 2½ for year ending 30th Sept. 08 Y. 1.20 for year ended Feb. 29..................	Apr. 26, 1909
Shanghai Electric & Asbestos Company, Limited.............	$21 sellers		$125,000	5,000	$25	$25	—	8% for year ended Feb. 28, 09....	June 21, 1909
Shanghai Electric Construction Company, Limited	£6/5	£11	£320,000	32,000	£10	£10	—	First year..................	—

DEBENTURES

LOANS		PRICE—PLUS ACCRUED INTEREST	AMOUNT OF LOAN	OUTSTANDING	NOMINAL VALUE	RATE OF INTEREST	WHEN PAYABLE
Shanghai Municipal Debentures	1892	Tls. 97	Tls. 45,400	Tls. 45,400	Tls. 100	5 %	June & Dec.
do	1893	,, 100	,, 46,200	" 32,000	" 100	5½ ,,	Do
do	1894	,, 106	,, 60,000	" 60,000	" 100	6 ,,	Do
do	1895	,, 97	,, 107,600	" 32,600	" 100	5 ,,	Do
do	1896	,, 97	,, 117,300	" 131,800	" 100	5 ,,	Do
do	1897	,, 97	,, 268,400	" 268,400	" 100	5 ,,	Do
do	1898	,, 106	,, 60,000	" 60,000	" 100	6 ,,	Do
do	1900	,, 100	,, 81,700	" 31,700	" 100	5½ ,,	Do
do	1901	,, 106	,, 77,000	" 200,000	" 100	6 ,,	Do
do	1902	,, 106	,, 145,000	" 150,000	" 100	6 ,,	Do
do	1903	,, 106	,, 430,500	" 490,500	" 100	6 ,,	Do
do	1904	,, 106	,, 164,500	" 214,500	" 100	6 ,,	Do
do	1905	,, 106	,, 285,900	" 320,000	" 100	6 ,,	Do
do	1907	,, 106	,, 500,000	" 250,000	" 100	6 ,,	Do
do	1908	,, 250 scarce	,, 650,000	" 354,400	" 250	6 ,,	Do
do	1909	,, 97½	,, 300,000	" 250,000	" 100	6 ,,	Do
Chinese Imperial Government Loan	1886 E	,, 102½	,, 354,400	"	" 100	7 ,,	Mar. & Sept
Shanghai Land Investment Co., Debentures	1892	,, 95	,, 250,000	" 250,000	" 100	6 ,,	May & Nov.
do	1894	,, 104	,, 250,000	" 250,000	" 130	6 ,,	Mar. & Sept.
do	1896	,, 104	,, 250,000	" 250,000	" 100	5 ,,	June & Dec.
do	1900	,, 95	,, 250,000	" 250,000	" 100	6 ,,	April & Oct.
do	1901	,, 104	,, 250,000	" 100,000	" 100	6 ,,	June & Dec.
do	1901	,, 104	,, 100,000	" 400,000	" 100	5 ,,	May & Nov.
do	1902	,, 104	,, 400,000	" 250,000	" 100	6 ,,	June & Dec.
do	1905	,, 104	,, 250,000	" 815,900	" 100	6 ,,	Do
Shanghai Waterworks Co., Debentures.................	1909	,, 104	,, 865,900	"	" 100	6 ,,	April & Oct.
Shanghai Gas Co., Debentures..............................	1909	,, 106	,, 775,000	" 800,000	" 100	5 ,,	Do
Shanghai and Hongkew Wharf Co., Debentures...........	1902	,, 105 scarce	,, 1,000,000	" 799,800	" 100	6 ,,	June & Dec.
Astor House Co., Debentures..............................	1905	,, 100	,, 750,000	" 500,000	" 100	7 ,,	Do
British Municipal Council, Hankow.......................	1901	Sh. ,, 100	H'kow Tls 100,000	H'kow Tls 100 000	" 100	7 ,,	June & Dec.
Shanghai Club Debentures....................................	1907	,, 100	Tls. 170,000	Tls. 170,000	" 100	6 ,,	Do
Country Club Debentures..		,, 102½	,, 139,000	" 139,000	" 100	6 ,,	Do
do	1907	,, 102	,, 92,000	" 92,000	" 100	6 ,,	Do
Lane Crawford & Co., Debentures...........................	1907	,, 105	,, 110,000	" 110,000	" 100	7 ,,	Mar. & Sept.
Anglo-French Land Debentures..............................	1908	,, 102	,, 250,000	" 250,000	" 100	6 ,,	June & Dec.
Central Stores Ltd. Debentures..............................	1908	,, 102½	,, 250,000	" 250,000	" 100	8 ,,	Do
Shanghai Mutual Tel. Co. Debentures	1909	,, 102½	,, 200,000	" 200,000	" 100	6 ,,	Do

SINGAPORE SHARE QUOTATIONS

(Courtesy Messrs. Fraser & Co., Brokers, Singapore, December 30, 1910)

Date of Formation	Capital	Capital paid up	No. of Shares Issued	Issue Value	Paid up	Reserve	Last Dividend	Name	Buyers	Sellers.
								MINING		
1903	$300,000	300,000	30,000	10	10	....	10% interim	Belat Tin Mining Co., Ltd..................	4.10	4.25
1907	$300 000	225,000	22,500	10	10	....	....	Bruang Ltd..................................	6.25	6.75
1901	$600,000	600,000	60,000	10	10	25,000	6% for year ending 30-4-09	Bruseh Hydraulic Tin Mining Co., Ltd......	----	5.00
1907	$400,000	375,000	37,500	10	10	....	....	Kanaboi, Ltd................................	1.75	2.00
1901	£60,000	60,000	60,000	1	1	....	6/- interim 1910....................	Kinta Tin Mines, Ltd.......................	16.00	16.50
1905	$150,000	99,000	9,900	10	10	6,485.68	35% for year ending 31-12-07	Kuantan Tin Mining Co., Ltd...............	2.00	3.00
1906	£120,000	120,000	120,000	1	1	....	1/- interim 1909.........................	Lahat Mines Ltd.............................	8.50	9.25
1906	$450,000	450,000	45,000	10	10	....	....	Malacca Tin Dredging Co., Ltd..............	----	1.50
1906	£30.000	30,000	30,000	1	1	....	....	Malaya and Siam Corporation Ltd............	----	7/6
1906	£250,000	179,500	500,000s	5/-	5/-	....	....	Pahang Consolidated Co., Ltd...............	4/6	5/6
1907	£100,000	80,000	80,000	1	1	....	....	Pengkalen. Ltd..............................	4.00	4.50
1904	£100,000	80,000	80,000	1	1	....	6/- interim............................	Pusing Bahru Tin Mines, Ltd	7.00	7.50
1904	£120,000	100,000	100,000	1	1	6,000	6/- interim............................	Pusing Lama Tin Mines, Ltd.................	2.00	2.50
1907	$450,000	300,000	30,000	10	10	....	....	Rahman Hydraulic Tin, Ltd..................	10.00	10.50
1905	£40,000	£40,00	40,000	1	1	....	....	Rahman Tin Co.,Ltd.........................	11.00	12.00
1905	£27,000	27,000	27,000	1	1	....	1/- for 1907..........................	Rambutan, Ltd..............................	----	9.00
1892	£200,000	200,000	200,000	1	1	4,873	1/2 paid April, 1910..................	Raub Aust. Gold Ming. Co., Ltd,............	2.00	2.50
1905	£40,000	40,000	40,000	1	1	....	....	Redhills Tin Mining Co., Ltd...............	2.00	3.00
1900	$110,000	110,000	22,000	5	5	....	3% for year ending 22-1-09...........	Royal Johore Tin Mining Co., Ltd...........	----	1.25
1907	$550,000	500,000	50,000	10	10	....	....	Salak South, Ltd...........................	----	3.00
1907	£80,000	80,000	80,000	1	1	....	....	Sempam Tin Mines, Ltd......................	1.00	1.50
1906	$850,000	850,000	85,000	10	10	25,000	5% interim 1910.......................	Serendah Hydraulic Tin Ming. Co., Ltd...	4.00	5.00
1899	$230,000	230,000	23,000	10	10	....	3% for ½ year ending 31-12-08.......	Sipiau Tin Co., Ltd........................	1.50	2.00
1909	$200,000	$150,000	15,000	10	10	....	....	Sungei Gau Tin Mining Co., Ltd.............	----	3.00
1907	£90,000	70,000	70,000	1	1	....	6/- during 1910	Tekka, Limited.............................	20.00	21.00
1906	£150,000	150,000	150,000	1	1	....	1/- interim 1909.......................	Tongkah Harbour Tin Dredging Co., Ltd.	----	12.50
1902	£160 000	160,000	160,000	1	1	....	7/- during 1910........................	Tronoh Mines, Ltd..........................	15.25	16.00

SINGAPORE SHARE QUOTATIONS.—(Continued.)

Date of Formation	Capital	Capital paid up	No. of Shares Issued	Issue Value	Paid up	Reserves	Last Dividend	Name	Buyers	Sellers
								STERLING RUBBER		
1909	£85,000	78,225	782,250	2/-	2/-	......		Allagar Rubber Estates, Ltd	4/8	5/-
1905	£150,000	150,000	1,500,000	2/-	2/-	......	25% interim	Anglo-Malay Rub. Co., Ltd.	1.2.3	1.3.6
1909	£50,000	47,000	470,000	2/-	2/-	......		Batang Malaka Rubber Estates, Ltd.	2/9	3/-
1904	£30,000	26,750	26,750	1	1	......	35% interim	Batu Caves Rub. Co., Ltd.	17.0.0	17.10.0
1906	£80,000	67,800	67,800l*	1	1	......	2½% for 1909	Batu Tiga (Selangor) Rubber Co., Ltd.	4.15.6	5.0.0
1909	£100,000	74,454 }	57,816	1	1	......	6½% for 18 months ending 30-6-10	Bukit Kajang Rubber Estates, Ltd	2.9.0	2.10.0
			22,184n*	1	15/-	......	" " " " "	" " " part paid	1.10.0	1.15.0p.
1907	£30,000	25,500 }	24,000	1	1	......	30% for year ending 30-6-10	Bukit Lintang Rubber Estates, Ltd	4.11.3	5.0.0
			6,000	1	5/-	......		" " " part paid	2.2.6	2.7.6p.
1903	£70,000	66,700	66,700	1	1	2,000	25% interim	Bukit Rajah Rubber Co., Ltd.	15.10.0	16.0.0
1906	£35,000	35,000	35,000	1	1	......		Castlefield (K.) R. Estate, Ltd.	5.18.9	6.5.0
1909	£225,000	176,086	1,760,860	2/-	2/-	......		Chersonese (F.M.S.) Estates, Ltd	3/6	3/9
1904	£16,000	16,000 }	100,000	2/-	2/-	......	50% interim	Cicely Rubber Estates Co., Ltd.	2.0.0	2.5.0
			60,000	2/-	2/-	......	51½% interim	" " " " 5% Pref	2.0.0	2.5.0
1905	£75,000	62,007	620,070	2/-	2/-	1,000	50% interim	Consolidated Malay Rub. Estates, Ltd.	1.2.6	1.3.6
1906	£110,000	110,000	110,000	1	1	......	50% interim for 1910	Damansara (Selangor) Rubber Co., Ltd.	7.5.0	7.12.6
1903	£600,000	447,200	447,200a	1	1	......		Duff Development Co., Ltd.	11/6	12/6
1909	£45,000	42,500	425,000	2/-	2/-	......	15% interim	Edinburgh Rub. Estates, (Selangor) Ld.	10/6	11/6
1907	£80,000	70,000	70,000	1	1	......	25% interim	Golconda Rubber Co., Ltd.	5.5.0	5.15.0
1906	£310,000	307,770	307,770	1	1	8,784	10% interim	Highlands & Lowds. Para Rub. Co., Ltd.	5.1.3	5.5.0
1904	£50,000	30,000	30,000	1	1	2,500	100% for year ending 30-6-10	Inch Kenneth Rubber Estates, Ltd.	13.10.0	14.0.0
1909	£200,000	143,750 }	775,000p	2/-	1/-	......	15% for eleven monhts end. 30-6-10	Kam. (P.) R. & T. Co., Ltd. "A" Shares	4/3	4/9 p.
			105,000	1	1	......	" " " " "	" " " " "B" "	...	nom.
1905	£70,000	70,000	70,000	1	1	......	20% interim	Kapar Para Rubber Estates, Co., Ltd.	8.17.6	9.3.6
1909	£35,000	£17,250 }	95,000	2/-	2/-	......		Kota Tinggi Johore Rubber Co., Ltd.	...	2/-
			155,000	2/-	1/-	......		" " "	0/1	0/6 p.
1906	£180,000	180,000	180,000	1	1	.....	75% interim	Kuala Lumpur Rubber Co., Ltd	7.17.6	8.5.0
1907	£100,000	100,000	1,000,000	2/-	2/	......	30% interim	Labu (F. M. S.) Rub. Co., Ltd	15/-	16/-
1907	£320,000	£252,067.10/- }	198,930v	1	1	3,000	10% interim	Lanadron Rubber Estates, Ltd	4.18.6	5.2.6
			70,850	1	15/-	......	10% interim	" " " part paid	3.12.6	4.2.6p.
1908	£125,000	75,000 }	60,000g*	1	1	......	10% interim	Ledbury Rubber Estates Ltd.	3.7.6	3.10.0
			40,000	1	7/6	......	10% interim	" " " part paid	1.15.0	1.17.6p.
1895	£100,000	98,324 8/- }	883,244w	2/-	2/-	4,000	150% interim	Linggi Plantations Ltd.	2.5.3	2.6.3
			10,000	1	1	......	7% for 1909	" " " 7% Pref	...	nom.
1907	£160,000	140,000	1,400,000k	2/-	2/-	......	10% interim	London Asiatic R. & Produce Co., Ltd.	12/-	13/-
1909	£220,000	147,500 }	50,000	1	1	.....		Lumut Rubber Estates, Ltd.	...	nom.
			150,000	1	3/-	......		" " " " part paid	16/3	17/3 p.
1906	£400,000	300,000 }	185,000	1	1	......	10% interim for 1909	Malacca Rubber Plants., Ltd.	7.10.0	8.0.0
			115,000	1	1	.....		" " " " 7½% Pref.	7.10.0	8.0.0
							" " "		5/3	5/9
1909	£210,000	181,250	1,812,500	2/-	2/-	......		Merlimau Rubber Estates, Ltd.	2.17.6	3.0.0
1903	£30,000	22,500	225,000	2/-	2/-	......	75% interim	Pataling Rubber Estates Synd. Ltd	7/6	8/-
1906	£85,000	85,000	850,000	2/-	2/-	......	12½% interim	Perak Rubber Plantations, Ltd	...	nom.
1909	£60,000	41,150 }	15,000z*	1	1	......		Rembia Rubber Estates Ltd.	6/-	7/- p.
			35,000	1	15/-	......		" " " 6% Cum. Pref.		
1904	£25,000	19,092 }	17,732u	1	1	......	50% for year ending 30-9-10	Sagga Rubber Company, Limited	11.10.0	12.0.0
			2,268	1	12/-	......				
1905	£100,000	100,000 }	71,378	1	1	.....		Sapong Rubber and Tobacco Estates, Ltd.	1.4.0	1.5.0
			28,622l‡							
1907	£100,000	100,000	100,000	1	1	......	15% interim	Seafield Rubber Co., Ltd	7.2.6	7.10.0
1898	£30,000	30,000	300,000	2/-	2/-	3,000	225% interim	Selangor Rubber Co., Ltd	3.1.3	3.3.3
1909	£50,000	36,000	40,000	1	18/-	......		Sendayan (F. M. S.) Rubber Co., Ltd	1.6.3	1.10.0p.
1906	£65,000	65,000	65,000	1	1	......	10% interim	Shelford Rubber Estate, Ltd	3.11.3	3.15.0
1909	£150,000	78,500 }	14,000i‡	1	1	......		Sialang Rubber Estates, Ltd	1.0.0	1.2.6p.
			86,000	1	15/-	......				
1909	£120,000	100,000	100,000	1	1	......	12½% for year ending 31-6-10	Singapore Para Rubber Estates, Ltd.	2.15.0	3.0.0
1906	£200,000	192,500	1,925,000	2/-	2/-	......	17½% for year ending 31-3-10	Straits Settlements (B.) Rub. Co., Ltd	6/7½	6/10
1907	£60,000	50,000	50,000p‡	1	1	.....		Sungei Choh Rub. Estate, Co.Ltd	4.0.0	4.7.6
1906	£110,000	100,000	1,000,000	2/-	2/-	......	25% interim	Sungei Kapar Rubber Co., Ltd	12/6	13/6
1907	£70,000	60,500	60,500	1	1	......		Sungei Salak Rubber Co., Ltd	4.2.6	4.7.6
1904	£60,000	59,500	59,500	1	1	......	12½% interim	Sungei Way (Selangor) Rub. Co., Ltd	6.0.0	6.5.0
1908	£150,000	100,560	100,560	1	1	......		Tebrau (Johore) Rubber Co	3.7.6	3.12.6
1907	£200,000	200,000	200,000	1	1	......	5% interim	United Serdang (S.) R. Plantations, Ltd.	5.10.0	6.0.0
1908	£85,000	78,612	786,120	2/-	2/-	.....	20% interim	United Sumatra Rubber Estates, Ltd.	7/9	8/3
1904	£60,000	50,600	506,000	2/-	2/-	.....	75% interim	Vallambrosa Rubber Co., Ltd.	1.15.3	1.17.6
								DOLLAR		
1909	$120,000	105,000	105,000w*	1	1	......		Alor Gajah Rubber Estate, Ltd	1.75	2.00
1909	$750,000	700,000	140,000	5	5	......		Ayer Panas Rubber Estates, Ltd	5.80	6.15
1905	$200,000	151,200	151,200	1	1	5,250	40% interim	Balgownie Rub. Estate, Ltd	10.50	11.00
1910	$500,000	500,000	50,000	10	10	......		Bukit Timah Rubber Estates, Ltd	13.50	14.50
1910	$750,000	700,000	70,000	10	10	......		Changkat Serdang Estates, Ltd	7.75	8.00
1909	$300,000	300,000	300,000	1	1	.....		Glenealy Plantations, Ltd	1.80	2.00
1910	$200,000	164,285	32,857m‡	5	5	......		Haytor Rubber States, Ltd	5.50	7.50
1910	$600,000	180,000	30,000	10	7	......		Henrietta Estates, Ltd.	...	1 dis.
1909	$250,000	200,000	20,000	10	10	......		Indragiri (S.) R. and Gutta P. Co., Ltd.	13.00	14.00
1910	$350,000	300,000	300,000s‡	1	1	.....		Jimah Rubber Estates, Ltd	0.50	0.60
1910	$350,000	291,000 }	11,000	5	5	......		Kelemak Rubber Estate, Ltd.	3.50	4.00
			59,000	5	4	......		" " " part paid	2.00	1.50 dis.
1907	$300,000	170,000	20,000	10	8.50	.....		Kombok Rubber Co., Ltd	15.00	prem.
1910	$1,000,000	1,000,000	500,000	2	2	......		Malakoff Rubber Co., Ltd.	2.25	2.40
1910	$1,250,000	1,250,000	250,000	5	5	......		New Singapore Rubber Co., Ltd	6.50	7.00
1910	$700,000	600,000	600,090q‡	1	1	......		Nyalas Rubber Estates	0.40	0.50
1909	$400,000	400,000	80,000	5	5	......	5% interim	Pajam Limited	11.75	12.25
1909	$200,000	200,000	200,000	1	1	......		Pantai, Limited	1.15	1.30
1909	$500,000	450,000	45,000	10	10	.....	17½% for year ending 31-8-10	Pegoh, Limited	30.00	30.50
1910	$450,000	295,000 }	45,000f‡	5	5	.....		Port Dickson Rubber Co., Ltd	10.00	12.00
			35,000	5	2	.....		" " " part paid	2.00	3.00 p.
1910	$5,000,000	3,675,000 }	360,000	10	2	.....		Pulau Bulang Rub. & Produce Co., Ltd.	1.75	1.85
			7,500	10	10	.....		" " " "	....	...
1910	$200,000	150,000	50,000	1	1	.....		Pulo Daat Plantations, Ltd.	0.75	1.00
1904	$100,000	100,000	50,000	2	2	20,000	100% interim	Sandycroft Rubber Co., Ltd	24.50	25.50
1910	$1,500,000	1,500,000	1,500,000	1	1	......		Sembawang Rubber Plantations, Ltd.	0.55	0.60
1903	$450,000	417,300	208,650	2	2	......	25% interim	Singapore & Johore Rub. Co., Ltd	12.00	12.25
1909	$250,000	100,000	10,000	10	10	.....		St. Helena Rubber Coy., Ltd.	...	28.00
1910	$600,000	450,000	225,000n‡	2	2	.....		Sungei Bagan Rubber Co., Ltd.	1.30	1.60
1909	$200,000	165,000	33,000	5	5	......		Teluk Anson Rubber Estate, Ltd.	4.60	4.85
1910	$425,000	371,700	371,700r‡	1	1	.....		Ulu Pandan (Singapore) Rub. Estates Ltd.	0.50	0.60
1909	$1,000,000	737,500	737,500y*	1	1	.....		United Singapore Rubber Estates, Ltd.	1.25	1.35
								GENERAL		
1903	£400,000	400,000	400,000	1	1	......		Singapore Electric Tramways, Co., Ltd.	3/3	4/3
1907	$1,500,000	1,065,150 }	25,000d*	10	10	......	10% for year ending 31/12/08	Eastern Smelting Co. Ltd	...	10.00 n.
			116,450	10	7	......	10% for year ending 31-12-08	" " part paid	...	6.00 n.
1898	$360,000	360,000	36,000	10	10	170,000	10% interim	Fraser & Neave, Ltd.	25.50	26.50
1905	$2,400,000	2,400,000 }	18,000	100	....	75,000	2½% for year ending 31-10-08	Howarth Erskine, Ltd.	...	56.00
			6,000	100	....	......	7% for year ending 31-10-08	" " 7% Pref	...	91.00
1896	$1,000,000	1,000,000 }	6,000	100	100	40,600	12% for year ending 31-12-09	Katz Brothers, Ltd. Deferred	...	125.00
			4,000	100	100	......	8% " " " " 09	" " 8% Cum. Pref	...	nom.
1901	$34,000	34,000	3,400	10	10	......	20% for year ending 31-10-09	Maynard & Co., Ltd.	20.00	23.00
1899	$875,000	875,000 }	6,000	100	100	175,000	5% for year ending 31/12/09	Riley, Hargreaves & Co., Ltd.	85.00	87.50
			2,750	100	100	......	7% for year ending 31/12/09	" " " " 7% Pref	102.00	...
1897	£3,500,000	3,500,000 }	2,500,000	1	1	1,120,000	22½% for 1909	Shell Transport and Trading Co., Ltd.	3.19.00	4.2.6
			100,000	10	10	......		" " " " Pref.	11.5.0	12.0.0
1903	$600,000	250,000	25,000n	10	10	....	12½% for year ending 30-6-10	Singapore Cold Storage Co., Ltd	22.50	23.00
1891	$30,000	30,000	600	50	50	23,000	10% for year ending 31-7-09	Singapore Dispensary Ltd.	50.00	52.50
1884	$200,000	200,000	2,000	100	100	75,000	15% interim	Straits Ice Co., Ltd	...	165.00
1890	$1,000,000	623,000 }	4,980	100	100	760,000q	5% interim	Straits Steam Ship Co., Ltd.	215.00	225.00
			2,500	100	50			" " " " part paid	65.00	prem.
1887	$3,000,000	3,000,000	300,000	10	10	805,400r / 1,400,000	10% & 5% bon. for half yr. end. 31/3/10	Straits Trading Co., Ltd	51.50	55.00
								DEBENTURES		
								Howarth Erskine, Ltd. 6% $600,000	...	par.
								Riley, Hargreaves & Co., Ltd. 6% 284,000	1%	3% p.
								Singapore Electric Tramways, Co., Ltd. 5%	...	....
								Singapore Municipal 5% £350,000	6%	nom.
								" " 4½% of 1907 1,878,000	7%	7% p.
								" " 4½% of 1909 1,600,000	...	8% p.
								" " 4% 1,000,000 / 602,000	...	7% dis.

a } 152,800 unissued; 43,949 6% debenture
e { 54,500 £1 Prefs issued; 45,500 £1 " unissued; 100,000 5/- Ord. "
f 6,250 unissued
k £40,000 6% Debentures 200,000 unissued

p 175,000 unisd "A" shares
q Sundry Reserves.
r "
u 5,000 issued £1 prem.
v 50,220 unissued
w 16,756 "
b* 221 7½% Debentures
d* 8,550 unissued

g* 25,000 unissued
l* £10,000 Convertible 6% Debentures issued 12,200 shares unissued
n* 20,000 unissued
y* 262,500 "
z* 10,000 "
i‡ 50,000 "

l‡ 6% Deb. Stock Convble.
m‡ 7,143 unissued
n‡ 75,000 unissued
o‡ 67,750 "
p‡ 10,000 "
q‡ 100,000 "
r‡ 53,300 "
s‡ 50,000 "

YOKOHAMA SHARE QUOTATIONS

COURTESY A. C. HUTTON POTTS, SHARE AND GENERAL BROKER, YOKOHAMA, DECEMBER 28, 1910.

STOCKS.	CAPITAL.	NO. OF SHARES.	ISSUE VALUE.	AMOUNT PAID UP.	DATE.	LAST DIVIDEND.	FOR TERM.	CLOSING QUOTATION.
Brett & Co., Ltd.	-Y- 28,000	2,800	-Y- 10	-Y- 10	31-12-09	12½%	for 1 year	15 Sellers
Club Hotel, Ltd.	185,000	1,850	100	100	31-3-10	6%	for 1 year	70 Sales
Grand Hotel, Ltd.	500,000	5,000	100	100	31-6-10	5%	for ½ year	90 Sellers.
Helm Bros., Ltd.	186,000	3,720	50	50	31-12-10	17½%	for 1 year	95 Sales.
Langfeldt & Co., Ltd.	100,000	2,000	50	50	30-6-09	6%	for ½ year	60 Sellers.
C. Nickel & Co., Ltd. †	500,000	20,000	25	25	31-10-09	20%	for 1 year	57 Sales.
Thwaites, Limited	100,000	2,000	50	50	First Year	—	—	55 Sales.
Yokohama Engine and Iron Works *	500,000	10,000	50	50	31-5-09	—	for 1 year	35 Sales.
Oriental Hotel, Ltd., Ordinary	250,000	3,000	50	50	31-8-07	12%	for 1 year	50 Sales
Oriental Hotel, Ltd., Preference		2,000	50	50		8%	for 1 year	52:50 Sales
The Union Estate and Investment Co., Ltd. ‡	1,000,000	10,000	100	100	30-9-09	7%	for 1 year	100 Nominal.
The Clifford Wilkinson Tansan Mineral Water Co., Ltd. §	500,000	5,000	100	100	31-12-09	7%	for 1 year	100 Buyers.

† 285,000 unissued.
‡ 475,000 unissued.
*-Y- 390,000 issued.
§-Y- 375,800 issued.

DEBENTURE LOANS.	AMOUNT OF LOAN.	FACE VALUE OF DEBENTURES.	RATE OF INTEREST.	INTEREST PAYABLE.	CLOSING QUOTATION.
Brett & Company, Limited	11,500.00	100.00	7%	1 June and 1 Dec.	95 Sales.
Yokohama United Club	230,000.00	100.00	6%	30 June and 31 Dec.	102 Nominal.
Oriental Hotel, Limited	350,000.00	100.00	8%	1 April and 1 Oct.	103 Sales.
Union Estate and Investment Co., Limited	250,000.00	100.00	6%	30 June and 31 Dec.	95 Sellers.

JAPANESE STOCKS.	FACE VALUE.	AMOUNT PAID UP.	LAST DIVIDEND.	DIVIDEND PAYABLE.	CLOSING QUOTATION.
Bonds & Debentures.					
Exchequer Bonds 3rd issue	-Y-100	-Y-100	5%	March and Sept.	-Y-101.00
Railway Bonds (Ko-Gobu)	100	100	5%	June and Dec.	,, 99.40
4% Imperial Loan Bonds (1st issue)	100	100	4%	June and Dec.	,, 93.45
4% Imperial Loan Bonds (2nd issue)	100	100	4%	March and Sept.	,, 94.30
Special 5% Bonds (issued 1906)	100	100	5%	June and Dec.	,, 99.30
Yokohama Water Works Bonds	100	100	6%	June and Dec.	,, 101.50
Yokohama City Public Loan Bonds	100	100	6%	March and Sept.	,, 103.80
Osaka City Harbour Construction Bonds	100	100	6%	June and Dec.	,, 101.00
Osaka City Public Loan Bonds	100	100	6%	June and Dec.	,, 101.00
Kawasaki Dock Yards Co.'s Debentures	100	100	7%	June and Dec.	,, 104.00
Tokyo Race Associations "	500	500	30%	June and Dec.	,, 190.00
Railways & Electric Trams.					
Tokyo Railway Company, Limited	50	50	5 2/5%	June and Dec.	,, 71.95
Yokohama Electric Tramway Company, Limited	50	50	6%	July and Jan.	,, 53.00
Keihin Electric Tramway Company, Limited	50	50	6%	June and Dec.	,, 43.05
Southern Manchurian Railway Co., Ltd.	100	20	6%	June and Dec.	,, 43.50
Hanshin Electric Tramway Co., Ltd.	50	50	12%	May and Nov.	,, 118.00
Cotton Spinnings.					
Kanegafuchi Cotton Spinning Company, Limited	50	50	14%	July and Jan.	,, 106.95
Fuji Gassed-yarn Company, Limited	50	50	14%	June and Dec.	,, 85.40
Tokyo Cotton Spinning Company, Limited	50	50	8%	July and Jan.	,, 44.00
Imperial Hemp Weaving Company, Limited	50	50	12%	July and Jan.	,, 71.95
Nisshin Boseki Kabushiki Kaisha	50	17½	7%	June and Dec.	,, 11.85
Sugar & Beer Cos.					
Dai-nippon Sugar Refinery Company, Limited	50	50	......	May and Nov.	,, 42.00
Ensuiko Sugar Refinery Company, Limited	50	20	20%	June and Dec.	,, 45.50
Dai-nippon Beer Company, Limited	50	50	12%	July and Jan.	,, 81.60
Kirin Brewery Company, Limited	50	50	7%	July and Jan.	,, 52.50
Docks & Steamships.					
Yokohama Dock Company, Limited	50	33	12%	June and Dec.	,, 60.00
Uraga Dock Company, Limited	50	50	......	July and Jan.	,, 6.50
Kawasaki Dockyard Company, Limited	50	50	12½%	Feb. and Aug.	,, 54.00
Nippon Yusen Kaisha	50	50	10%	May and Nov.	,, 96.30
Hokkaido Tanko S. S. Company, Limited	50	50	5%	July and Jan.	,, 29.00
Miscellaneous.					
Tokyo Electric Light Company, Limited	50	50	12%	June and Dec.	,, 82.80
Tokyo Gas Company, Limited	50	50	13%	July and Jan.	,, 102.60
Yokohama Union Electric Light Company, Limited	50	50	14%	June and Dec.	,, 107.50
Fuji Paper Mills	50	50	6%	June and Dec.	,, 30.50
Otaru Timber Company, Limited	50	50	......	March and Sept.	,, 33.00
Hoden Petroleum Company, Limited	50	50	20%	April and Oct.	,, 57.40
Tokyo Rope Manufacturing Company, Limited	50	50	18%	June and Dec.	,, 104½ Ex. Dividend.
Japan Horse Improvement Company, Limited	50	50	......	March and Sept.	,, 13.50
Tokyo Stock Exchange Company	50	50	15 1/5%	June and Dec.	,, 180.30
Osaka Electric Light Company, Limited	50	50	16%	July and Jan.	,, 103.50
Kobe Electric Light Company, Limited	50	50	14%	July and Jan.	,, 112.00

BANGKOK SHARE QUOTATIONS

(COURTESY MESSRS. EDWARDS & CO., BANGKOK, SIAM.) DECEMBER 28, 1910

NAME.	BUYERS.	SELLERS.	LAST SALES.	ESTABLISHED.	CAPITAL.	NO. OF SHARES.	ISSUE VALUE.	AMOUNT PAID UP.	RESERVE FUND	LAST DIVIDEND
Siam Electricity Co., Ltd.	Tcs. 300	Tcs. 325	Tcs. 325	1901	£ 300,000	30,000	£ 10—	£ 300,000	Tcs. 491,338	12% Tcs. 4 bon.
Paknam Railway Co., Ltd.	,, 200	,, —	,, 220	1893	Tcs. 400,000	5,000	Tcs. 80	Tcs. 400,000	,, ?7,566	14%
Siam Tramway Co., Ltd.	,, —	,, —	,, 108	1905	,, 1,450,000	6250 Shares 7250 Deb. 1000 P. Shares	,, 100	,, 2,230,000	,, 1,875	—
Meklong Railway Co., Ltd.	,, 90	,, 100	,, 90	1907	,, 2,230,000	22,300	,, 100	,, 223,000	,, 28,000	5%
Bangkok Manufact. Co., Ltd.	,, —	,, —	,, 132	1898	,, 400,000	4,000	,, 100	,, 400,000	,, 60,000	7% per for 6 months
Bangkok Dock Co., Ltd.	,, —	,, 135	,, 135	1865	,, 1,000,000	10,000	,, 100	,, 950,000	,, 220,000	
Siam Steam Packet Co.	,, 80	,, 909	,, 90	1898	,, 190,000	3,800	,, 50	,, 190,000	,, 34,000	5%
Siam Commercial Bank	,, 1,000	,, 1,500	,, 1,000	1906	,, 3,000,000	3,000	,, 1,000	,, 3,000,000	,, 338,850	4% for 6 mos.
Menam Motor Boat Co.	,, 75	,, 90	,, 90	1905	,, 200,000	2,000	,, 100	,, 200,000	—	none
Transport Co., Motor	,, —	,, 75	,, 100	1906	,, 200,000	2,000	,, 100	,, 200,000	—	—
Jenderata Rubber Co *	,, —	,, 325— Ticals	,, 325 (for six calls)	1906	£ 40,000	4,000	£ 10	£ 7.-paid	—	—
Bagan Rubber Co.	,, —	,, 100	,, 100	1907	Tcs. 300,000	3,000	Tcs. 100	Tcs. 40 per share	—	—
Siam Steam Navigation Co., Ltd.	,, 300	,, 325	,, —	1909	,, 2,000,000	10,000	,, 200	—	,, 10,000	—
Siam Stone Works, Ltd.	,, —	,, —	100	1909	,, 350,000	3,500	,, 100	,, 350,000	—	6% half year
Kombok Rubber Co.	,, 25	,, 35	32	1906	$ 300,000	30,000	$ 100	$7, per Share	—	—

PHILIPPINE SHARE REPORT

COURTESY B. A. GREEN, GENERAL SHARE, BOND AND INVESTMENT BROKER.—*Manila, P. I., January 10, 1911.*

Name	Closing Quot'n	When Incorporated	Authorized Capital	Issue Value of Shares	Number of Shares	Number of Shares Subscribed	Paid up	Reserve Fund	Working Account	Date	Last Dividend
American Drug Store	....	1908	₱ 100,000	₱1,000	100	51	₱1,000	₱5,000	₱ 50,000	June 30, 1910.	....
Antamok Valley Mining Co	₱0.40	1909	500,000	1	500,000	320,000	1	.....	....	....	First year
Banco Español Filipino	₱255.	1851	3,000,000	200	15,000	15,000	200	408,715	....	July 1, 1910.	10% for 1910
Bayhay Valley Oil Co	100.	1909	100,000	100	1,000	....	100	......	....	....	First year
Benguet Commercial Co	85.	1908	200,000	100	2,000	736	100	......	....	....	8% for 1906
Benguet Consolidated Mining Co	0.50	1903	2,000,000	2	1,000,000	495,000	2	.....	....	....	....
Bua Mining Co. Common	90.	1905	750,000	100	7,000	3,366	100	......	....	....	....
Bua Mining Co. Preferred	140.			100	500	500	100	......	....	....	....
Cadwallader-Gibson Lumber Co	....	1908	1,000,000	100	10,000	8,650	100	......	....	....	....
Camote-Clayton Mining Co	....	1909	400,000	10	40,000	26,000	10	......	....	....	First year
Compania Maritima	55.	1894	510,000	100	5,100	5,100	100	......	....	....	20% for 1902
East Batan Coal Mining Co	33.	1909	3,000,000	50	60,000	40,000	50	......	....	....	First year
El Varadero de Manila	80.	1885	450,000	100	4,500	4,500	100	288,955	134,715	Aug. 31, 1910	3½% interim 1910
Electrical Supply Co	....	1909	100,000	100	1,000	280	72	......	....	....	First year
Export & Import Lumber Co	....	1908	200,000	200	1,000	1,000	200	......	....	....	....
Escolta Press Inc	100.	1907	50,000	100	500	320	100	......	....	....	12% for 1909
Fabrica de Hielo de Manila	60.	1894	350,000	50	7,000	7,000	50	......	....	....	14% for 1910
Germinal Cigar Factory	525.	1900	1,500,000	500	3,000	3,000	500	......	....	....	12% for 1909
H. E. Heacock & Co	....	1909	100,000	100	1,000	800	100	......	....	....	First Year
Headwaters Mining Co	10.	1908	600,000	10	60,000	59,800	10	......	....	....	....
Insular Lumber Co	140.	1907	2,000,000	200	10,000	9,000	200	......	....	....	....
Lepanto Mining Co	....	1906	1,000,000	100	10,000	8,000	100	......	....	....	....
Juan Seiboth Co	....	1908	150,000	20	7,500	500	20	......	....	....	....
La Concha Button Factory	90.	1905	75,000	100	750	530	100	......	....	....	15% for 1909
Los Banos Improvement Co	150.	1908	100,000	200	500	500	200	......	....	....	16% for 1908
Lambert, Springer Co	....	1908	200,000	1,000	200	80	1,000	......	....	....	....
Luzon Stevedoring Co	25.	1909	250,000	25	10,000	4,200	25	......	....	....	....
Luzon Sugar Refining Co	18.	1882	700,000	100	7,000	7,000	100	......	....	....	3% for 1907
Manila Electric Ry. & Light Co	140.	1903	12,000,000	200	60,000	....	200	......	....	....	4% for 1909
Manila Hotel Co	100.	1909	400,000	100	4,000	3,500	100	......	....	....	Under Construction
Mindanao Herald Publishing Co	....	1907	15,000	100	150	75	100	......	....	....	½% for 1908
Muyot Mining Co	3.	1909	500,000	10	50,000	....	10	......	....	....	First Year
Paracale Gold Dredging Co	15.	1907	£10,000	£1	10,000	10,000	£1	......	....	....	£1 for 1908-9
Paracale Ext. Gold Dredging Co	10.	1909	₱450,000	₱10	45,000	....	₱10	......	....	....	First Year
Philippine Publishing Co	120.	1907	600,000	200	3,000	2,187	200	......	....	....	10% for 1910
Philippine Co., Ltd	5.	1904	750,000	10	75,000	75,000	10	......	....	....	....
Philippine Gold Dredging Co	8.	1907	200,000	10	20,000	20,000	10	......	....	....	....
Philippine Exploration Co	....	1908	2,000,000	10	200,000	120,000	10	......	....	....	....
Port Banga Lumber Co	....	1908	100,000	100	1,000	934	100	......	40,000	Oct 1, 1910.	....
Rosenstock Publishing Co	....	1908	75,000	10	7,500	6,000	10	......	....	....	....
San Nicolas Iron Works	100.	1901	300,000	500	600	600	500	......	....	....	15% for 1903
San Mauricio Gold Mining Co	....	1908	4,000,000	200	20,000	20,000	200	......	....	....	....
Sanitary Steam Laundry	20.	1908	100,000	20	5,000	3,900	20	......	....	....	....
Tarlac Railway Co	65.	1906	150,000	100	1,500	1,500	100	......	....	....	....
Tumbaga Mining Co	35.	1910	2,000,000	2	1,000,000	772,0000	2	......	....	....	Reorganized 1910
Union Hemp Machine Co	....	1909	50,000	10	5,000	2,600	10	......	....	....	First Year
Walter E. Olsen Co	100.	1909	500,000	100	5,000	2,033	100	......	....	....	First Year
Zamboanga Cold Storage Co	125.	1903	40,000	100	400	200	100	......	....	....	20% for 1909

PHILIPPINE BONDS

	Dated	Authorized	Issued	Outstanding	Par Value	Rate of Int.	When payable	Last Quotation
Philippine Friar Land Bonds	Feb. 1st, 1904	$7,000,000	$7,000 000	$7,000,000	$ 100	4%	Feb. 1, 1914	104⅝
Public Works and Permanent Improvement Bonds	March 1, 1905	$5,000,000	$2,500,000	$2,500,000	$ 100	4%	March 1, 1915	104⅝
Do.	Feb. 1, 1906		$1,000,000	$1,000,000	$ 100	4%	Feb. 1, 1916	104⅝
Manila Sewer and Water Works Improvement Bonds	June 1, 1905	$4,000,000	$1,000,000	$1,000,000	$ 100	4%	June 1, 1915	104½
Do.	Jan. 2, 1907		$2,000,000	$2,000,000	$ 100	4%	Jan. 2, 1917	104⅝
*Philippine Railway First Mortgage Four per cent Thirty Year Sinking Fund Gold Bonds	July 1, 1907	$15,000,000	$5,736,000	$5,736,000	$1000	4%	July 1, 1937	97
B. P. O. Elks. First Mortgage 7% Five-Fifteen Year Sinking Fund Gold Bonds	July 1, 1908	$75,000	$45,000	$45,000	$ 50	7	July 1, 1923	50½

*Payment of interest guaranteed until maturity or redemption by the Philippine Government.

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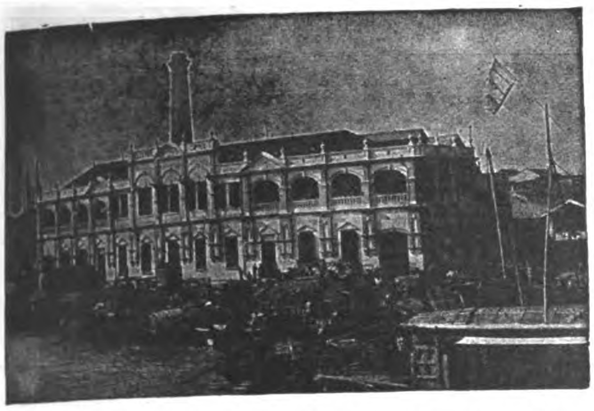

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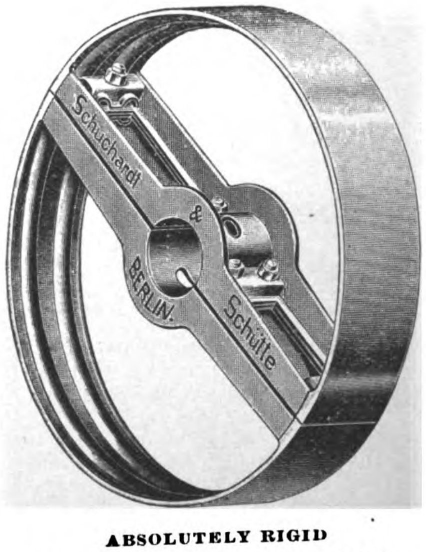

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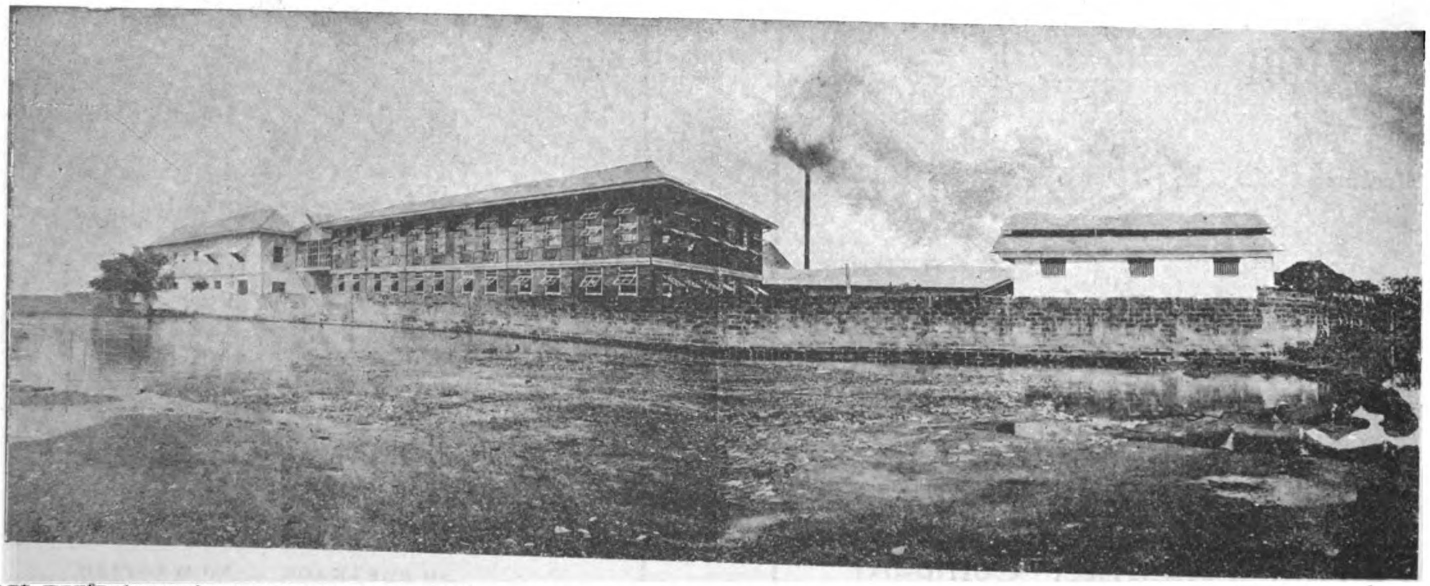

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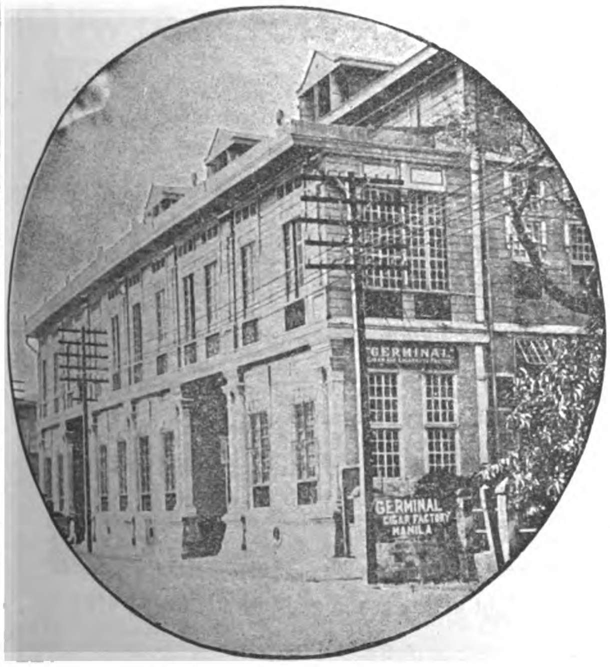

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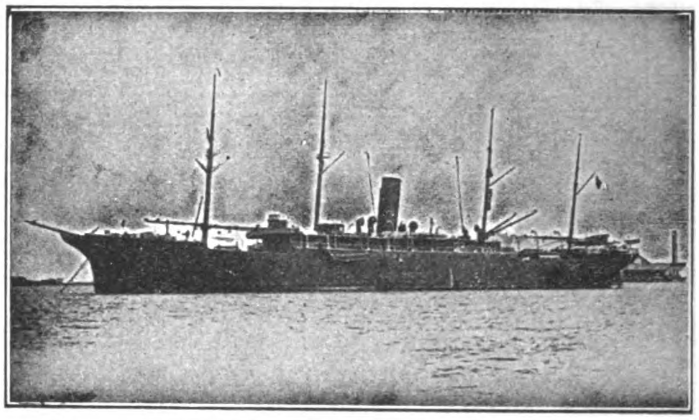

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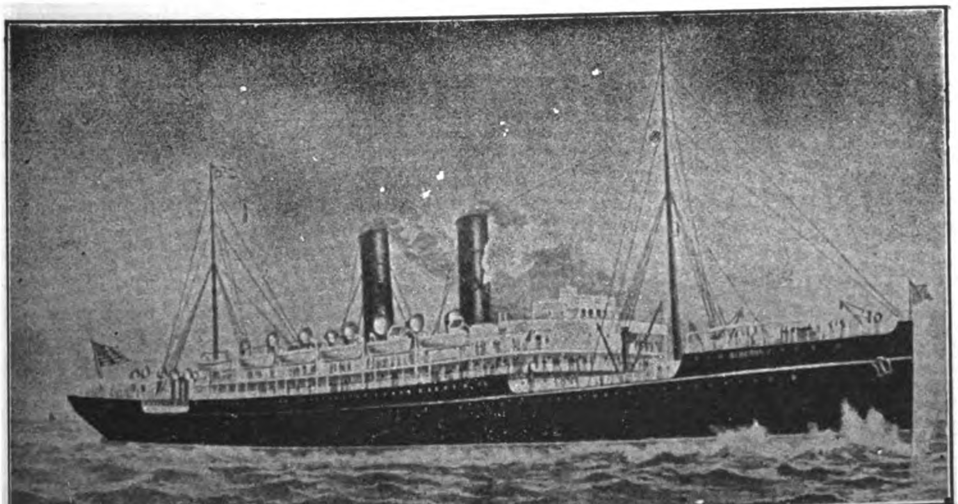

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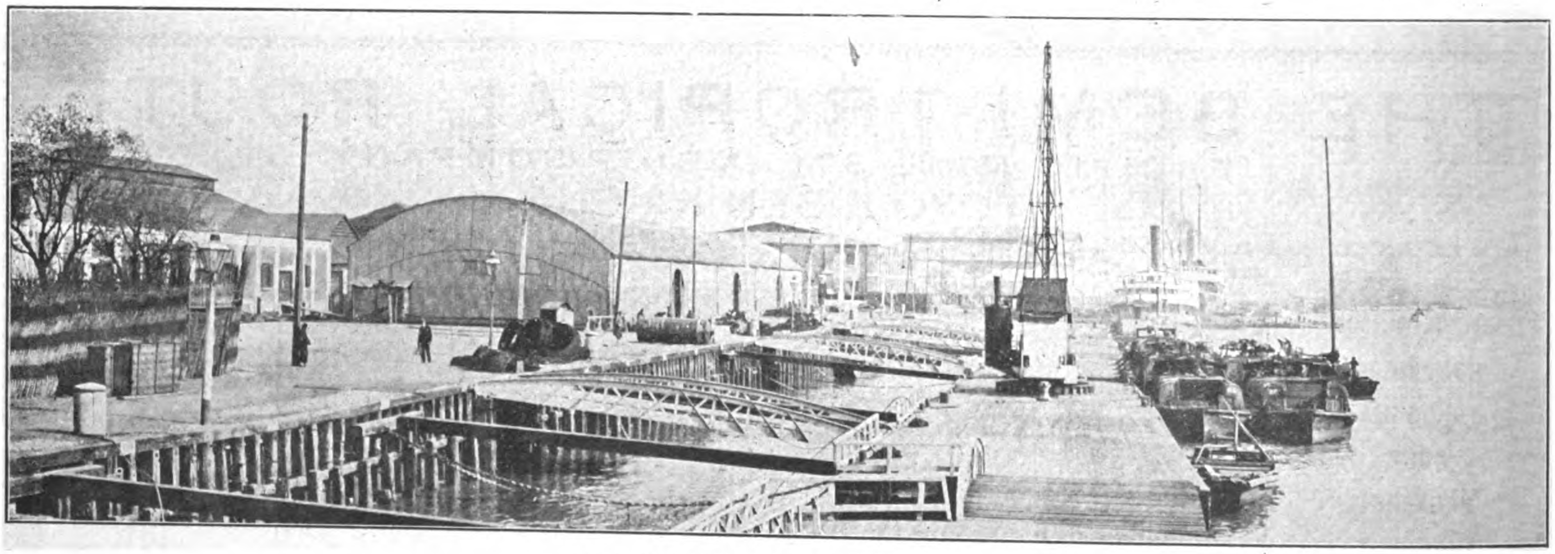

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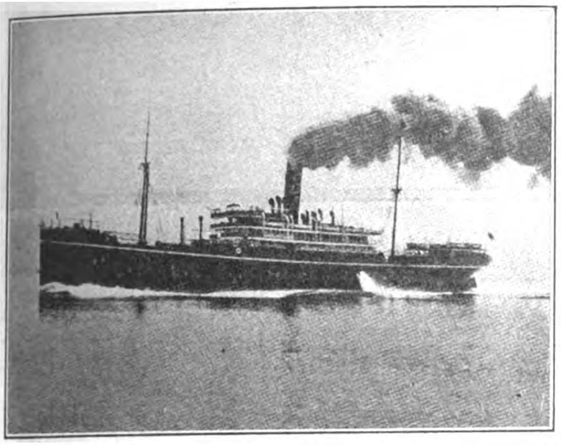

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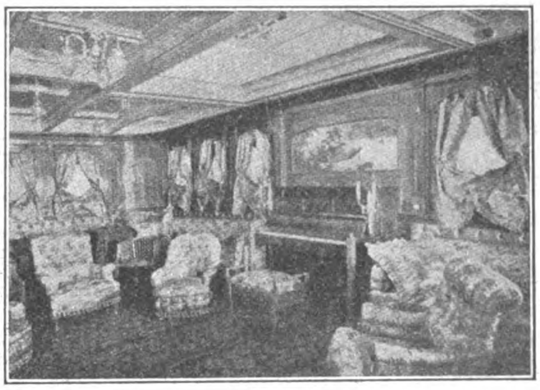

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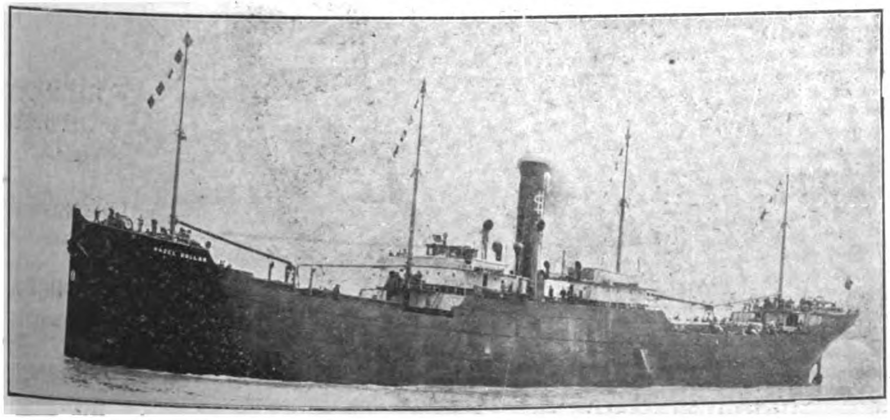

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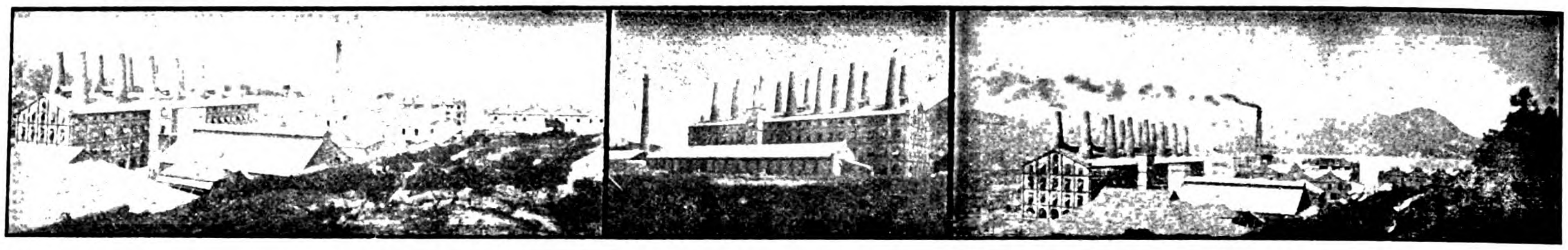

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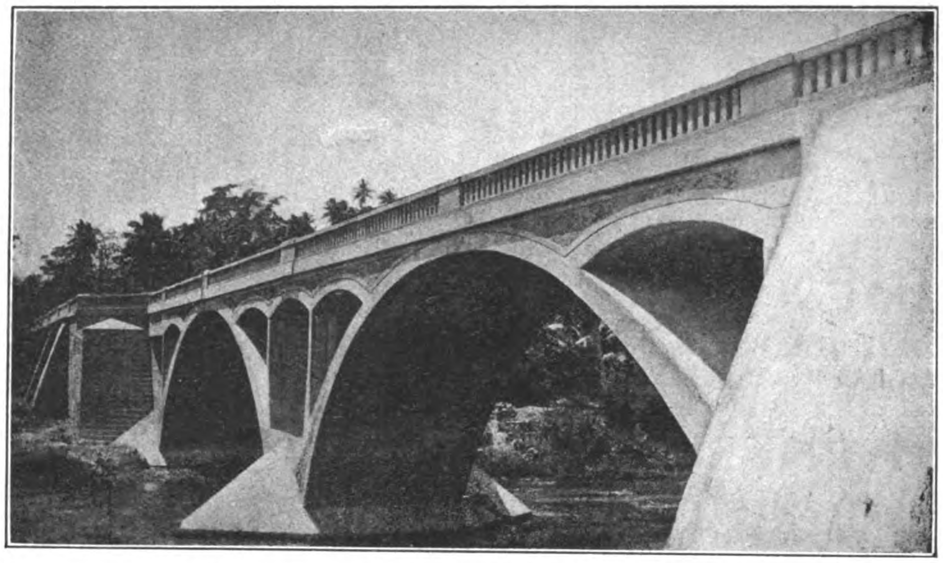

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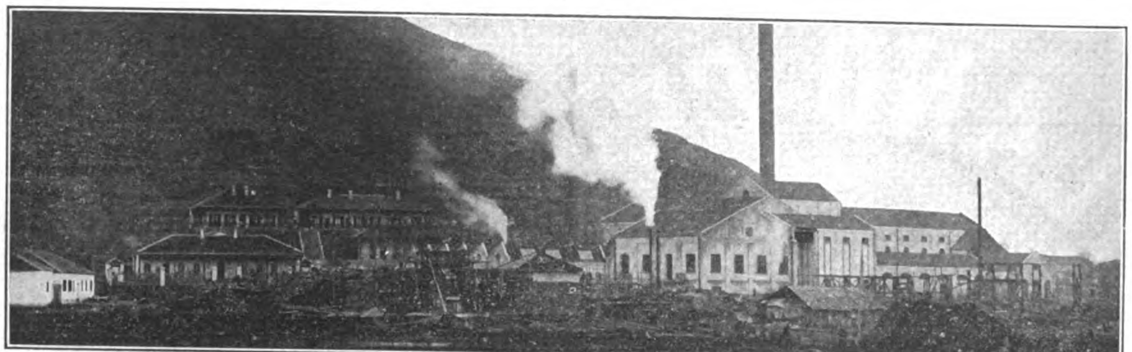

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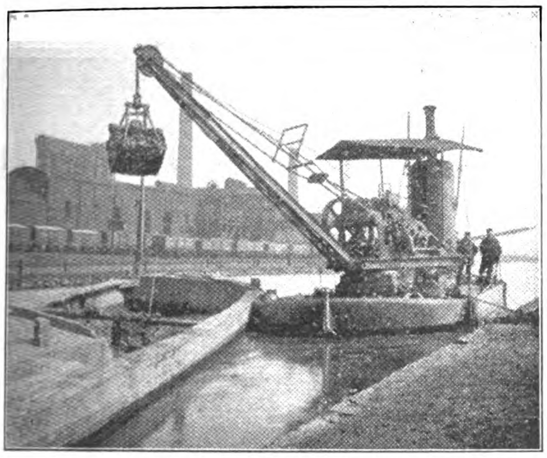

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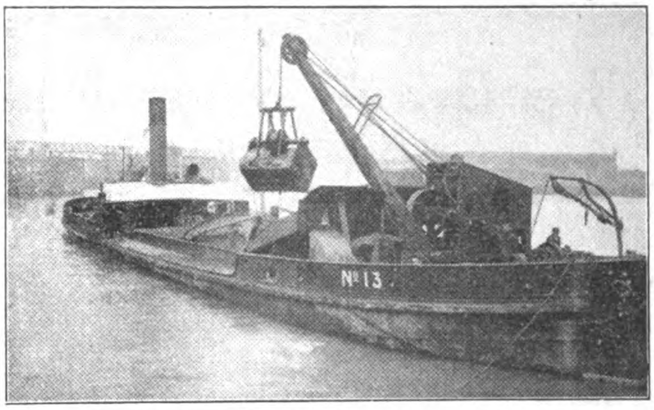

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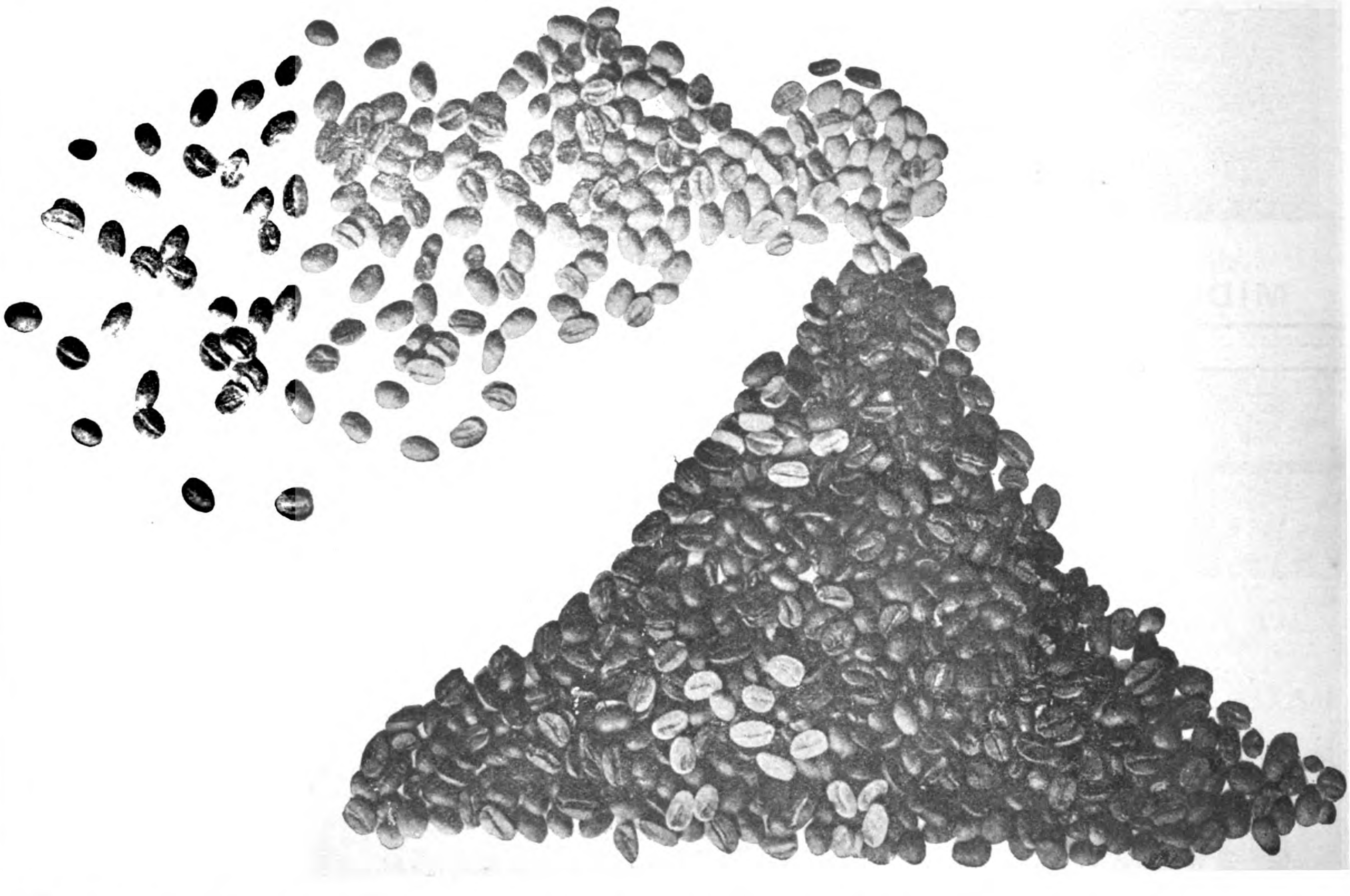

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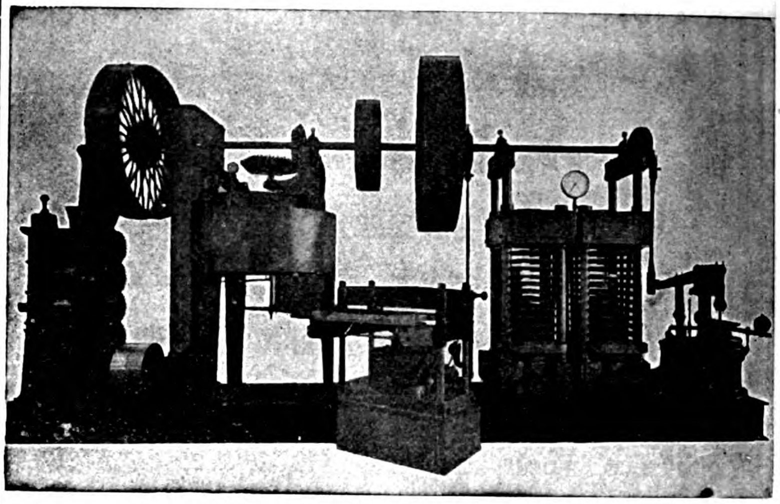

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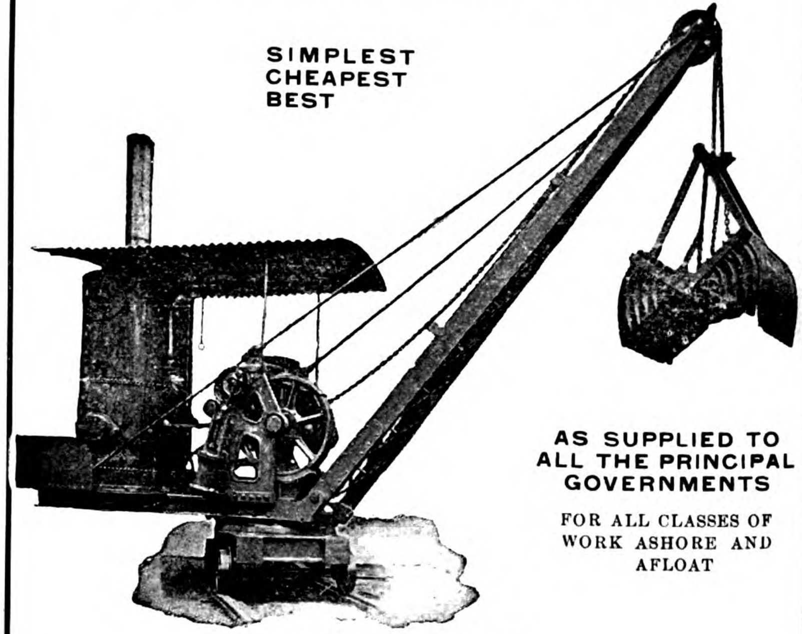

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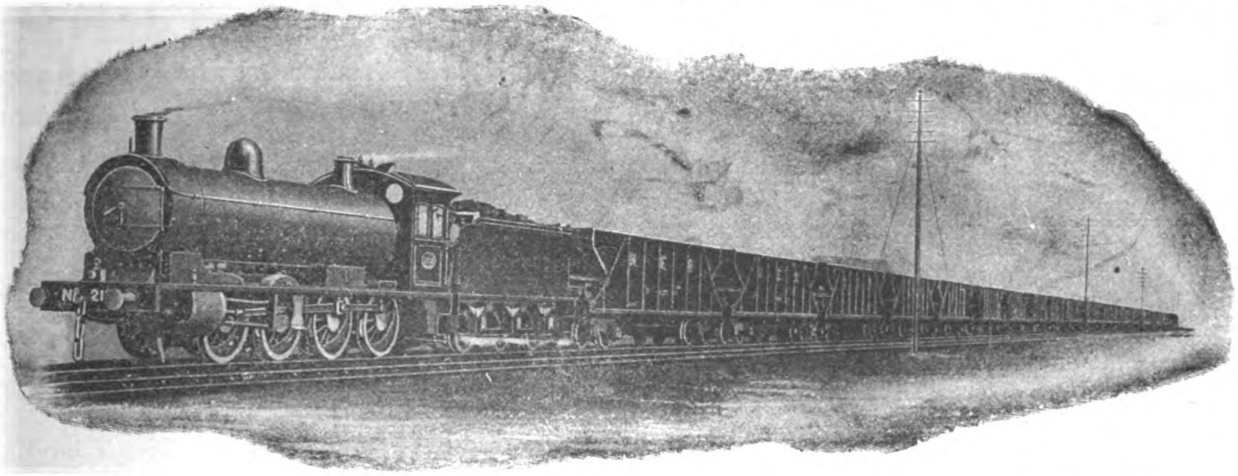

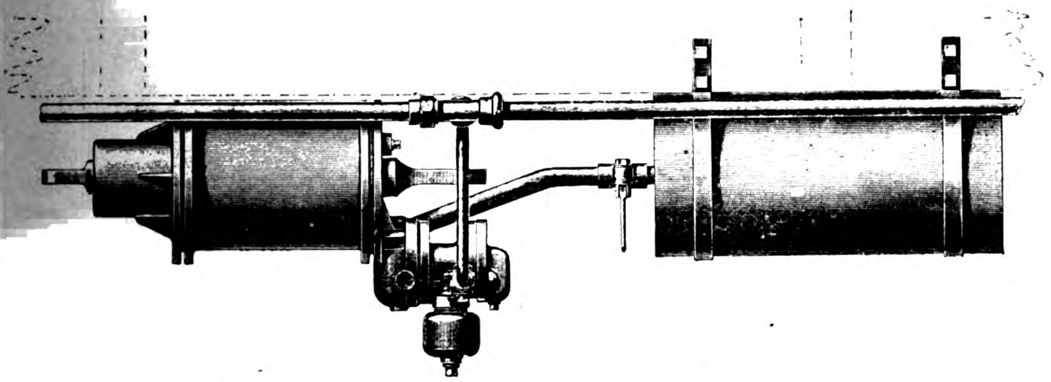

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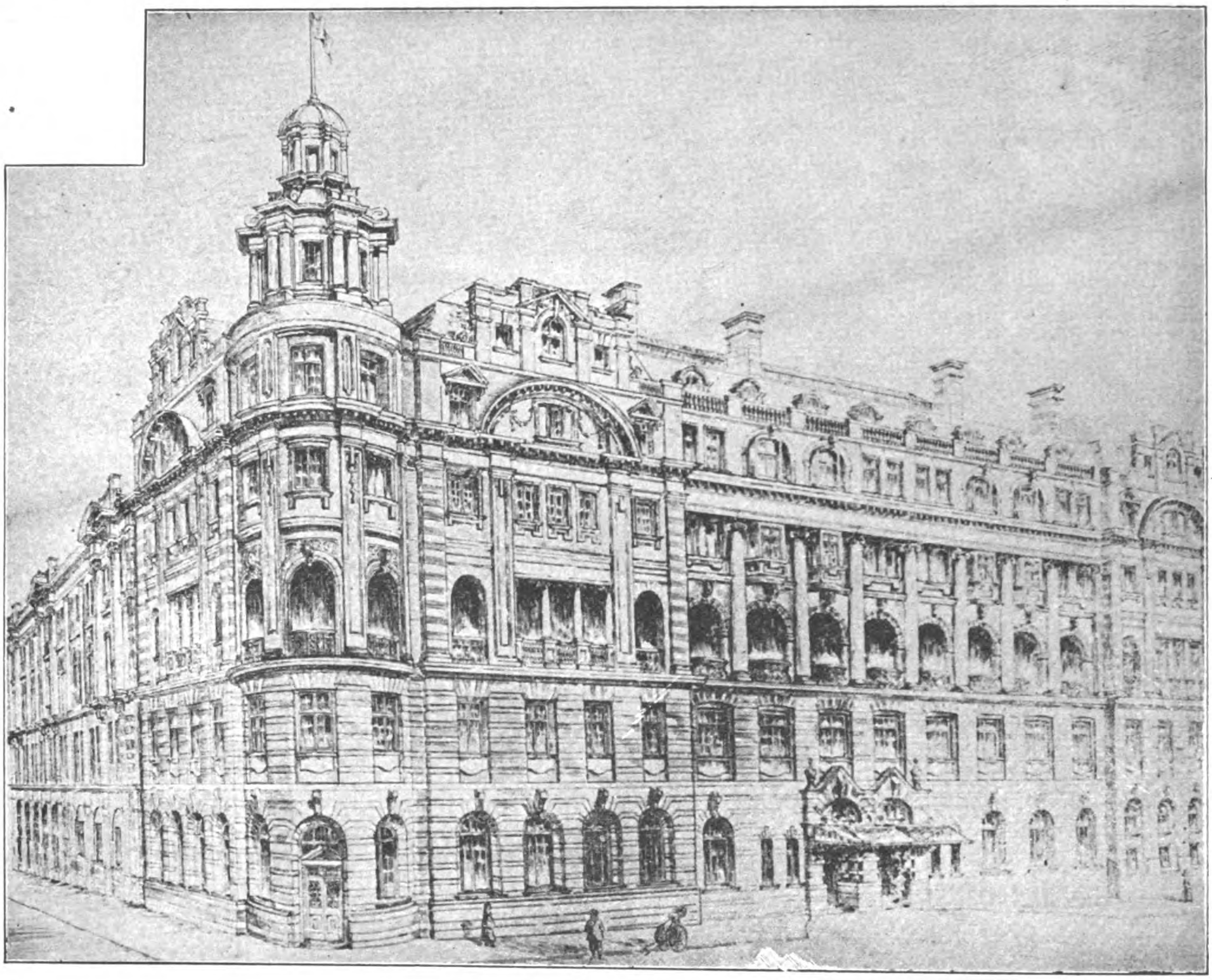

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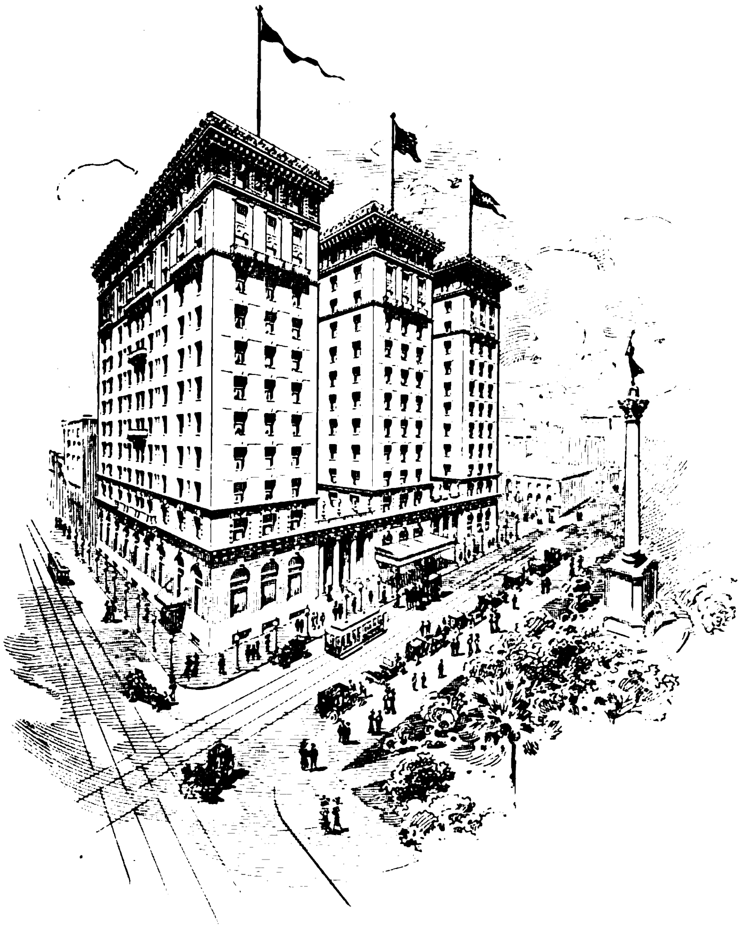

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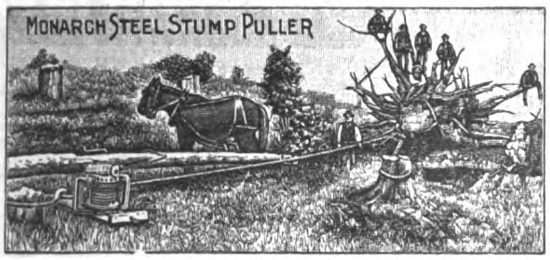

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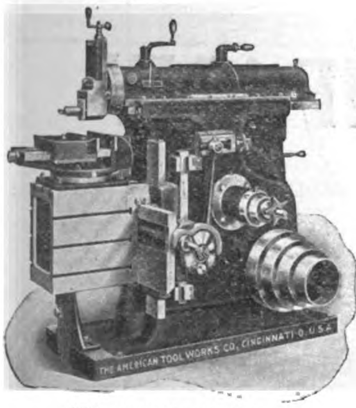

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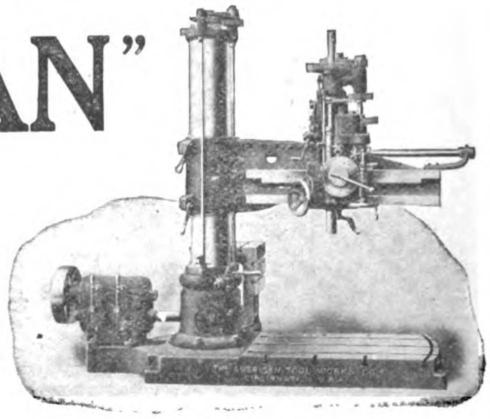

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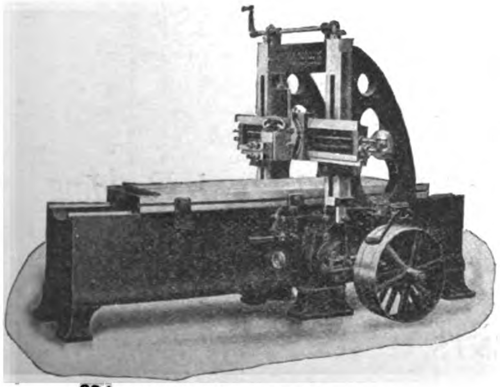

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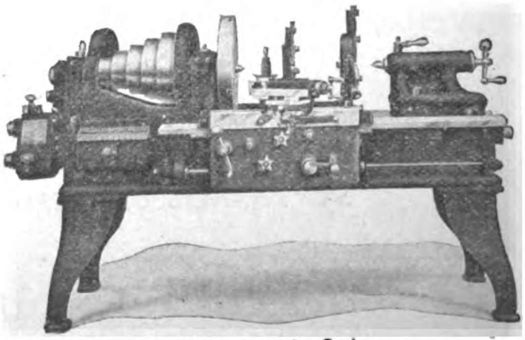

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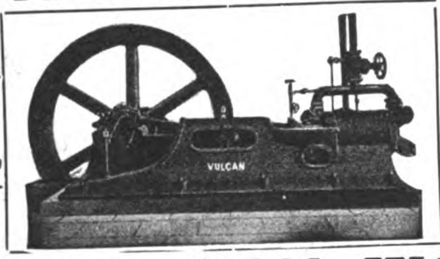
VUL  **CAN**

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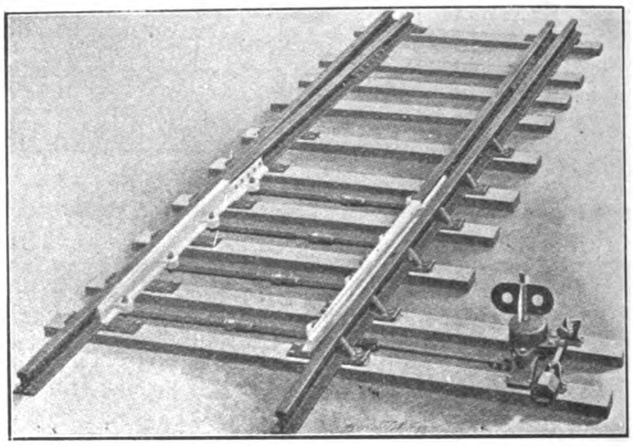

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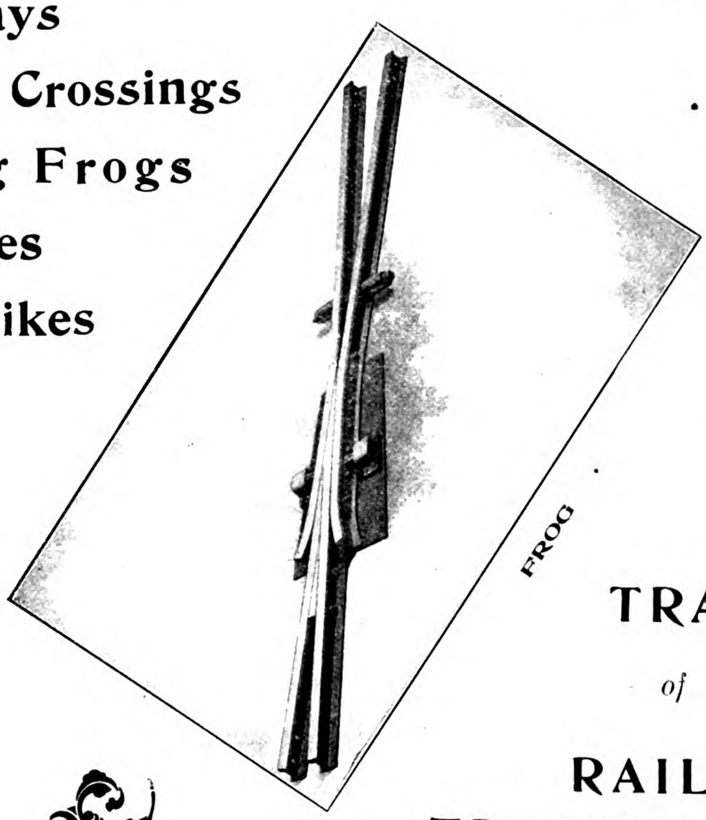

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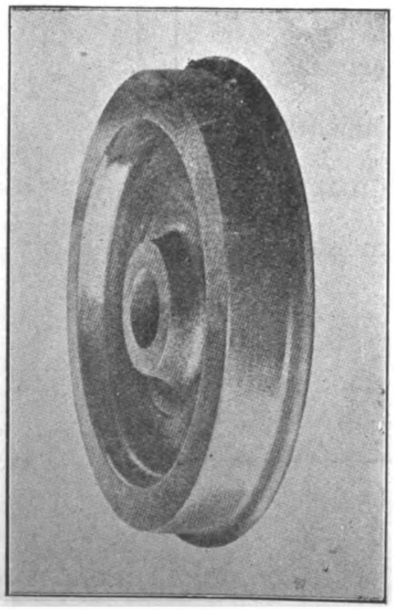

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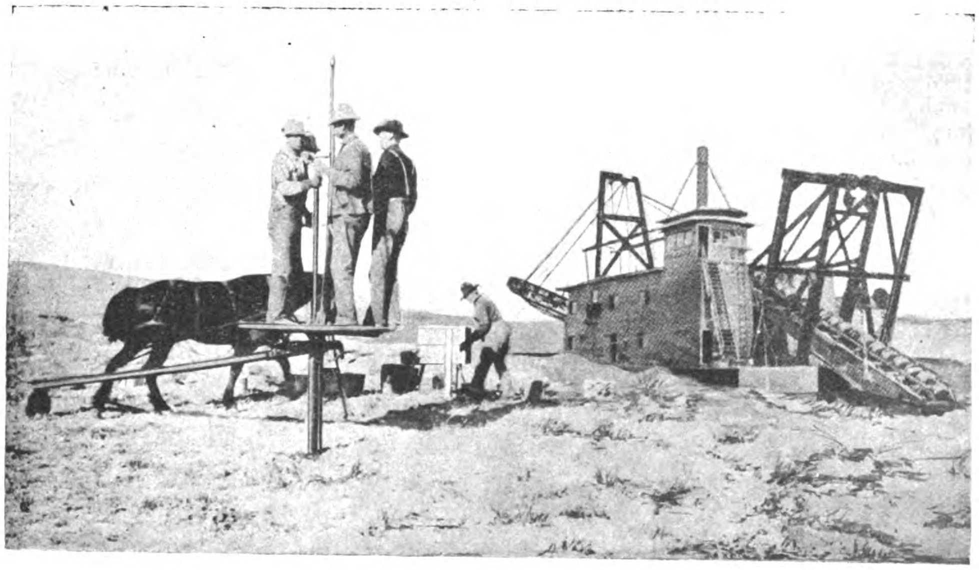

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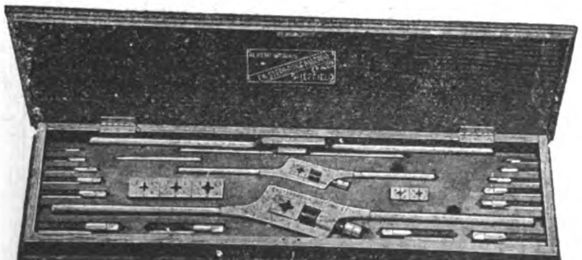

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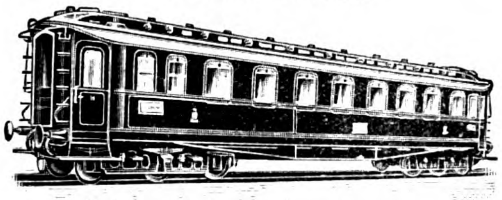

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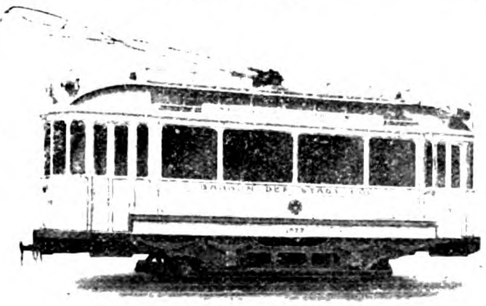

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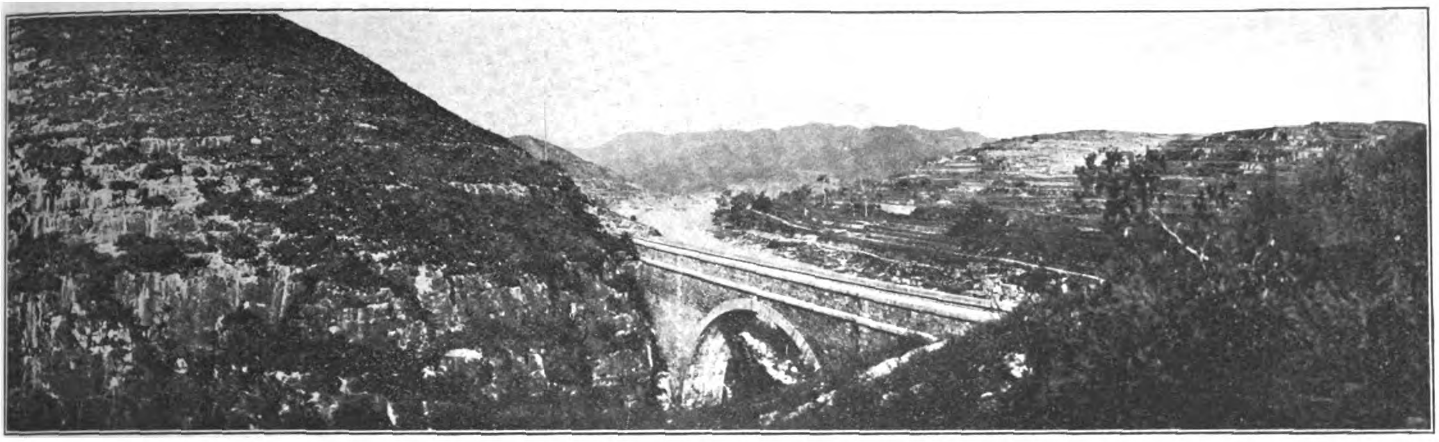

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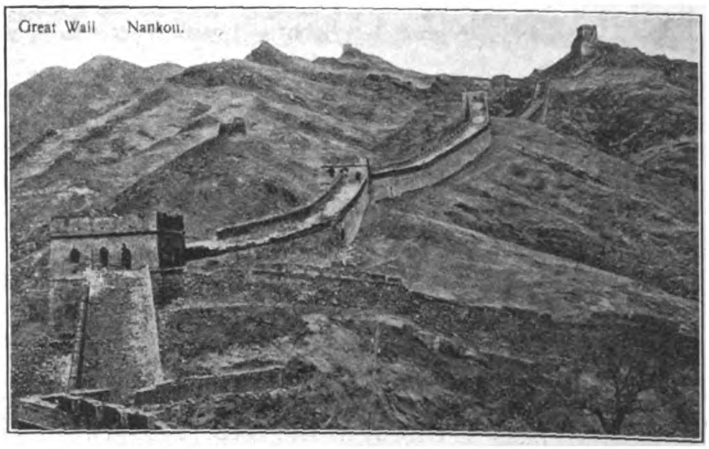

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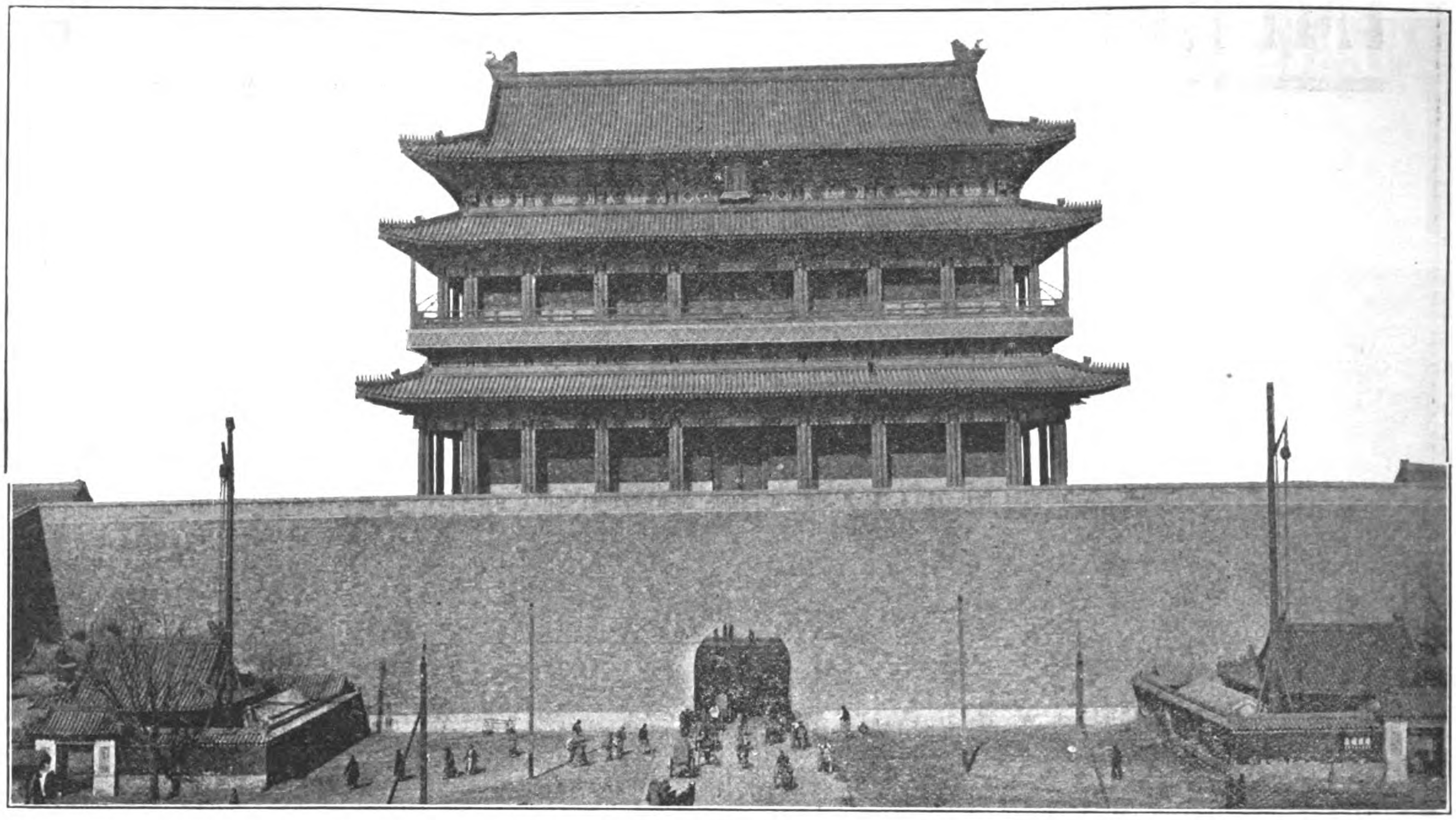

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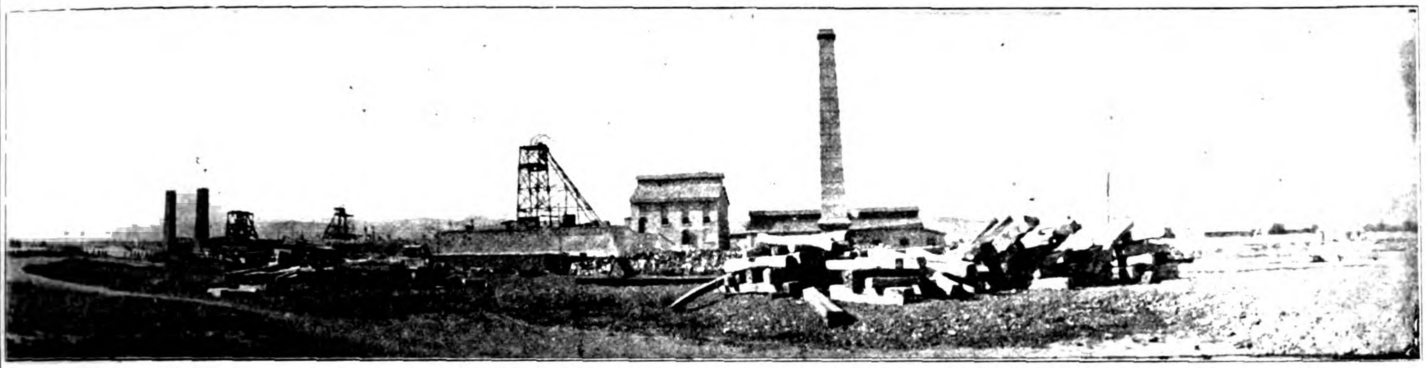
THE TAO-CHING RAILWAY

(Imperial Chinese Government Honan Line) Pekin-Syndicate Railway



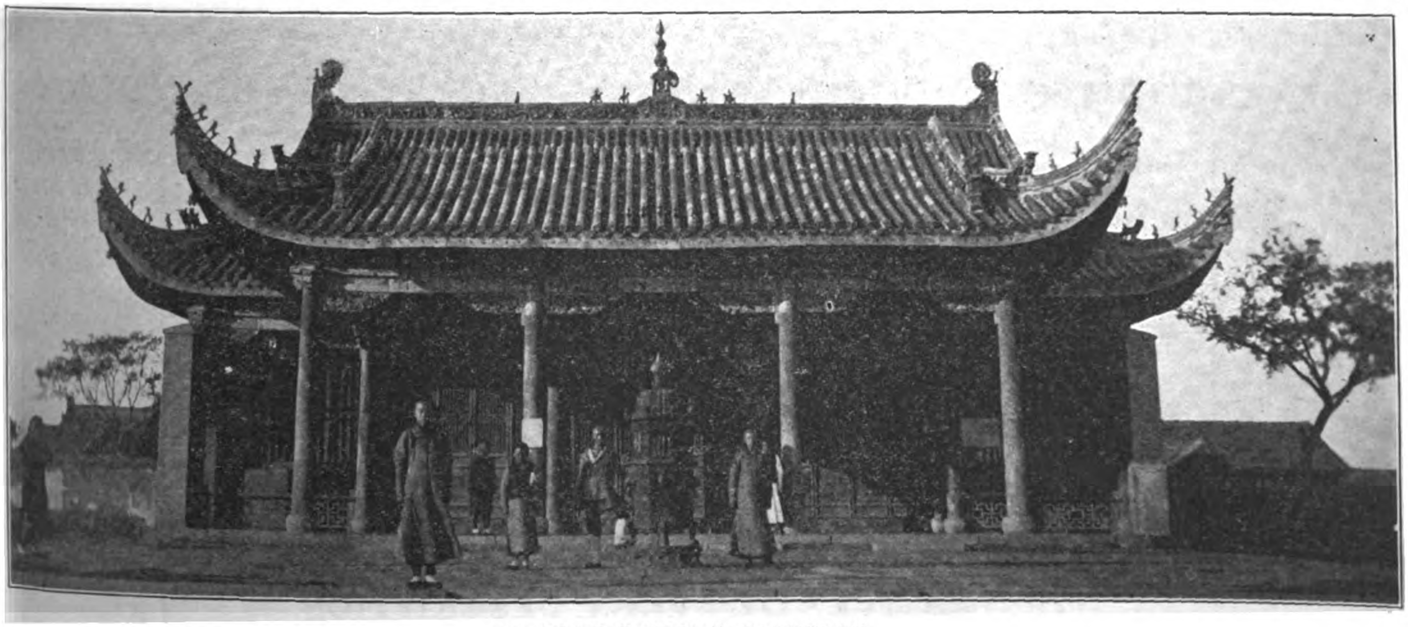
GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

"China's Road of Anthracite"

THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY, IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

THE PIEINLO RAILWAY

"THE FIRST SECTION OF THE PROJECTED CENTRAL TRUNK LINE" (KAIFENG-FU TO HONAN-FU)



CHUNG-HUAN TEMPLE, KAIFENG-FU.

This line connects with the through service of the Peking-Hankow Railway at Chengtingfu, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

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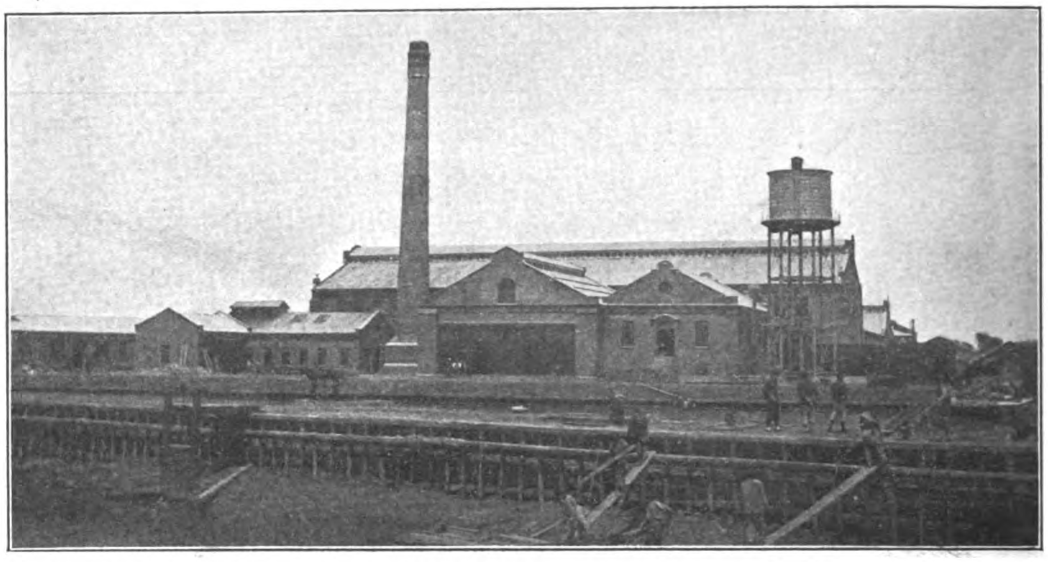

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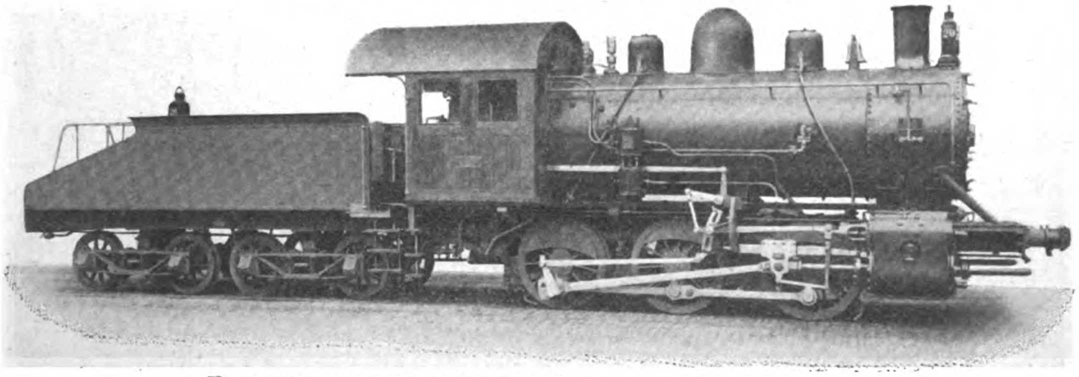

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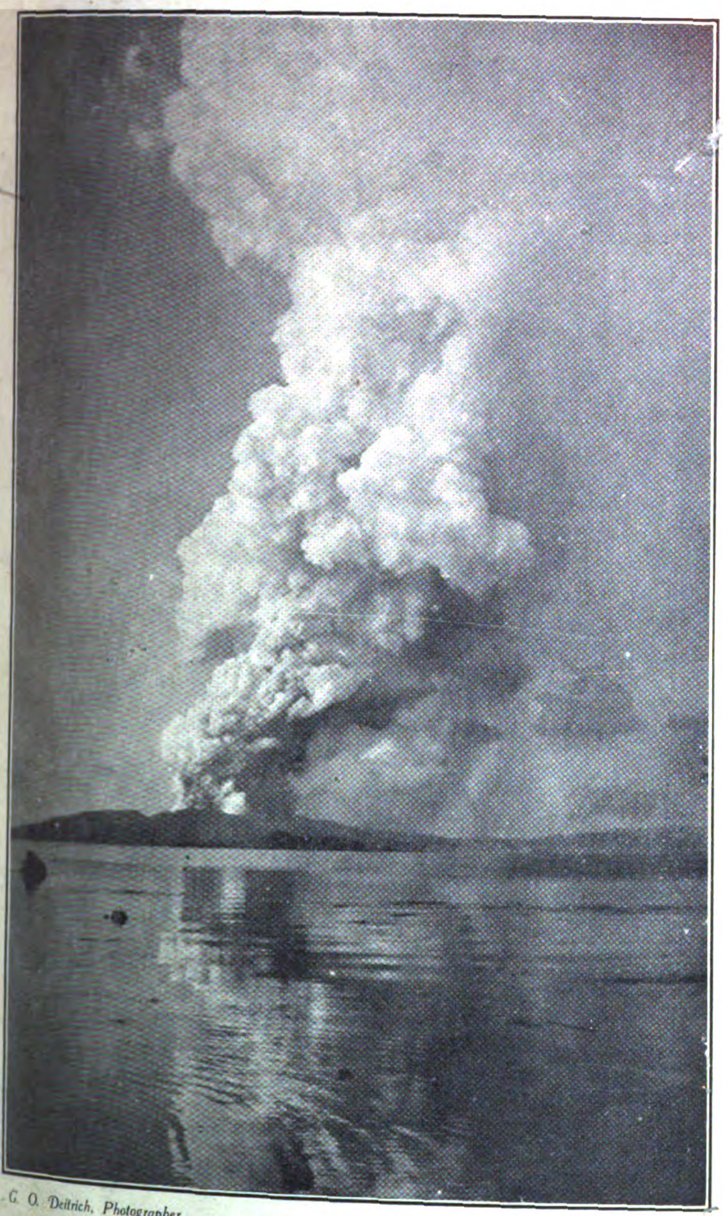
The "Maine:" Thirteen Years After



G. O. Deitrich, Photographer

VIEW OF TAAL VOLCANO
Taken Morning After Eruption Which Killed Over 1,500 Natives

The Taal Disaster

American Capital in the Philippines

Present Status of Mining in the Philippines

TAKATA & CO. SHANGHAI.

General News and Comment

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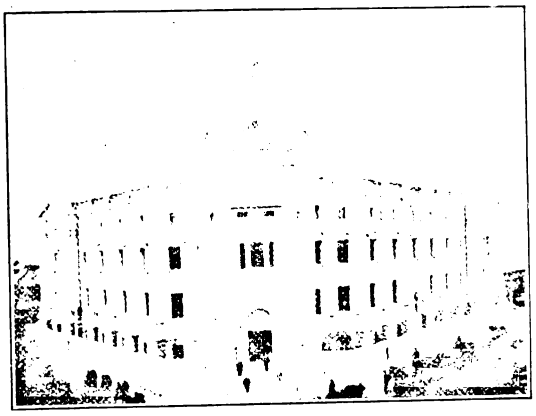

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Capital contributed by Imperial Chinese Government....... Kpg. $3,500,000
Reserve Fund......................... Kpg. $1,670,000

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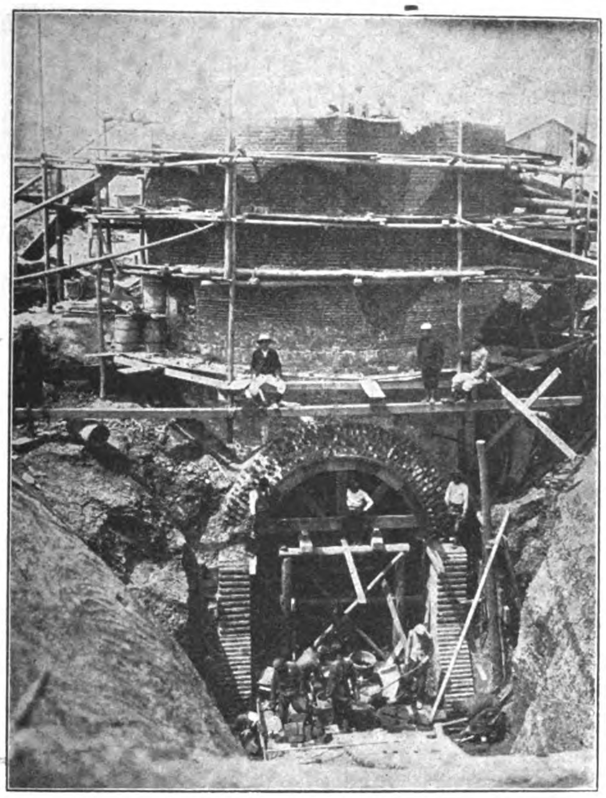

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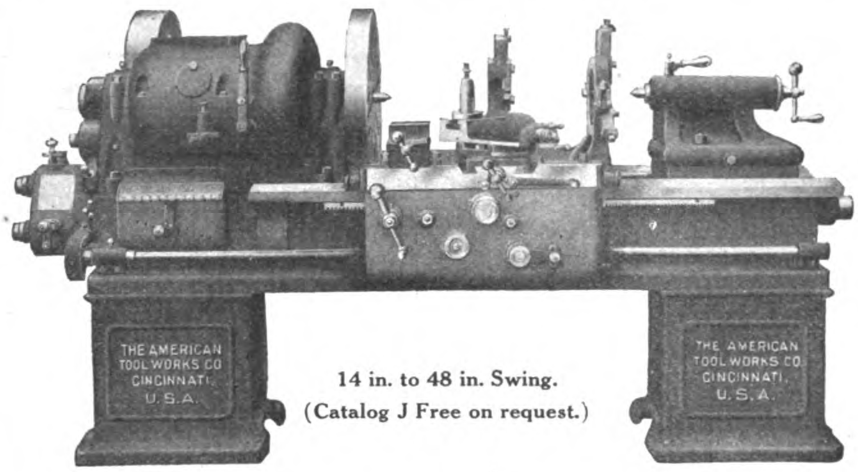

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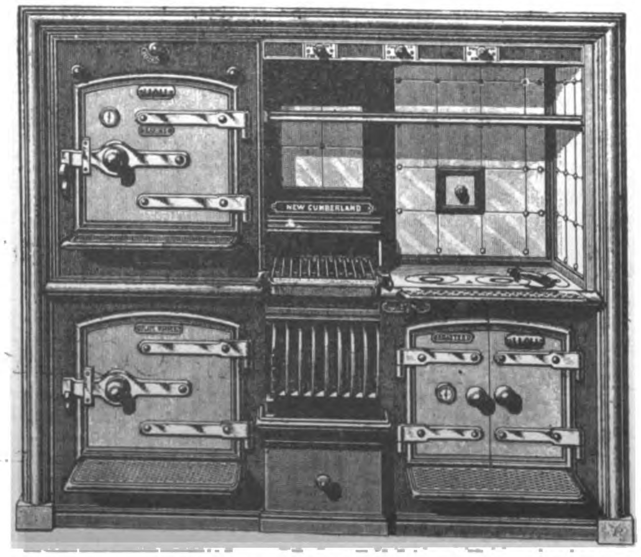

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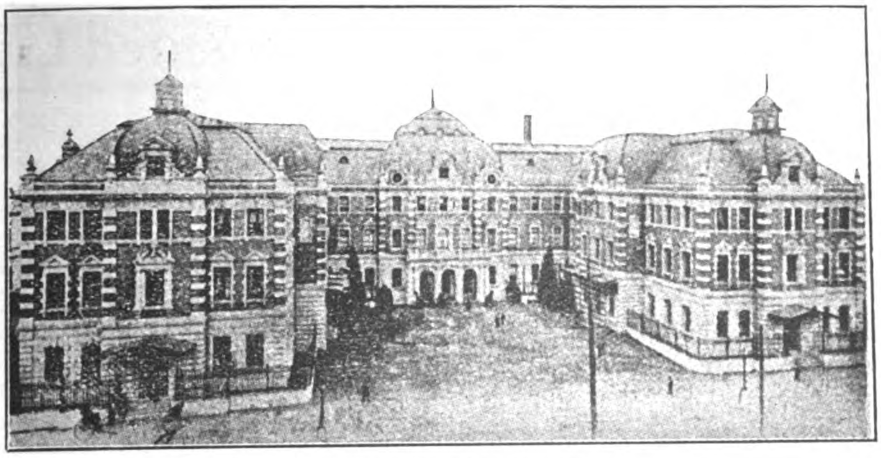

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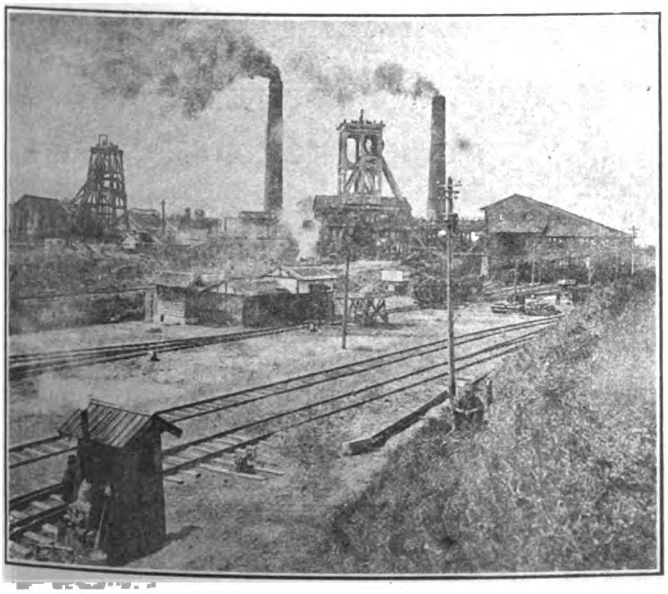

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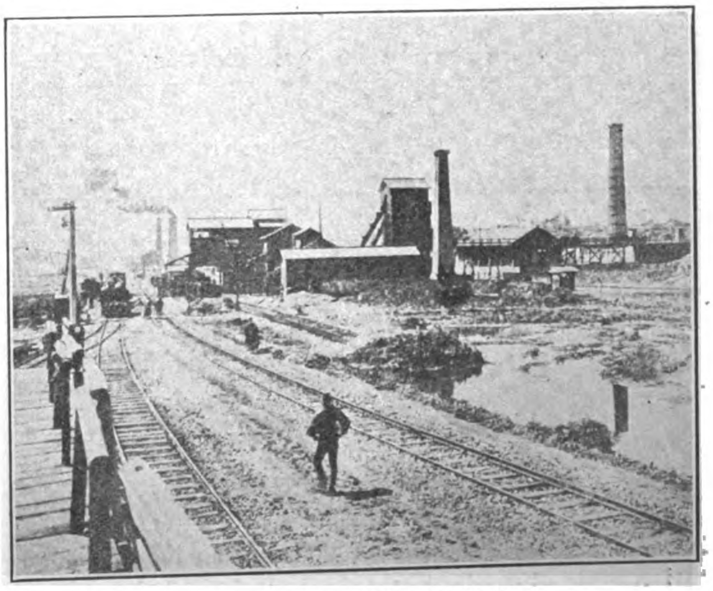
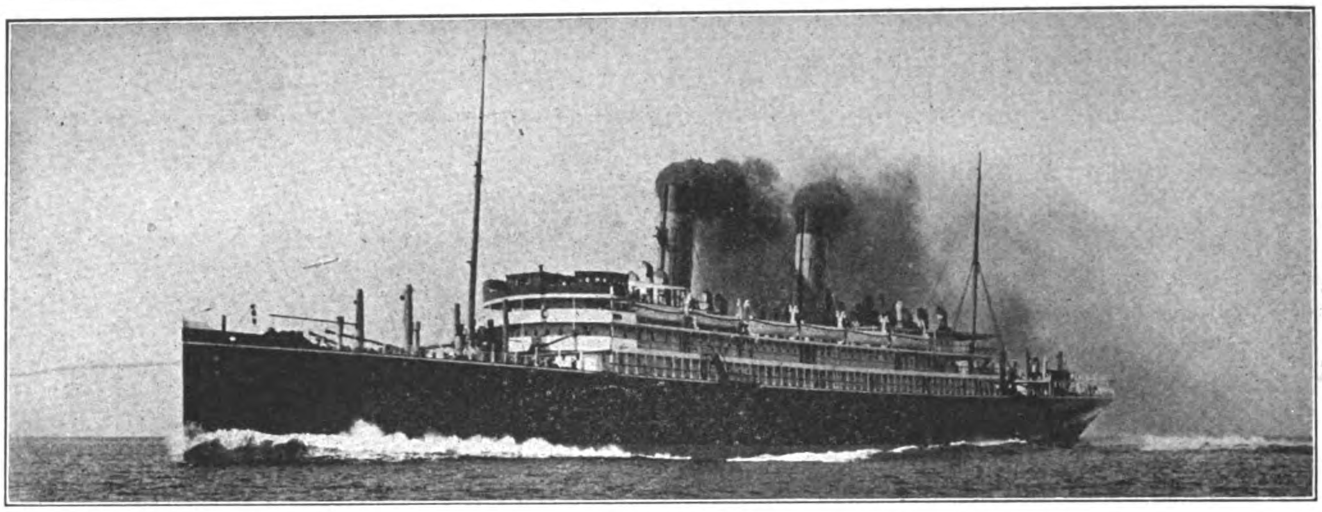


WASHING PLANT, MIIKE MINE



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WATER ON BLOCKS AT SPRING TIDE	26½	„

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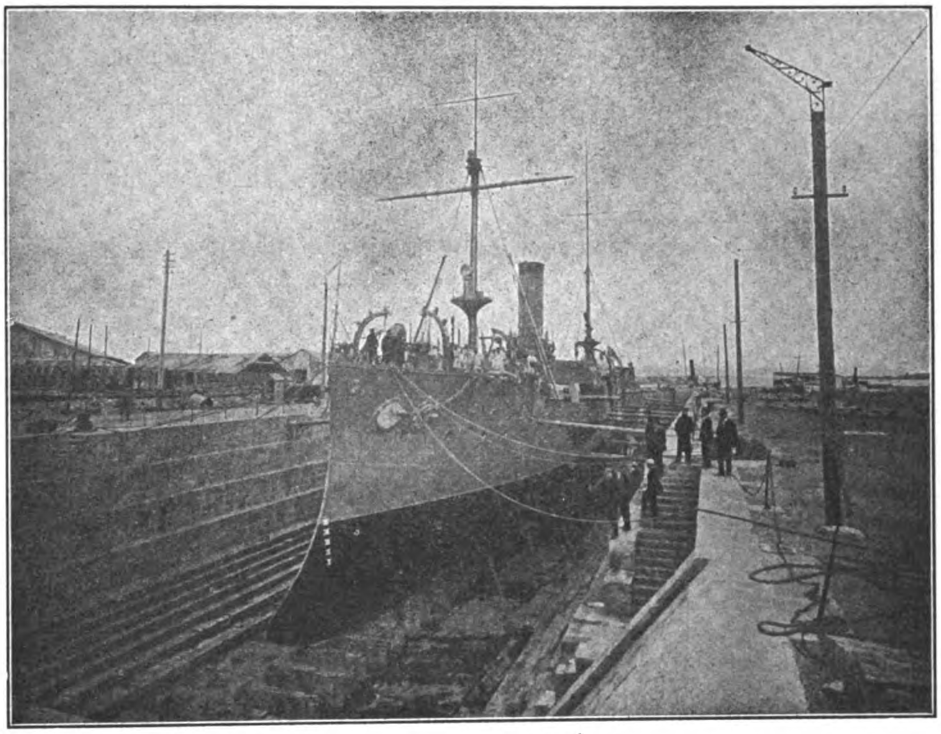

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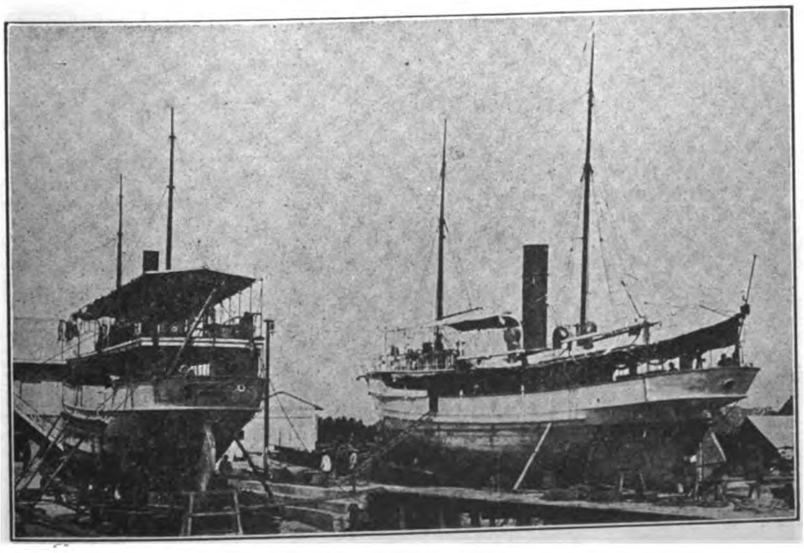

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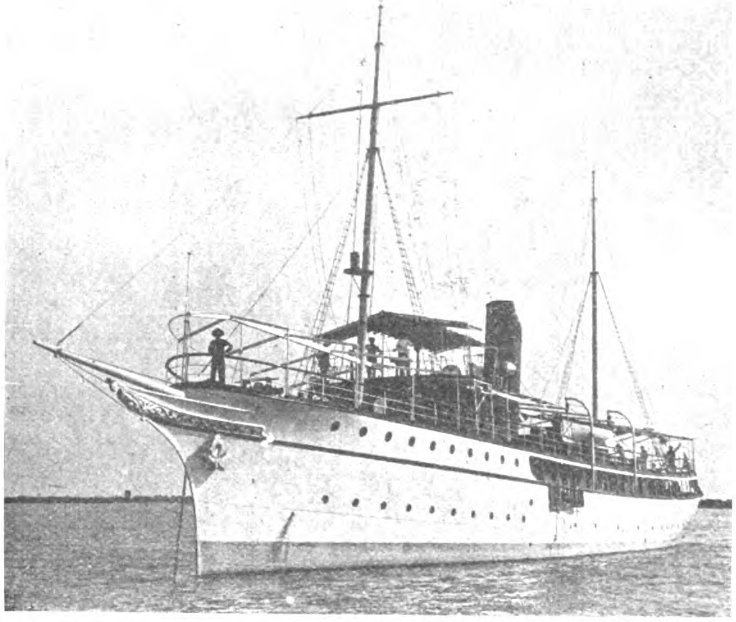

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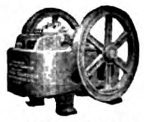

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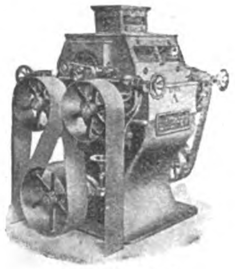

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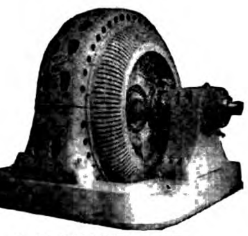
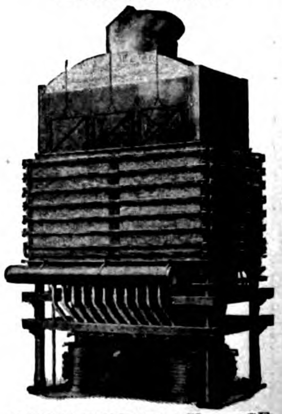
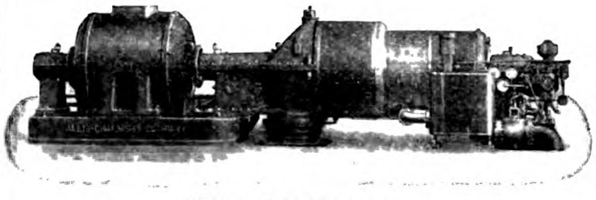


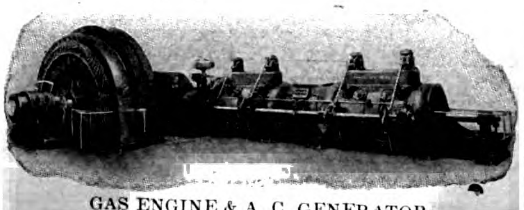
A.C. GENERATOR



RECTANGULAR FURNACE



STEAM TURBINE UNIT



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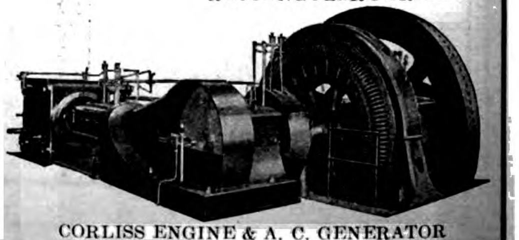

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TAIKOO DOCKYARD & ENGINEERING Co. OF HONGKONG LTD

Engineers, Boilermakers, Repairers

WORKS COVER AN AREA OF 53 ACRES

DRY DOCK 787 FT. × 88 FT. DEPTH 34½ FT.

SLIPWAYS
NO. 1 1030 FT.
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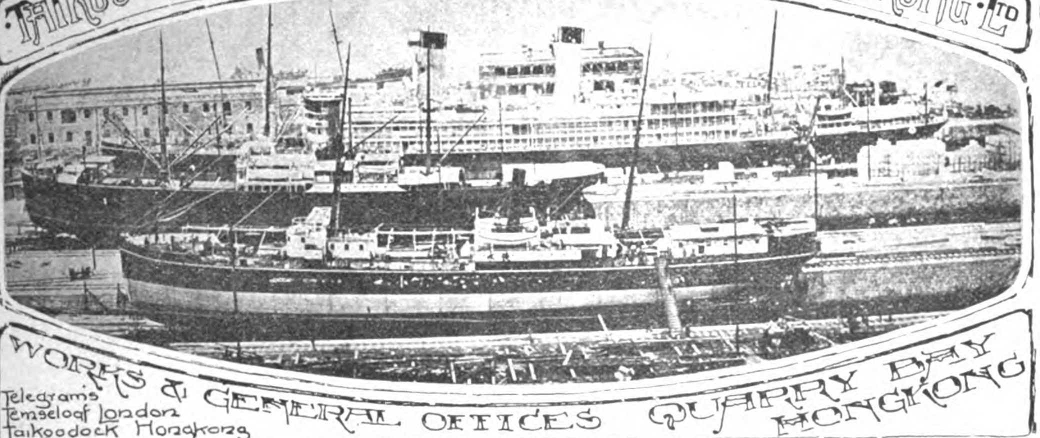

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A SECTION OF THE YARD SHEWING TURBINE STEAMSHIP "CHIYO MARU" 13,600 TONS IN DRY-DOCK, TWO COASTING STEAMERS ON SLIPWAYS, AND VESSEL LYING ALONGSIDE THE SEAWALL

THE BUILDING YARD IS LAID OUT WITH FURNACES AND PLANT SUITABLE FOR BUILDING VESSELS UP TO 20,000 TONS

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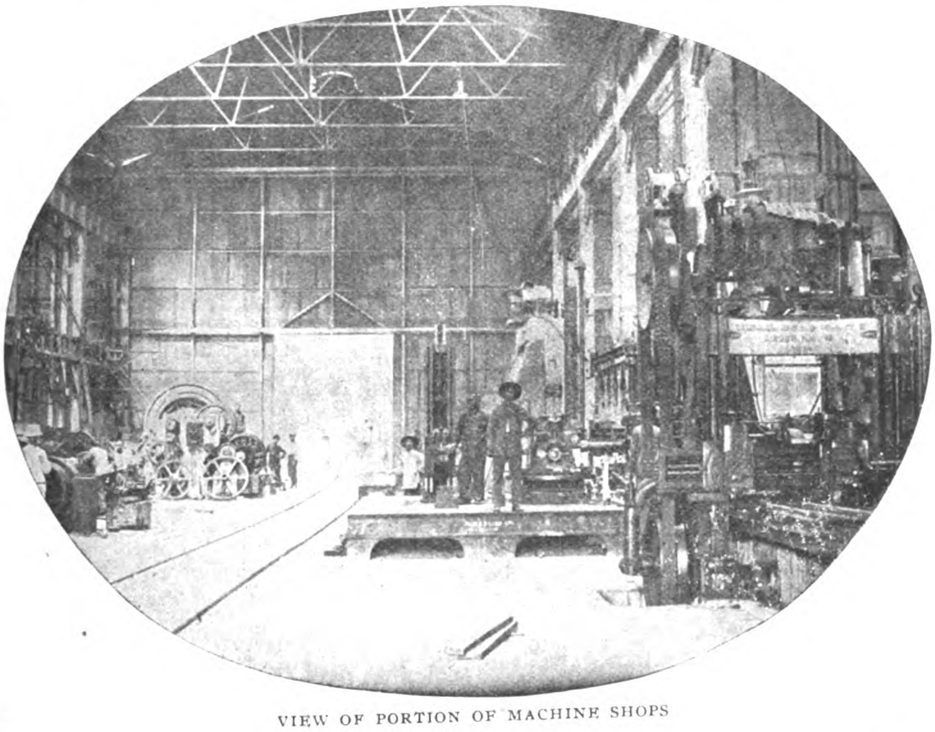

VIEW OF PORTION OF MACHINE SHOPS

AGENTS IN HONGKONG, CHINA AND JAPAN
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THE POWER FOR THE ESTABLISHMENT is generated by Gas Producers, on the Mond System, supplying 4 Cockerill Gas Engines of 3,000 collective horse power, driving Electrical Generators, and is transmitted throughout the Works by means of Electrical Motors.

AN ELECTRIC DERRICK CRANE capable of lifting weights up to 100 tons, is erected on the Sea Wall, and 14 Electric Overhead Travelling Cranes ranging from 5 tons to 100 tons, are fitted throughout the Workshops.

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PHILIPPINE ISLANDS

CASTLE BROS.-WOLF & SONS

THE DOCK PUMPS consist of 2 sets of Centrifugal, Electrically driven, pumps, together capable of emptying the Dock with 35 feet of water on the Sill in 2¾ hours.

THE MACHINERY in the Engine Works is laid out for dealing with the heaviest classes of Engines.

THE SLIPWAY CARRIAGES are of the latest pattern by Morton of Leith, and the Winding Gear consists of large electrically driven winches operating massive wire cables.

TENDERS SUBMITTED AND ESTIMATES GIVEN FOR BUILDING AND REPAIRING ALL CLASSES OF VESSELS; ALSO FOR EVERY DESCRIPTION OF ENGINE AND BOILER, MECHANICAL, ELECTRICAL AND CONSTRUCTIONAL WORK

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HONGKONG

Telegraphic Address: **Manifesto Hongkong**
Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians.

All classes of CONSTRUCTIONAL and GENERAL ENGINEERING WORK undertaken, also LOCOMOTIVES, RAILWAY ROLLINGSTOCK and PLANT, BRIDGES, etc.

COAST and RIVER STEAMERS, TUG BOATS and LAUNCHES, SHALLOW DRAFT VESSELS and STERN WHEEL STEAMERS.

AUXILIARY MACHINERY for MARINE and LAND Purposes.

LAND and MARINE BOILERS of all sizes and classes.

GALVANIZING by the Electrical process.

IRON and BRASS CASTINGS of all descriptions.

FORGINGS in IRON and STEEL for SHIPS, ENGINES, and LAND WORK, large and small.

We make a specialty of HIGH SPEED MOTOR BOATS for PASSENGER and CARGO Traffic.

ALL CLASSES of COCKS, VALVES and FITTINGS in IRON and BRASS supplied.

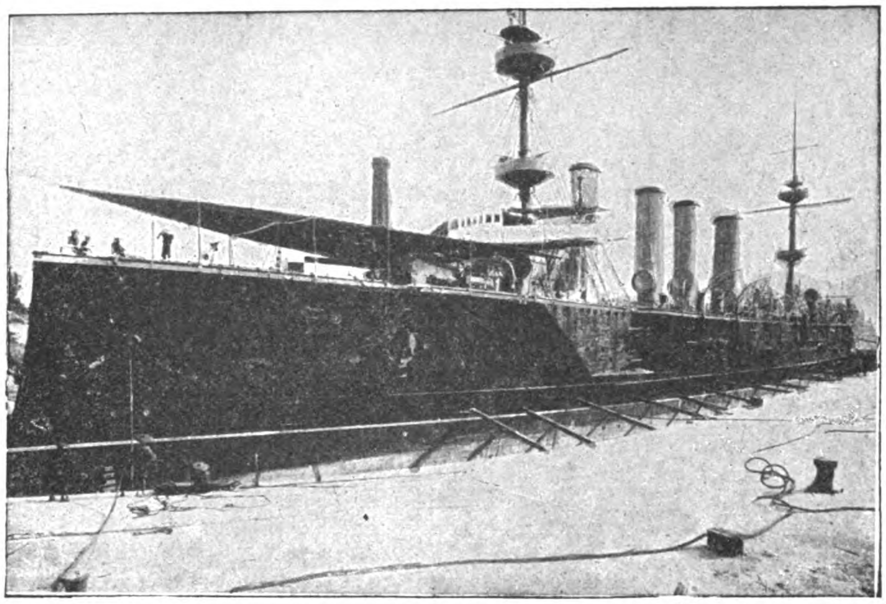
BOLTS, NUTS and RIVETS MANUFACTURED at SHORT NOTICE.

FINISHED NUTS in BRASS and IRON.

A LARGE STOCK of STEEL and IRON PLATES, BARS and ANGLES, always in hand.

The Company possesses SIX GRANITE DOCKS and TWO PATENT SLIPWAYS and these are equipped for EXPEDITIOUS WORK. Our plant is of the most modern type throughout.

Ship Owners and Captains are assured that DOCKING and REPAIRS are carried out PROMPTLY and at MODERATE CHARGES.



H. M. S POWERFUL IN NO. 1 DOCK, KOWLOON.

The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	Length on Keel Blocks	Entrance Breadth	Depth Over Sill at Ordinary Spring Tides	Rise of Tide	
				Springs	Neaps
KOWLOON	Feet	Feet	Feet	Feet	Feet
No. 1 Dock, Kowloon..........	700	86 ft. top / 70 ft. bottom	30'	7' 6"	3
No. 2 Dock, Kowloon	371	74'	18' 6"	7' 6"	—
No. 3 Dock, Kowloon.	264	49' 3"	14'	7' 6"	—
Patent Slip, No. 1, Kowloon...	240	60'	14'	7' 6"	—
Patent Slip, No 2, Kowloon...	220	60'	12'	7' 6"	—
TAI-KOK-TSUI					
Cosmopolitan Dock...........	466	85' 6"	20'	7' 6'	—
ABERDEEN					
Hope Dock	430	84'	23'	7' 6"	—
Lamont Dock................	333	64'	16'	7' 6"	—

Please Address Enquiries to the Chief Manager, R. M. DYER, B. Sc., M. I. N. A., Kowloon Dock, Hongkong

Telephone No. 13 K. Head Office, Kowloon.

Town Office, Queen's Buildings Telephone No. 20, Hongkong

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PENINSULAR AND ORIENTAL STEAM NAVIGATION CO., OSAKA SHOSEN KAISHA (IN CONNECTION WITH THE CHICAGO MILWAUKEE & ST. PAUL AND THE CHICAGO MILWAUKEE AND PUGET SOUND RAILWAYS), "BEN" LINE OF STEAMERS, "INDRA" LINE OF STEAMERS.

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4 MUELLE DEL REY, MANILA, P. I.

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PURE MANILA ROPE

MADE WITH LATEST IMPROVED ROPE MACHINERY

Average Breaking Load After Three Tests:

2 Inch Rope Circumference........ 4,037 Pounds
3½ " " " .... 16,670 "
5 " " " .... 23,728 "

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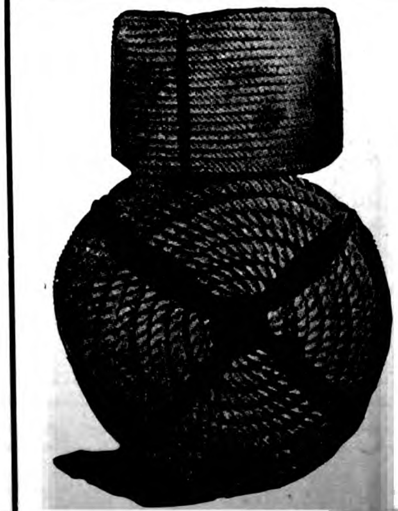
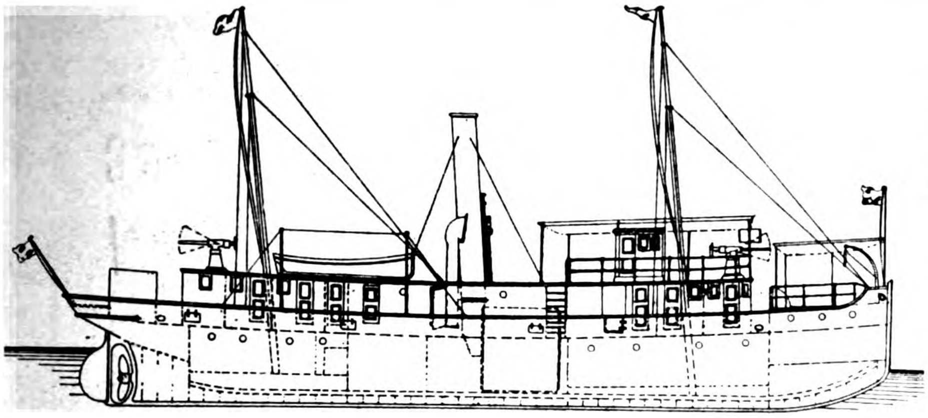


ENGINEERS, MACHINISTS and FOUNDERS



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I. C. M.'S GUNBOAT "KAI-HAI" BUILT BY THE NEW ENGINEERING AND SHIPBUILDING WORKS, LTD. SHANGHAI, FOR SERVICE IN NORTH CHINA: SPEED, 11 KNOTS

COAST AND RIVER STEAMERS, TUGBOATS, LAUNCHES, LIGHTERS, PONTOONS, SHALLOW DRAFT SIDE OR STERN WHEEL STEAMERS. ENQUIRIES SOLICITED. PLANS, SPECIFICATIONS AND ESTIMATES FURNISHED. ALL CLASSES OF ENGINEERING WORK UNDERTAKEN

THE NEW ENGINEERING AND SHIPBUILDING WORKS, LTD.

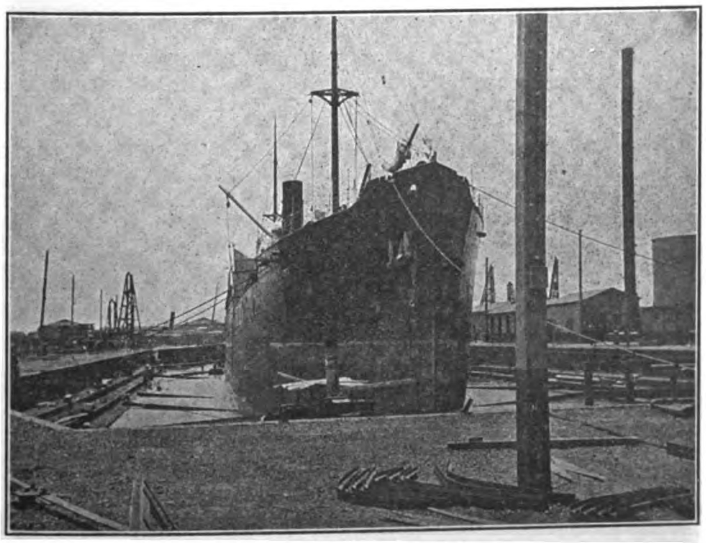
SHANGHAI

PROPRIETORS OF THE

YANGTSZEPOO DOCK

THE DOCK, WORKS AND OFFICE ARE LOCATED ON THE SHANGHAI SIDE OF THE RIVER, 15 MINUTES BY ELECTRIC TRAM FROM HEART OF THE CITY

THE WORKS ARE EQUIPPED WITH THE MOST MODERN MACHINERY, CAPABLE OF HANDLING THE LARGEST MARINE ENGINEERING WORK



VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK

LENGTH ON BLOCKS 455'0"

„ OVERALL - 469'0"

WIDTH, ENTRANCE 74'0"

„ SILL - - 64'0"

DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21'0"

DEPTH ON 3'0" BLOCKS (H. W. O. S. TIDES) 19'0"

PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.

WORKSHOPS LOCATED AT HEAD OF DOCK

OFFICE, DOCK & WORKS, 37 YANGTSZEPOO ROAD, SHANGHAI

TELEGRAPHIC ADDRESS: "SPEEDY." CODE: A.B.C., 5TH EDITION · TELEPHONE 703. · MANILA AGENT, F. L. STRONG

THE SHANGHAI DOCK AND ENGINEERING CO., LTD.

DOCK OWNERS ENGINEERS

SHANGHAI

CHINA

SHIP BUILDERS FOUNDERS

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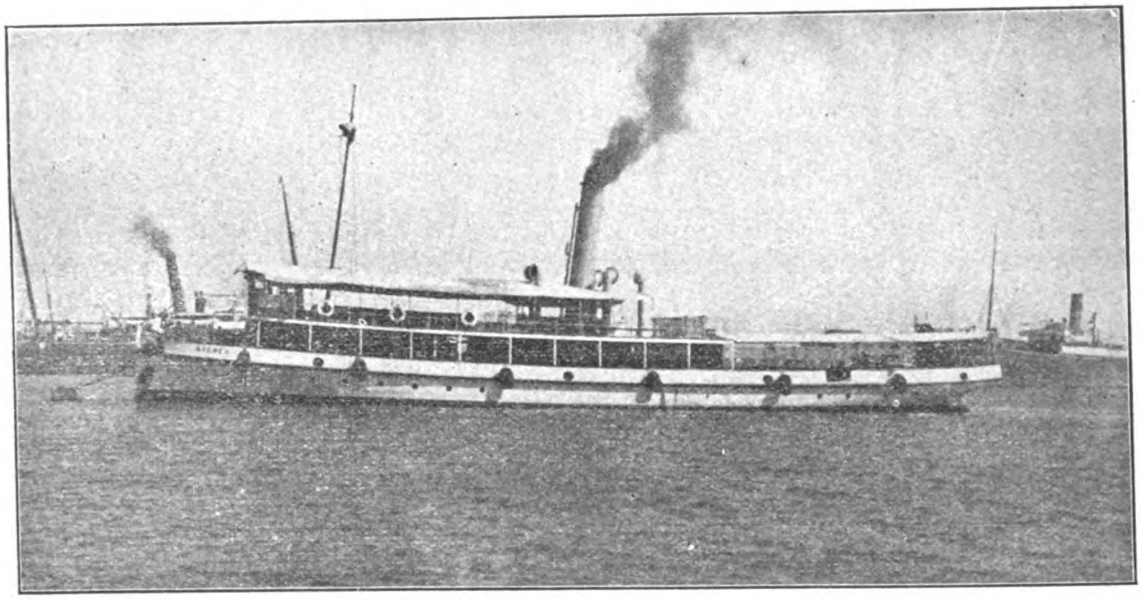

NORDDEUTSCHER LLOYD TENDER "BREMEN," BUILT BY THE SHANGHAI ENGINEERING AND DOCK COMPANY

The Docks are five in number, ranging in length from 360 feet to 560 feet, and breadth of entrance from 57 feet to 82 feet, with the depth of water on the sill from 16 feet to 24 feet.

The Dock charges are very moderate.

The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops are provided with the latest improvements in tools, traveling cranes of 70 tons' capacity, hydraulic and pneumatic machinery.

Lit up by Electric light with railway lines through workshops and yards.

Powerful salvage appliances can be supplied at short notice. Enquiries immediately attended to.

Estimates given for all classes of work; Coast Steamers, Side and Stern-Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools, Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and engineering accessories generally.

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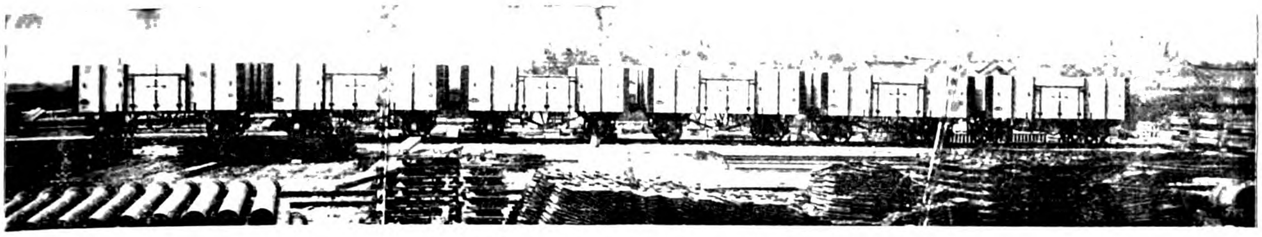

TYPE OF HIGH SIDE GOODS WAGONS

CONSTRUCTED BY THE VULCAN IRONWORKS, LTD., FOR THE NANKING CITY RAILWAY

Railway Coaches and Goods Wagons Assembled
Structural Steel Work Erected

ESTIMATES given for every description of Engineering and Constructional work and repairs, including supplying and installing of HOT WATER and STEAM HEATING in all its branches and HOT and COLD WATER SUPPLIES.

THE WORKS are electrically driven, and are equipped throughout with up-to-date machinery and labour saving devices, including an HYDRAULIC PLANT, and appliances to undertake constructing or repairing SHIPS, ENGINES, BOILERS, etc.

EXPERIENCED EUROPEAN STAFF SUPERVISES ALL BRANCHES OF WORK

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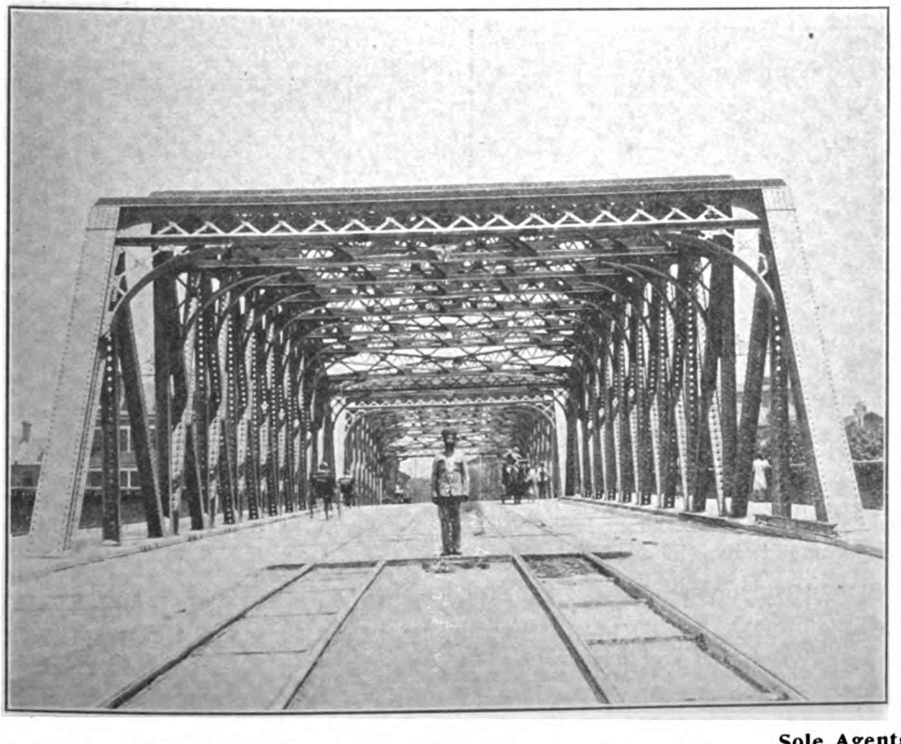

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STRUCTURAL IRON WORK, STEEL CARS, TRAIN SHEDS, IRON PARTS OF ROLLING STOCK

BRAKE RODS, TRUSS RODS, TRUCKS, AND BRIDGES, SUBJECTED TO SEVERE VIBRATORY STRAINS, SHOULD ALWAYS BE COATED WITH PATTON'S

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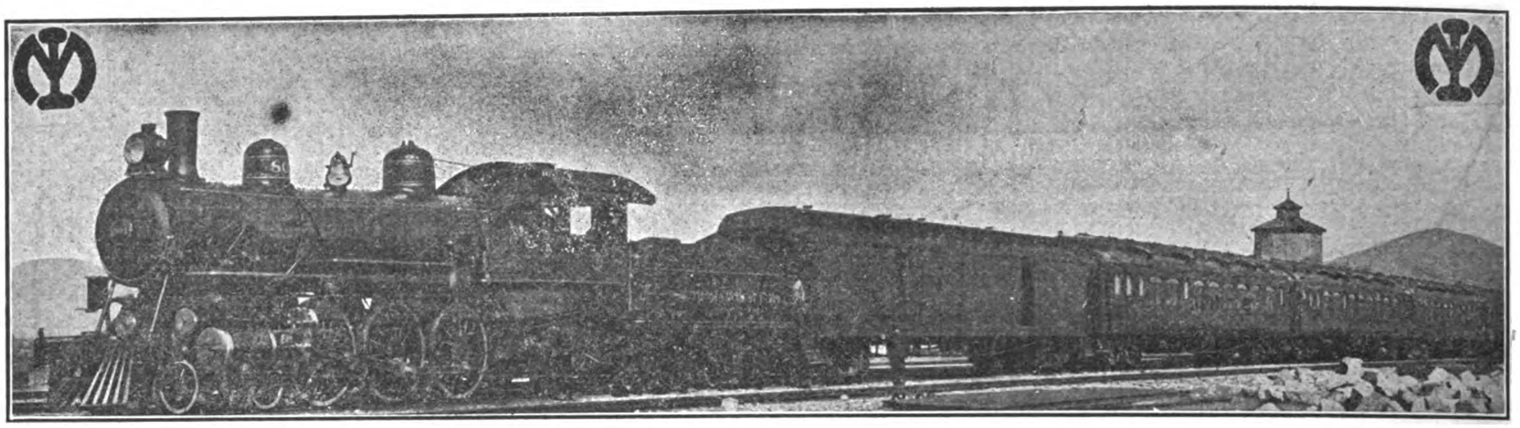

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SHORTEST, QUICKEST AND CHEAPEST ROUTE BETWEEN THE FAR EAST AND EUROPE VIA DAIREN

From Dairen	*Time Required*
To Changchun	15½ hours
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,, St. Pet'burg (via Viatka)	10 days.
,, Berlin	11 ,,
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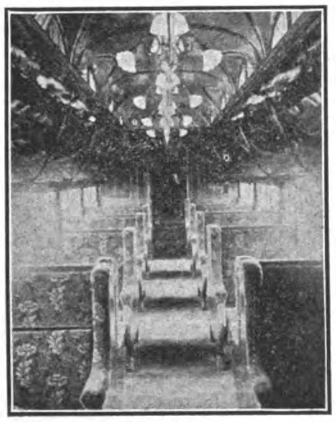
,, London	12½ ,,



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4 TIMES WEEKLY EXPRESS TRAINS

Composed of excellently equipped SLEEPING, DINING and 1st CLASS CARS, are operated between DAIREN & CHANGCHUN in connection with the TRANS-SIBERIAN ROUTE and SHANGHAI MAIL STEAMERS.

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These Express Trains connect at MUKDEN with the PEKING-MUKDEN RAILWAY running via TIENTSIN and connect also with the MUKDEN-ANTUNG LINE traversing a most picturesque country and connecting with the KOREAN RAILWAY.

INTERIOR PULLMAN DAY COACH

OTHER STEAMER CONNECTIONS AT DAIREN

Regular Steamship Services are maintained from DAIREN to MOJI, KOBE, CHEMULPO, TIENTSIN, CHEFOO, TSINGTAU and other ports in Japan and China.

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The INTERNATIONAL SLEEPING CAR & EXPRESS TRAINS CO., MESSRS. THOS. COOK & SON & the HAMBURG AMERIKA LINIE.

SOUTH MANCHURIAN RAILWAY COMPANY

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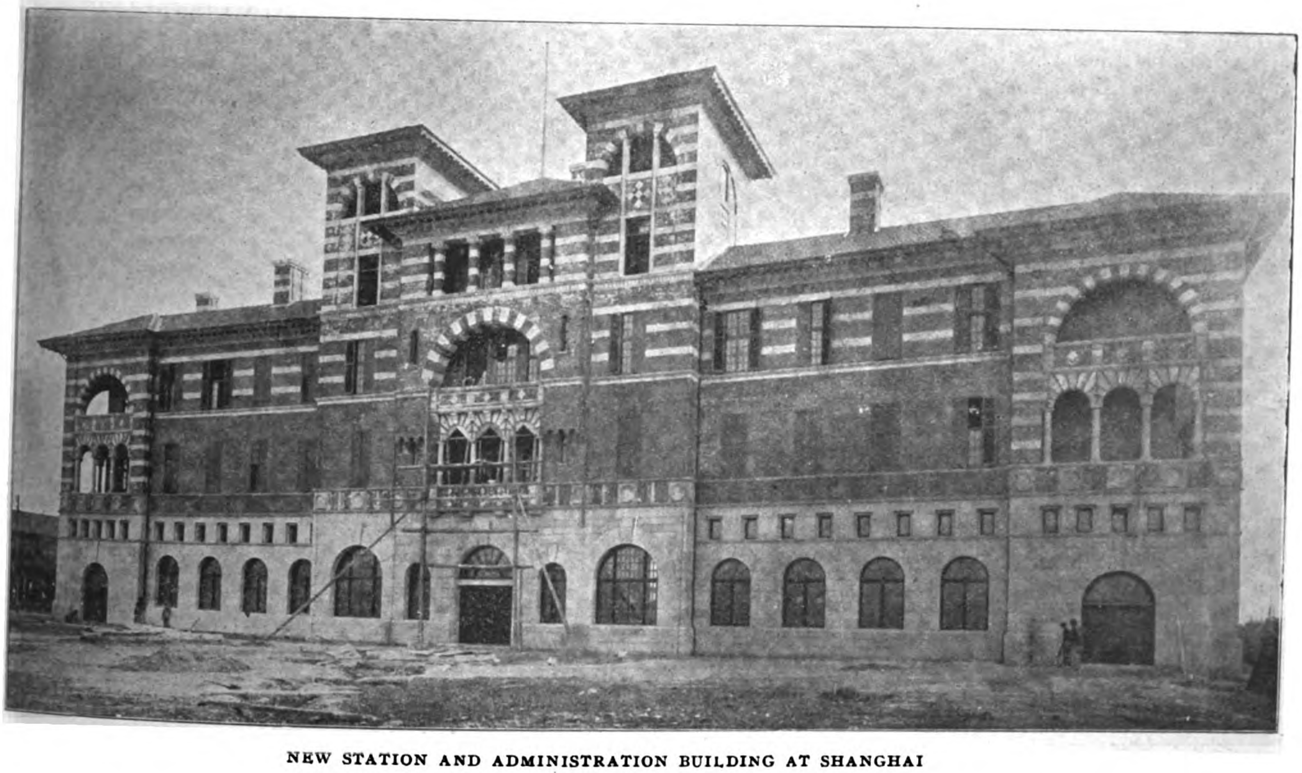

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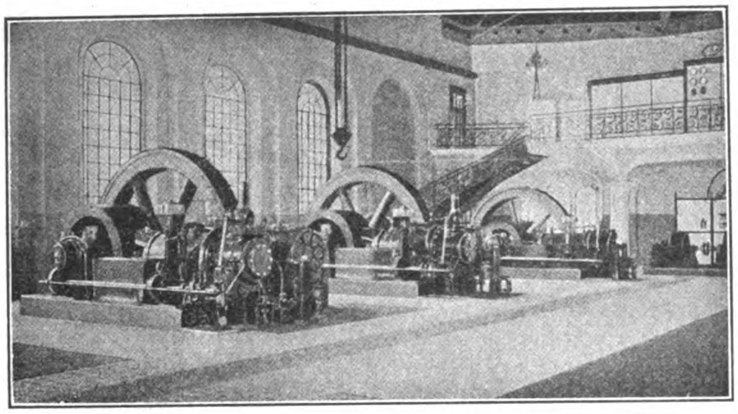

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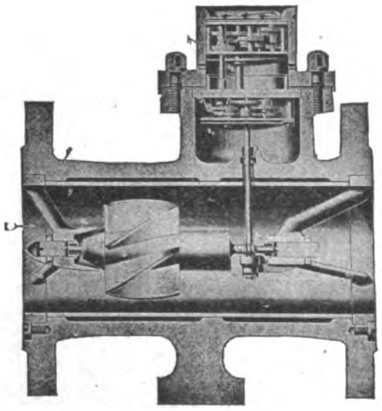

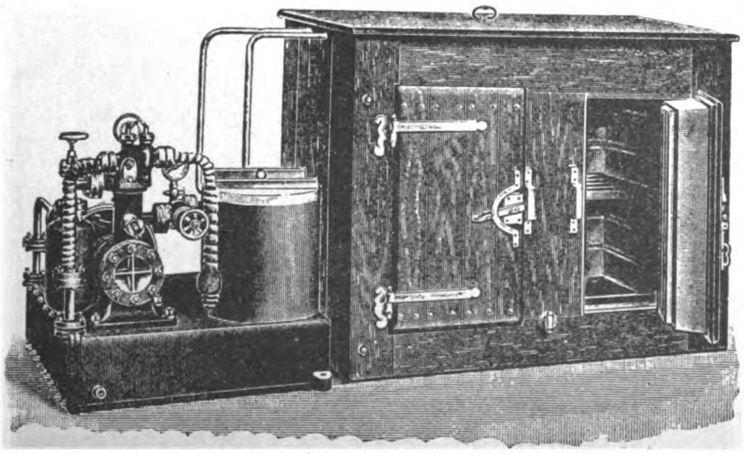

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from the smallest to the largest capacities. Small Ice-making and Refrigerating Plants for Hotels, Hospitals, Private Houses "System Ziegler." Safe—Reliable—Simple.

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MANUFACTURERS OF EVERYTHING ELECTRICAL

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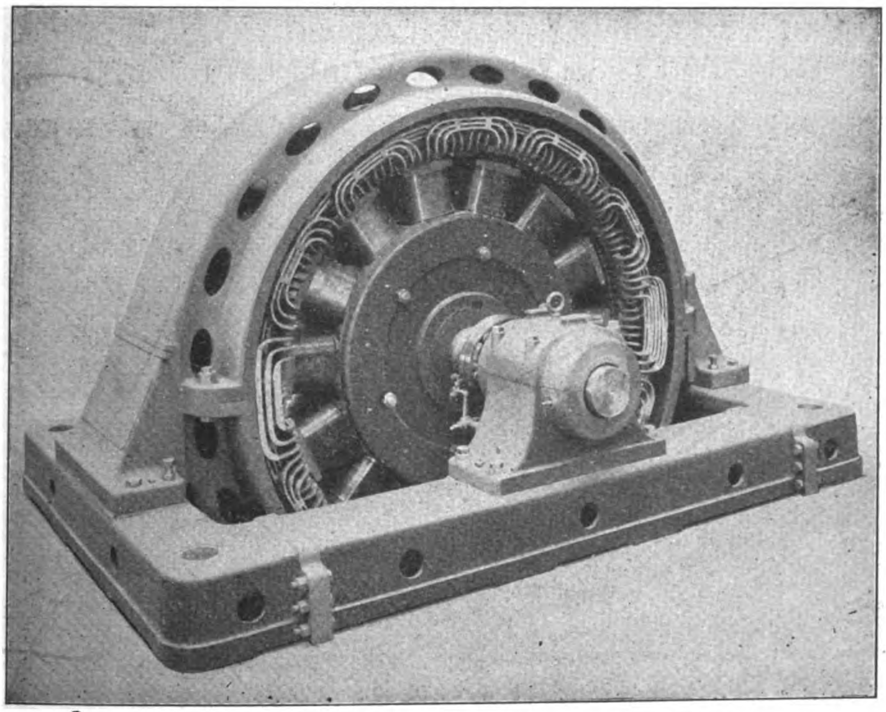

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DRIVEN BY GASOLINE OR ELECTRICITY

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DYNAMO

as installed at Mukden, Kirin, Soochow, Luanchow Mines and Tsingtao by Siemens-China

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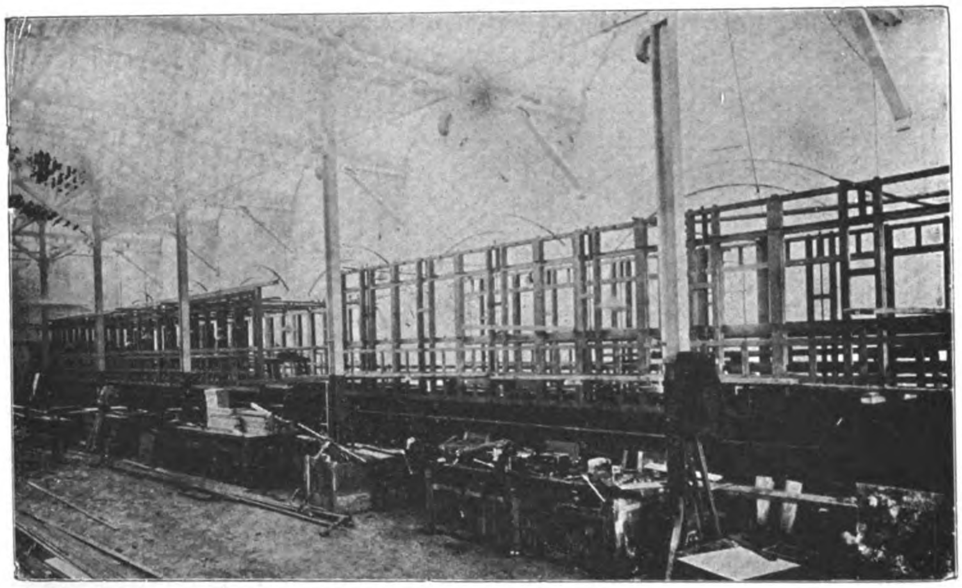
OF THE

SHANGHAI -:- NANKING -:- RAILWAY

LOCATED AT WOOSUNG AT ENTRANCE TO WHANGPOO RIVER, SHANGHAI. DEEP WATER WHARF WITH EVERY FACILITY FOR HANDLING HEAVY MATERIAL.



VIEW OF ERECTING SHOP

THESE SHOPS ARE FULLY EQUIPPED WITH THE MOST MODERN PLANT AND APPLIANCES FOR THE CONSTRUCTION OF CAR BODIES AND SETTING UP CAR PARTS ORDERED FROM ABROAD, ALL UNDER EXPERT SUPERVISION : : : : : : : : : : : : : : : : : : :

CARS FOR THE NANKING CITY RAILWAY, KIANGSU RAILWAY AND THE ANHWEI RAILWAYS WERE SET UP AND FINISHED AT THESE WORKS

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SHANGHAI NANKING RAILWAY

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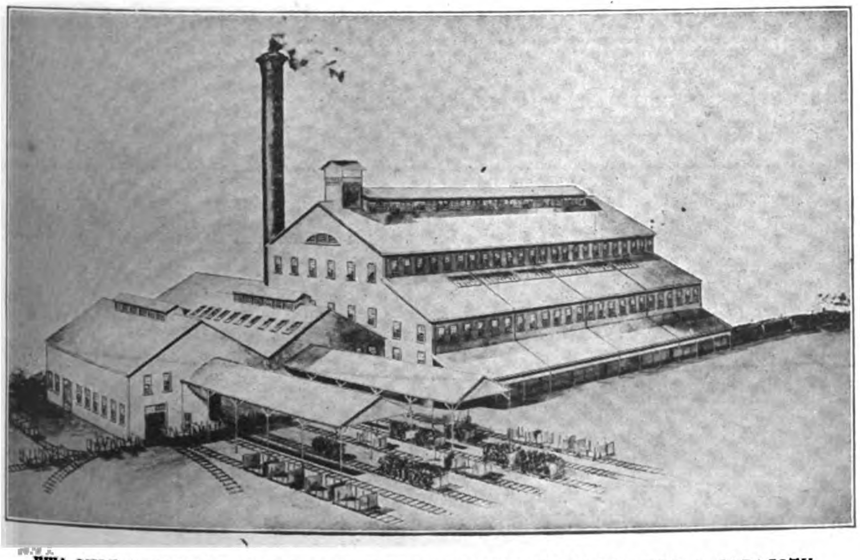

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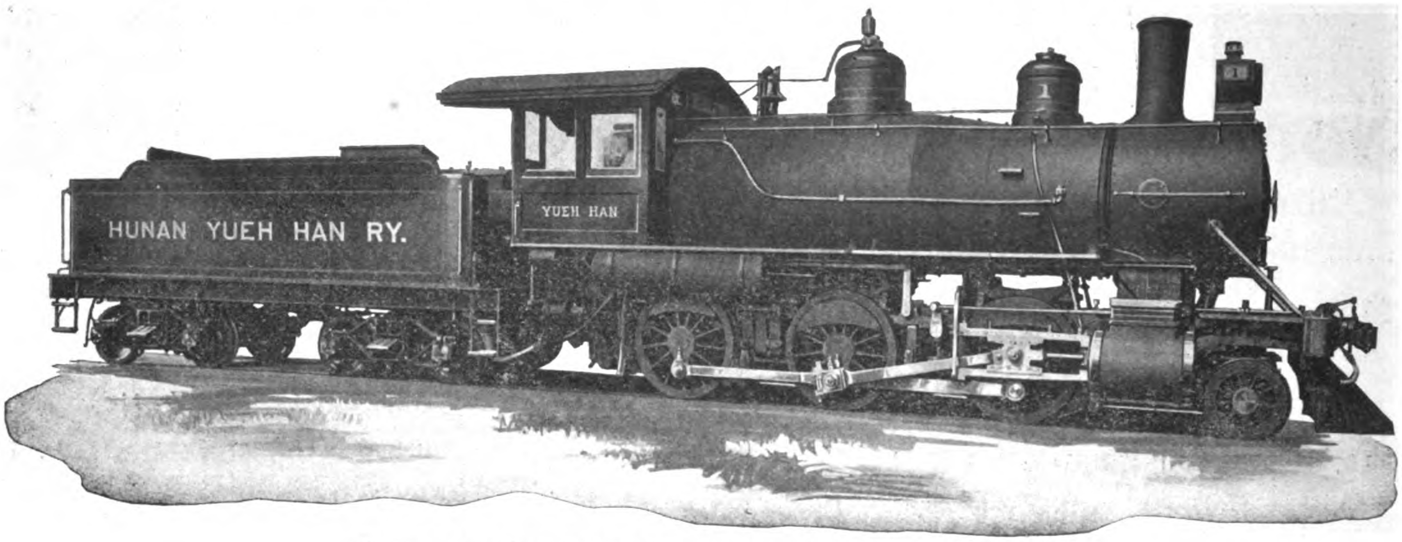

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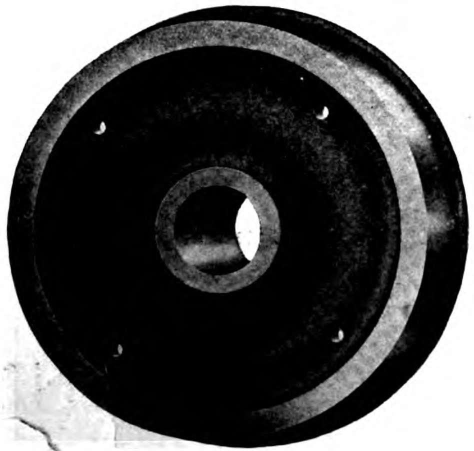

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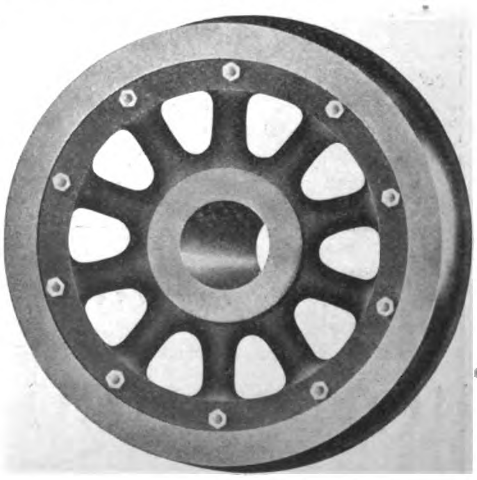

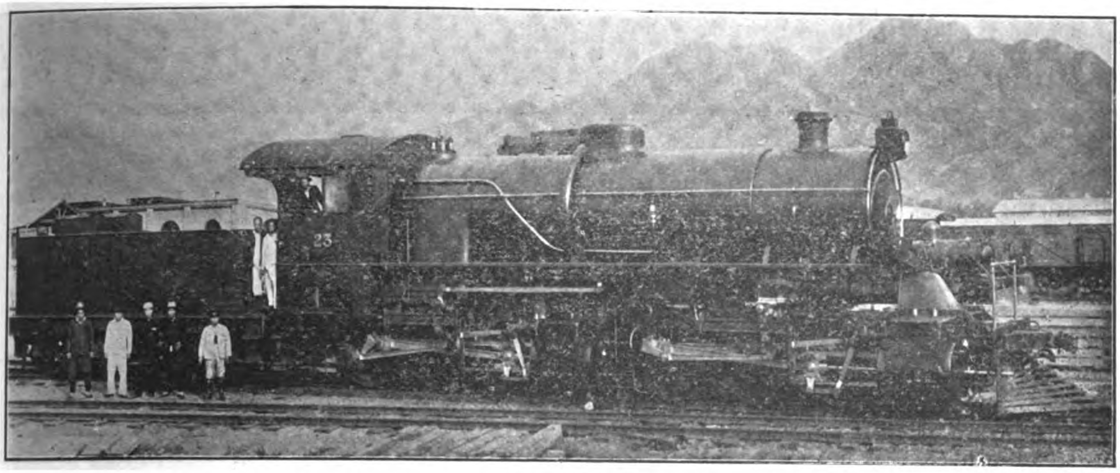

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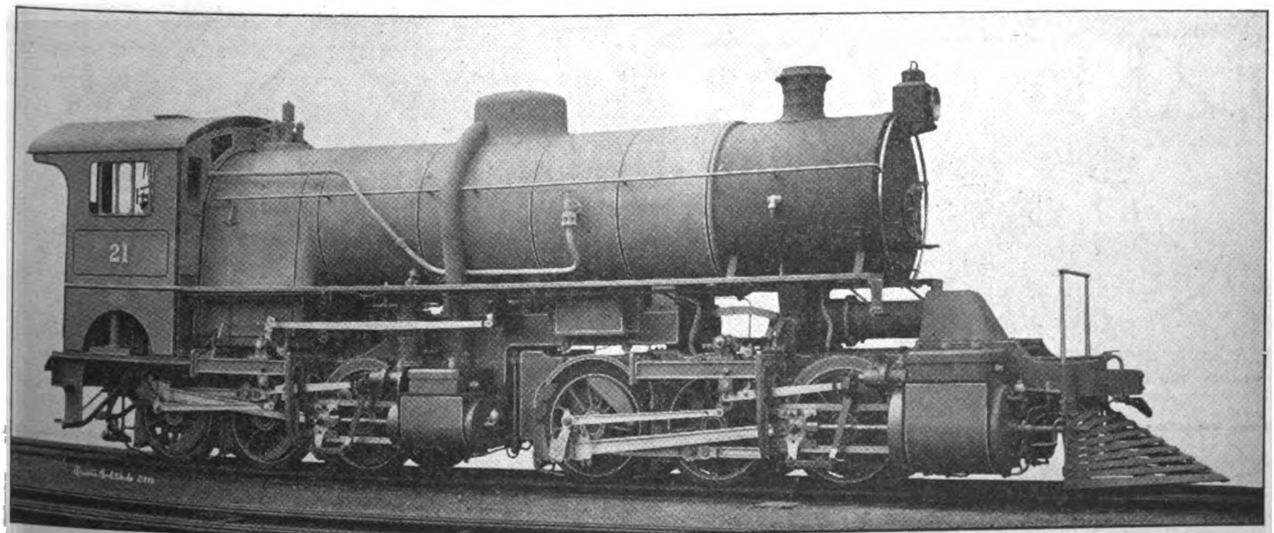

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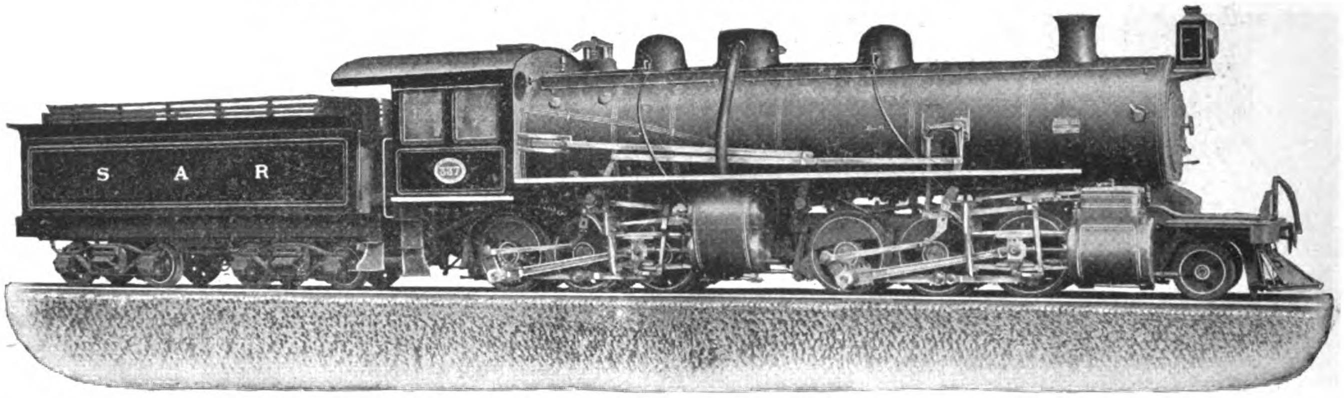
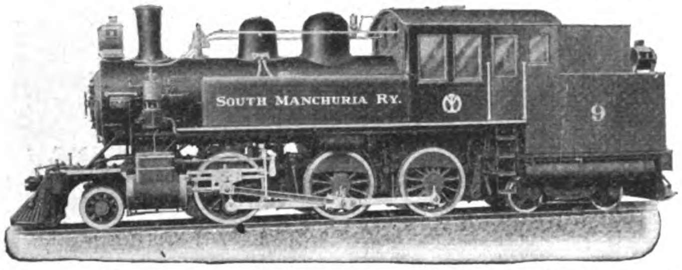
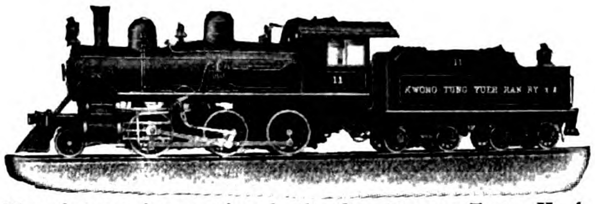


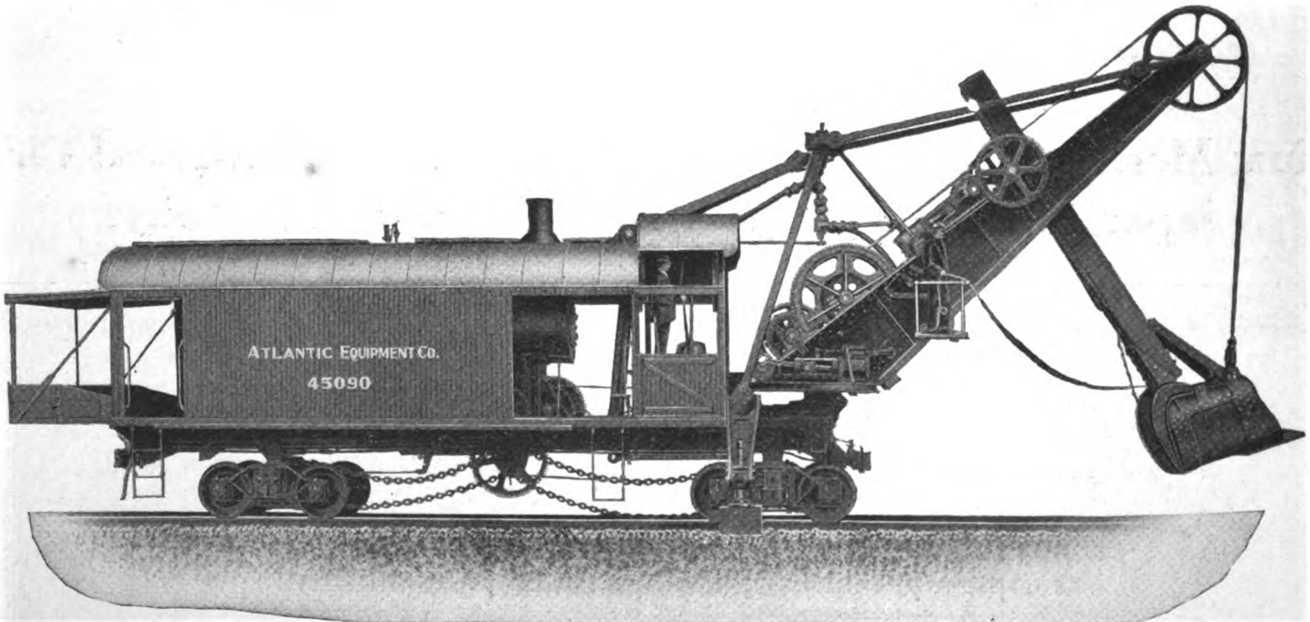
Articulated compound locomotive built for South African Government Railways to operate heavy trains on roads with steep grades and sharp curves.



Six coupled, double end locomotive built for South Manchuria Railway.



Mogul type locomotive built for Kwong-Tung Yueh-Han Railway.



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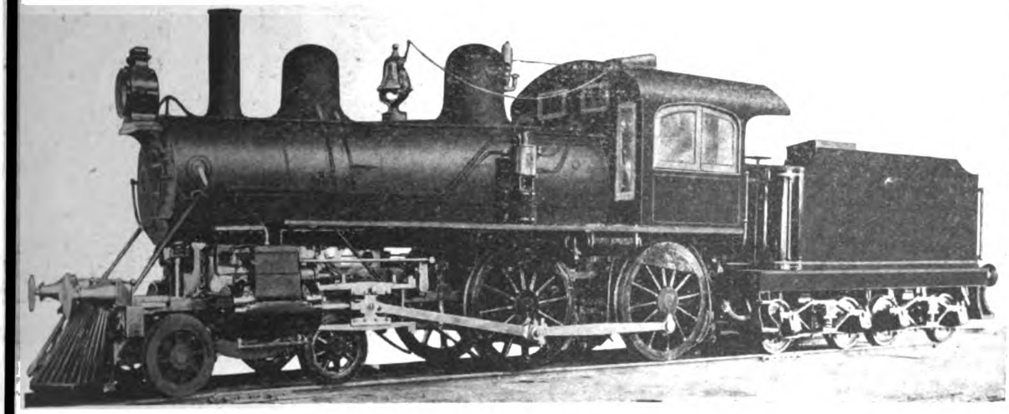

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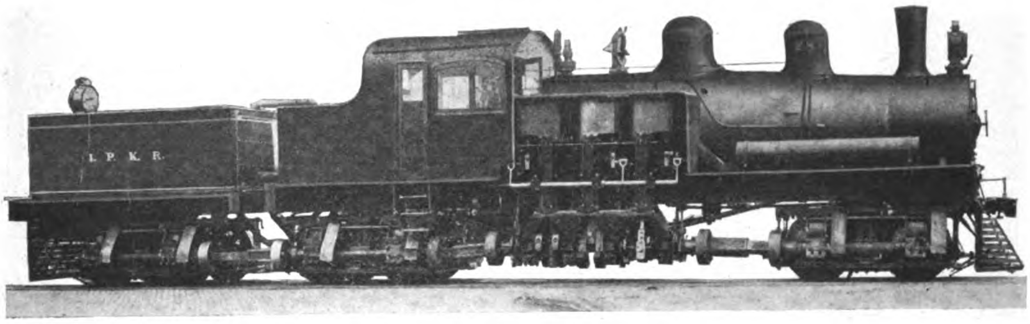

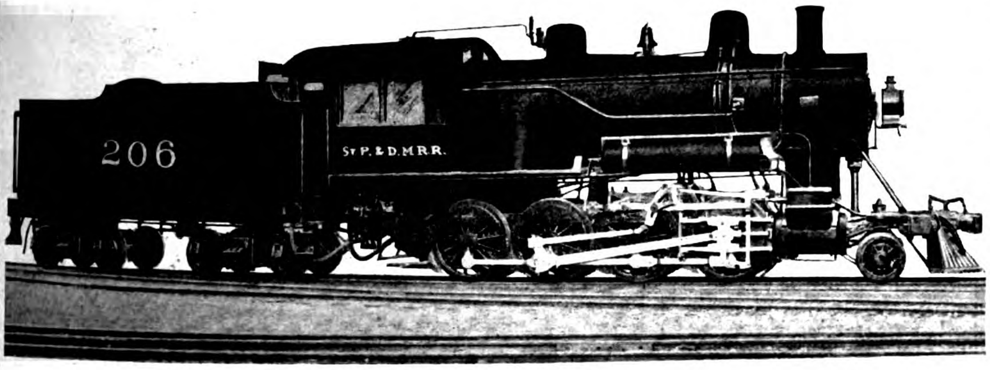

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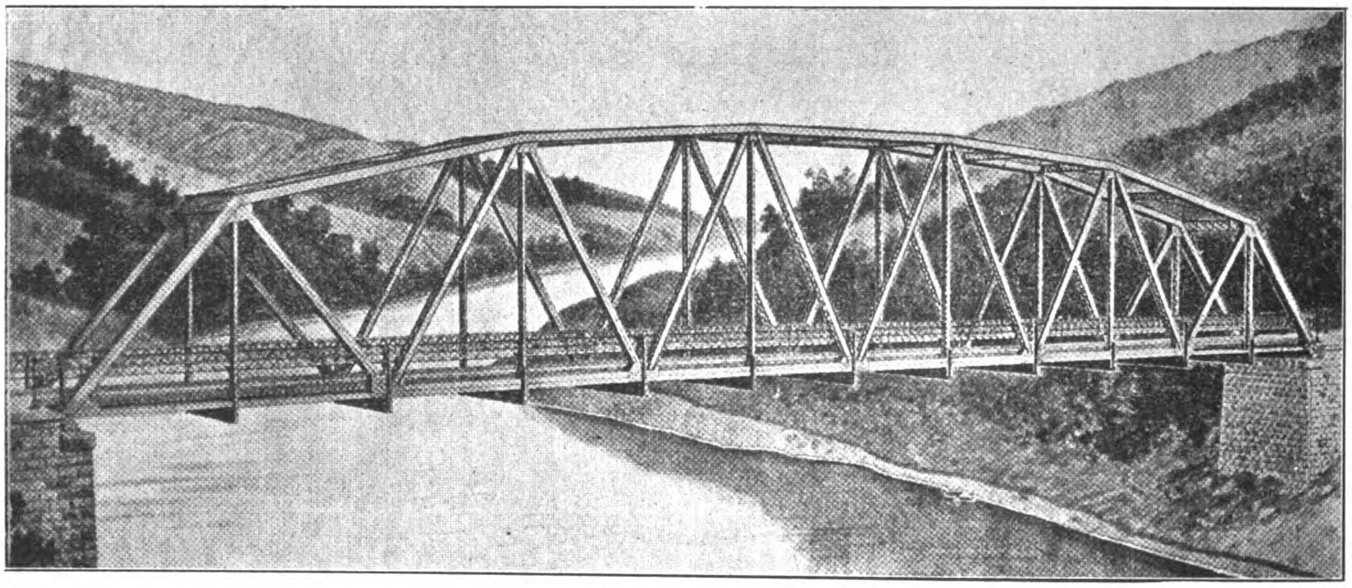

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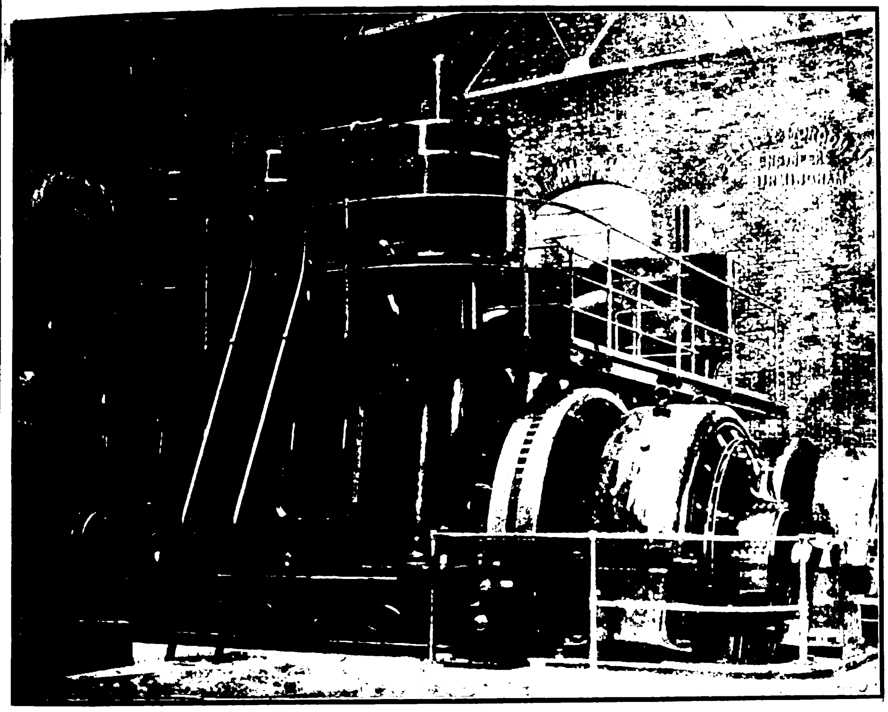

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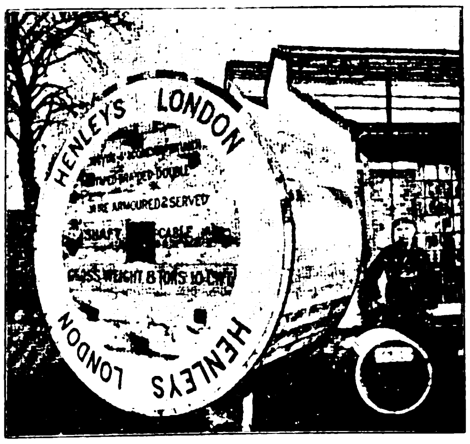

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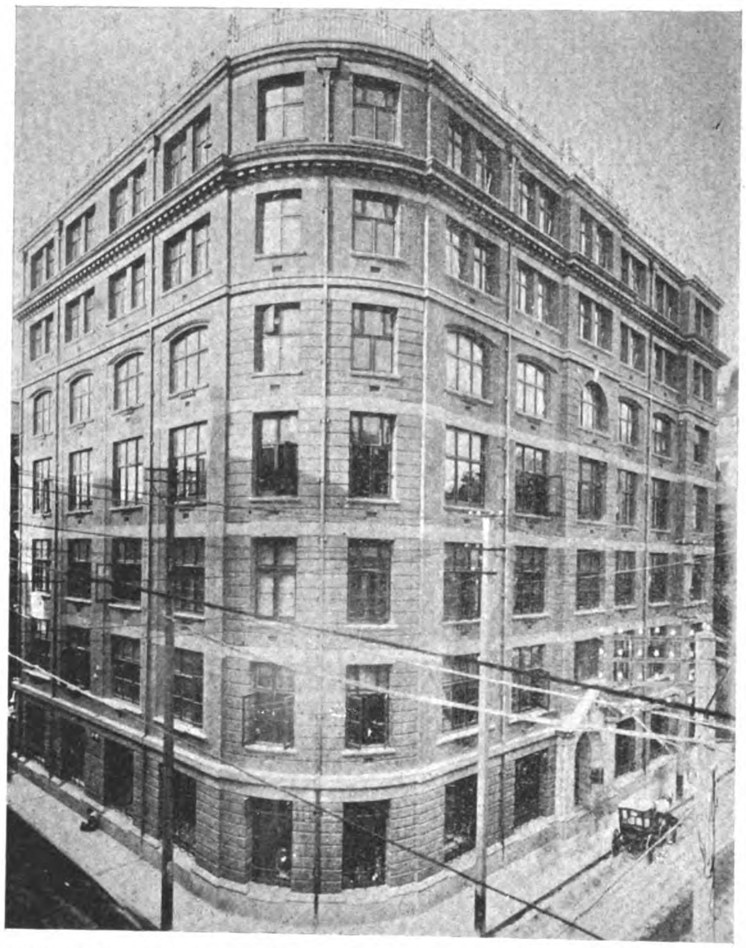

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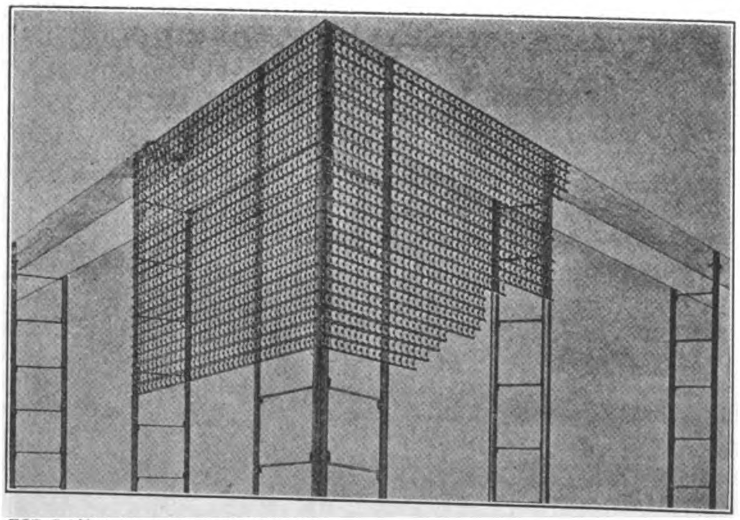

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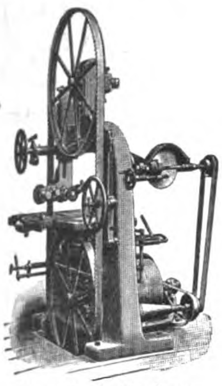
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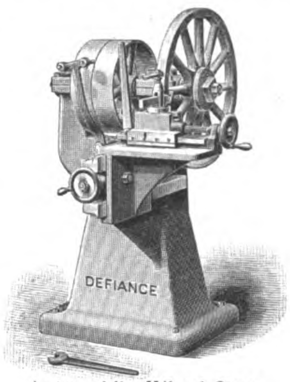

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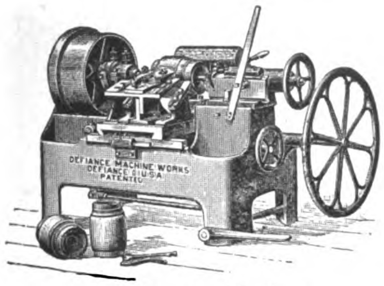
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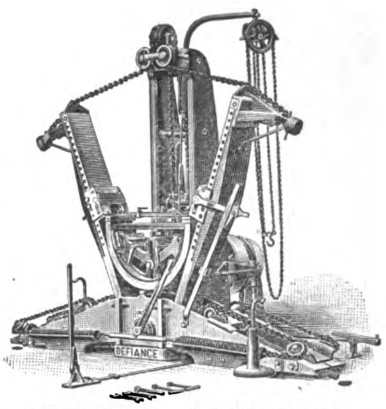

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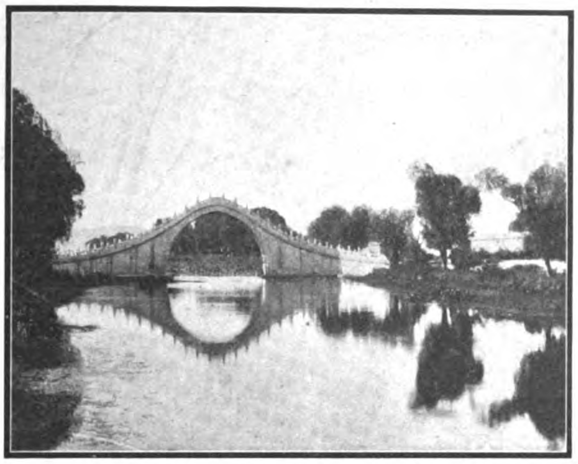

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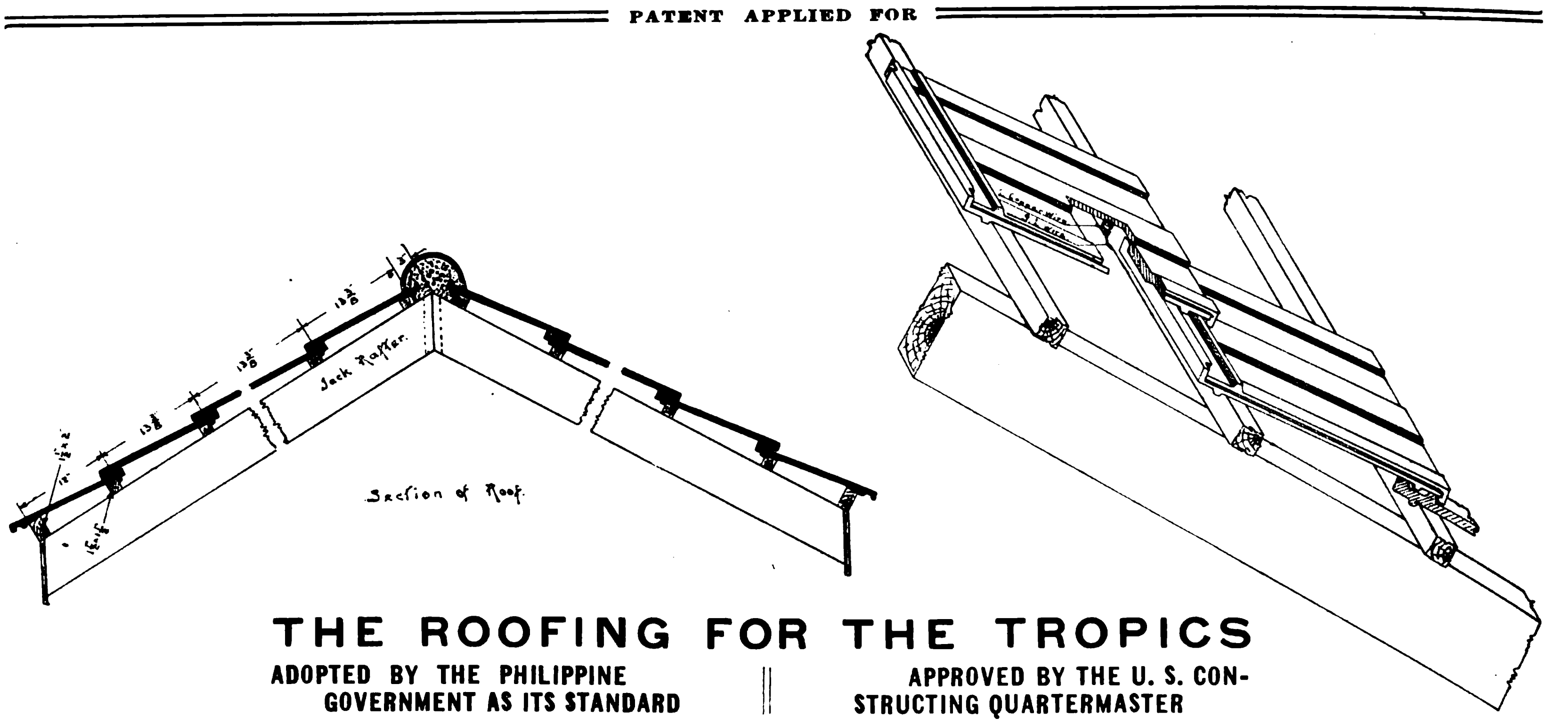

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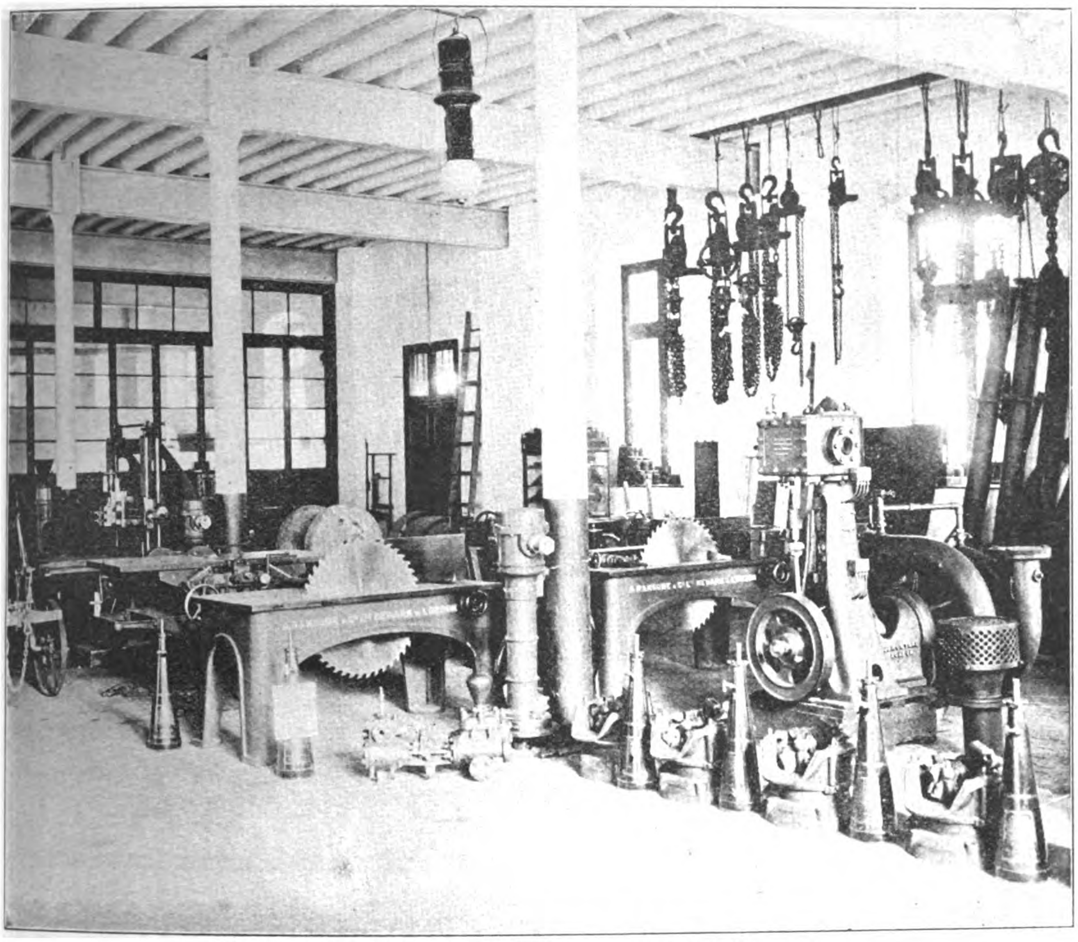

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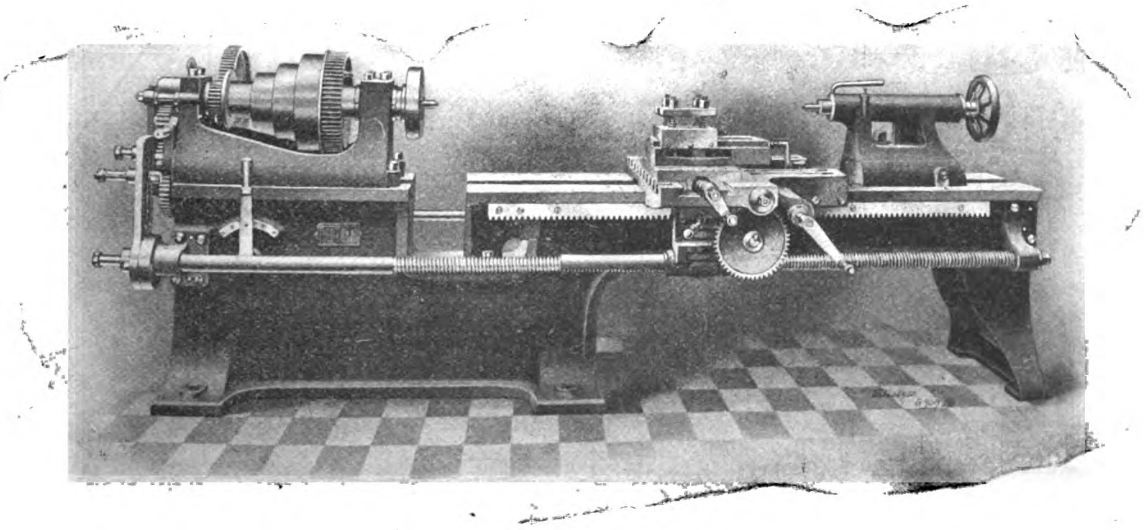

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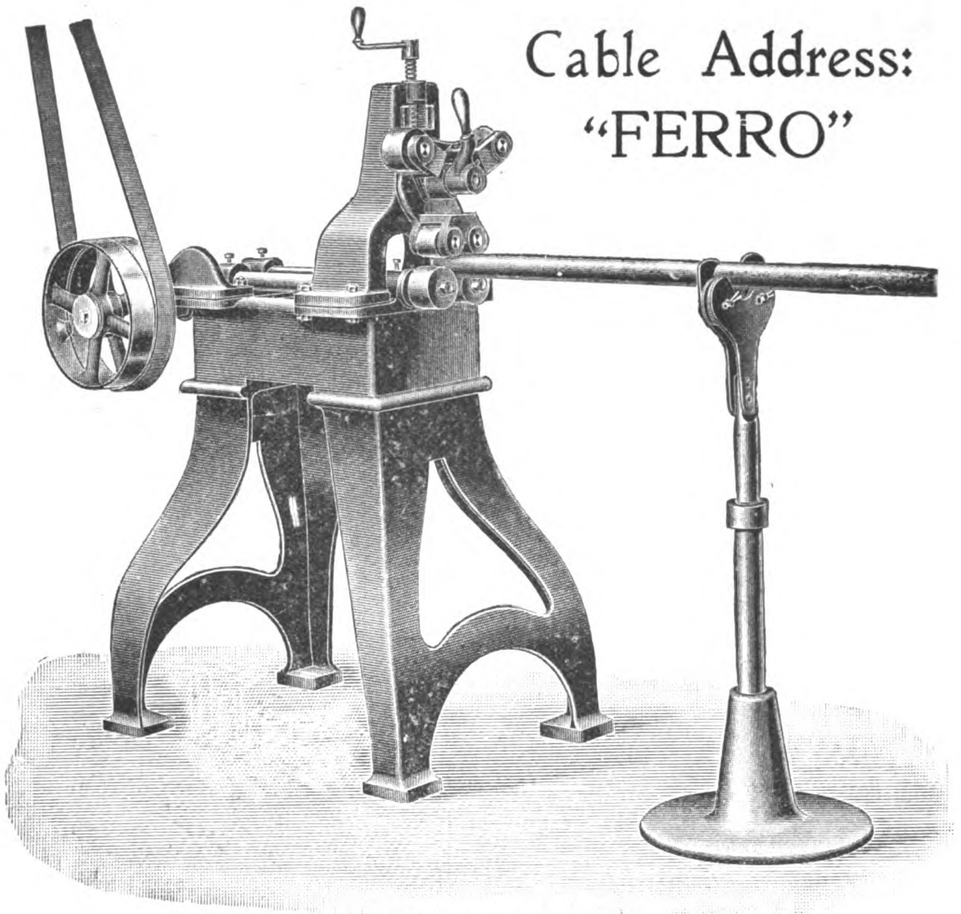

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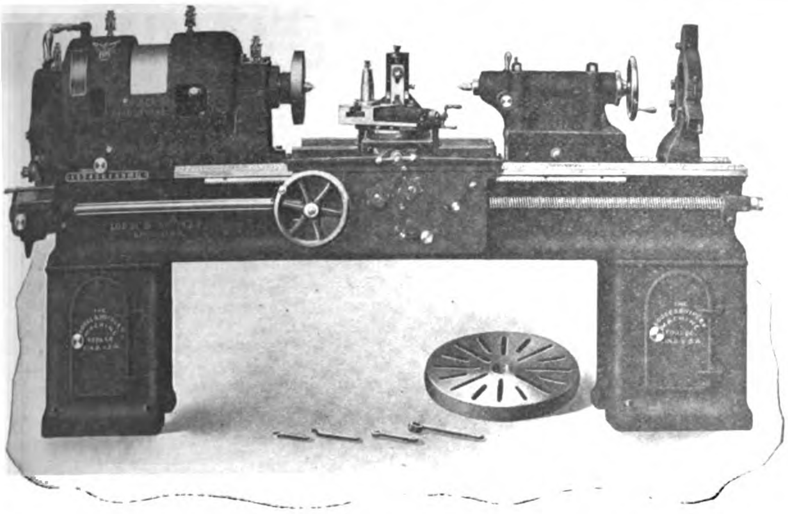

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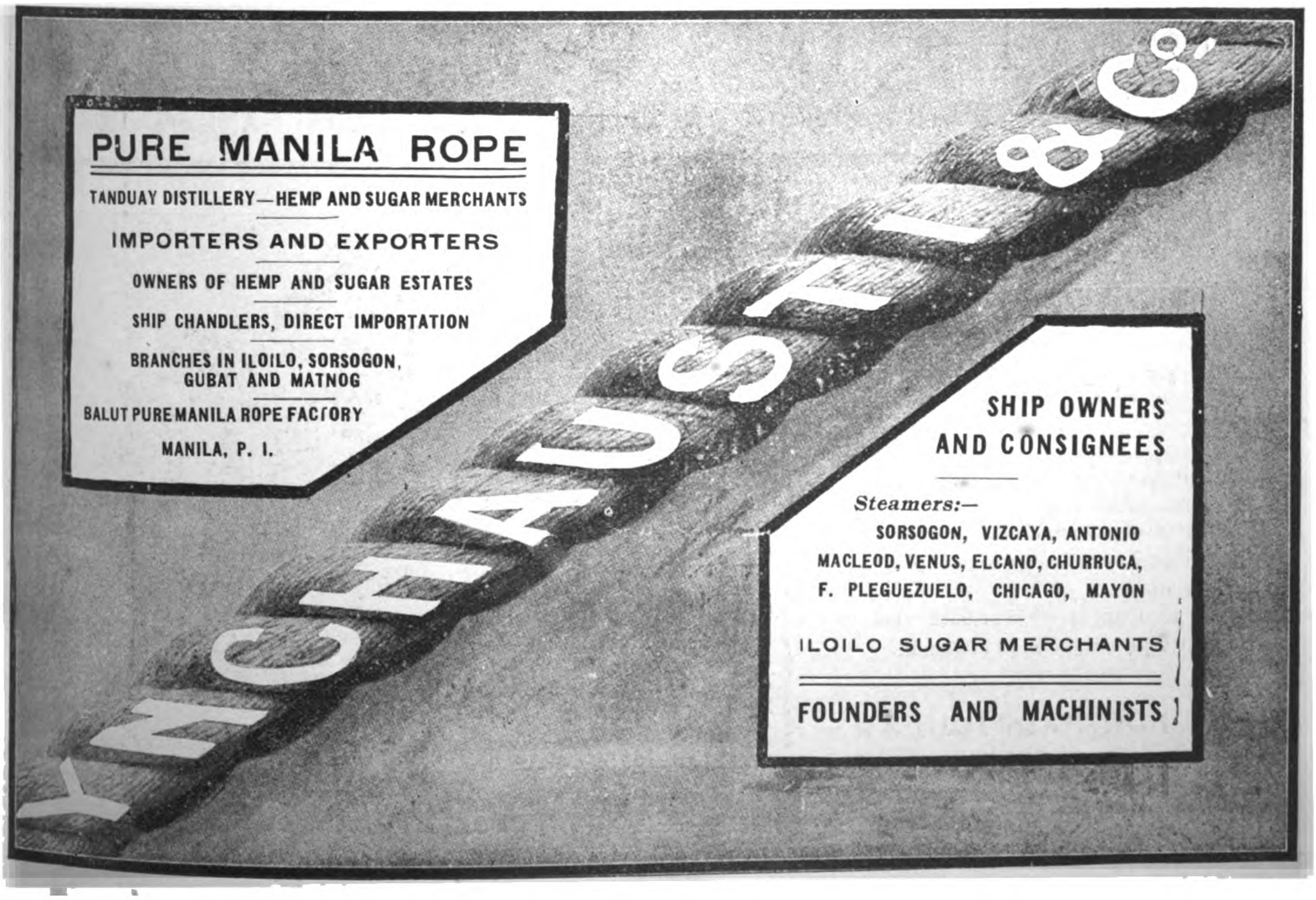

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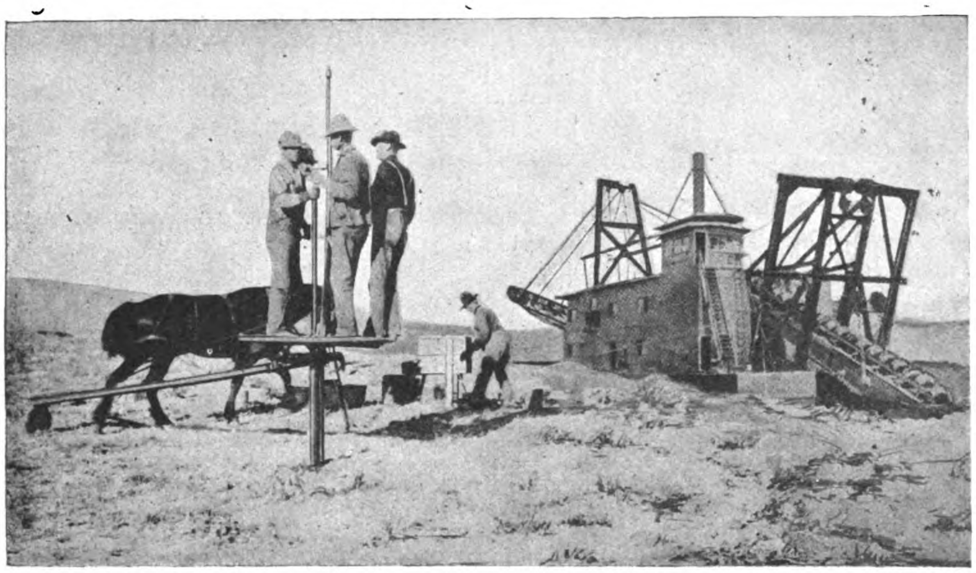

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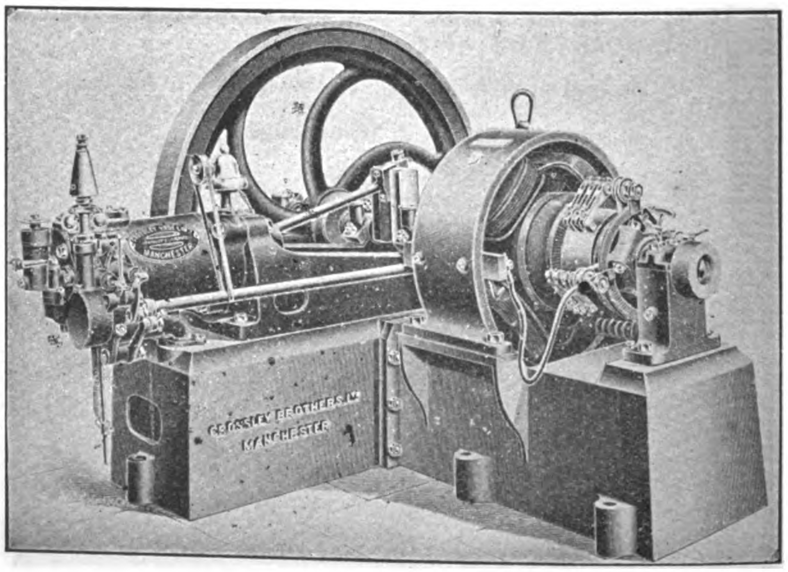

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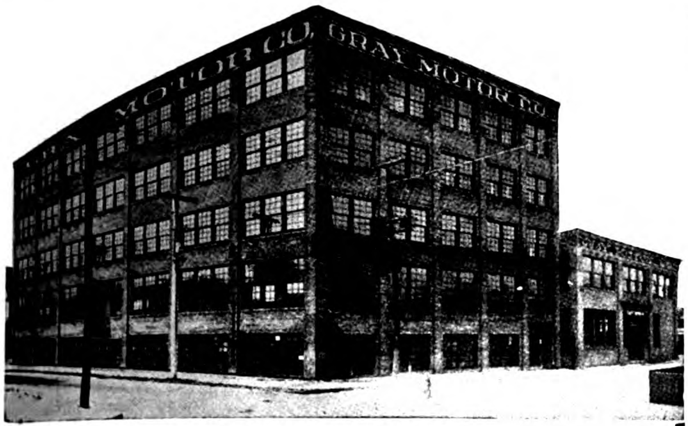

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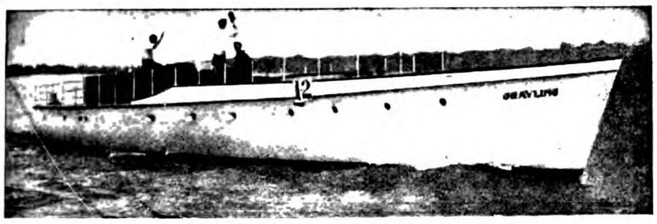

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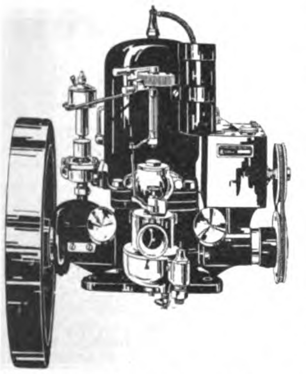

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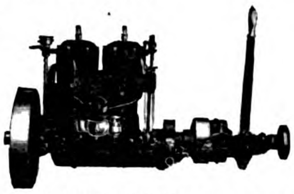

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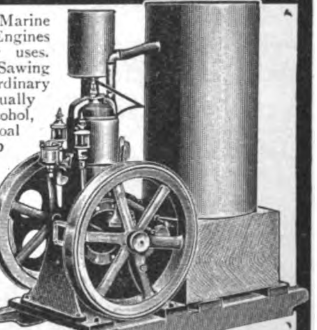

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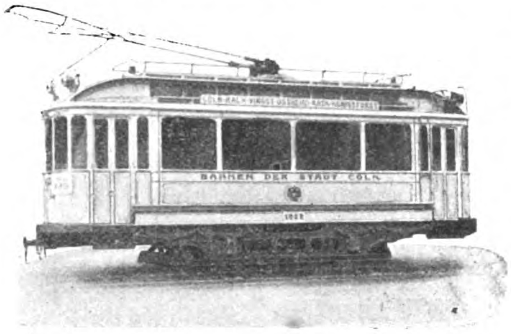

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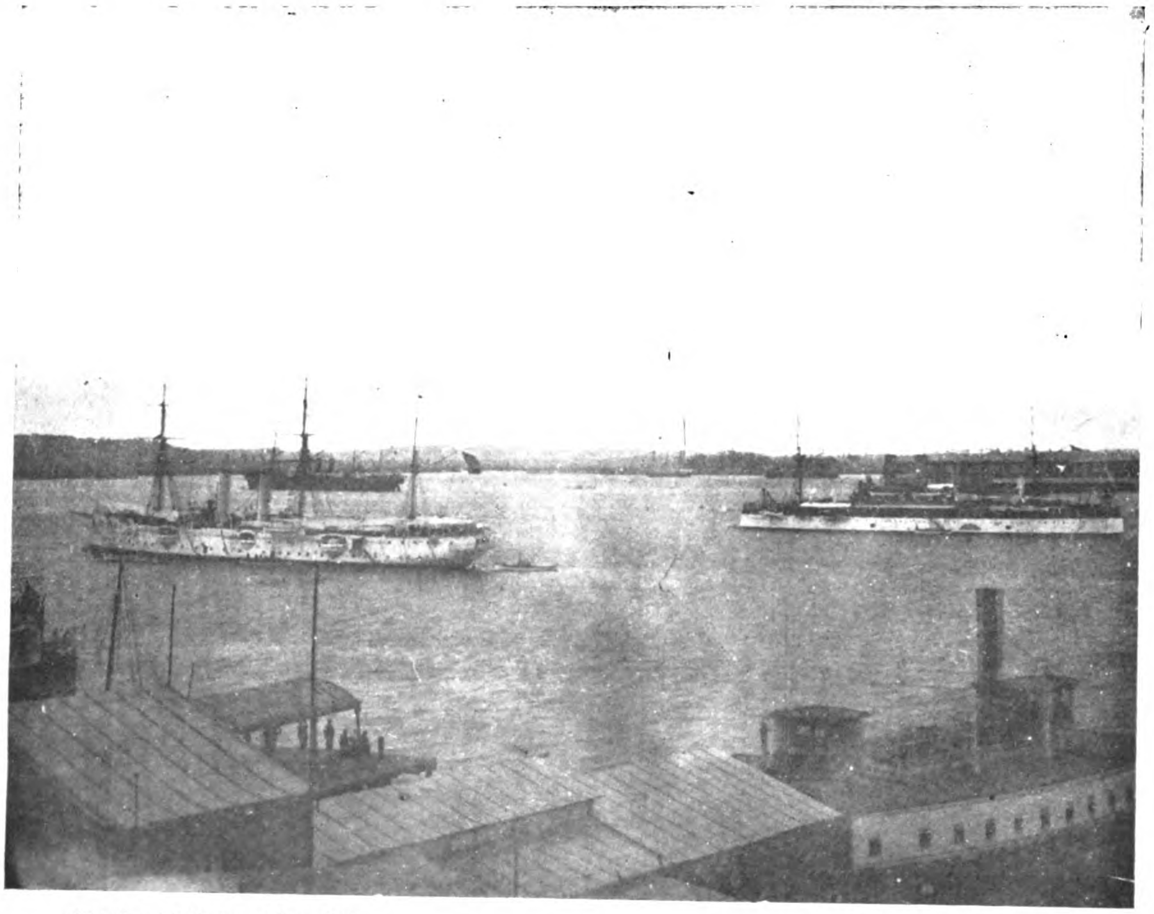
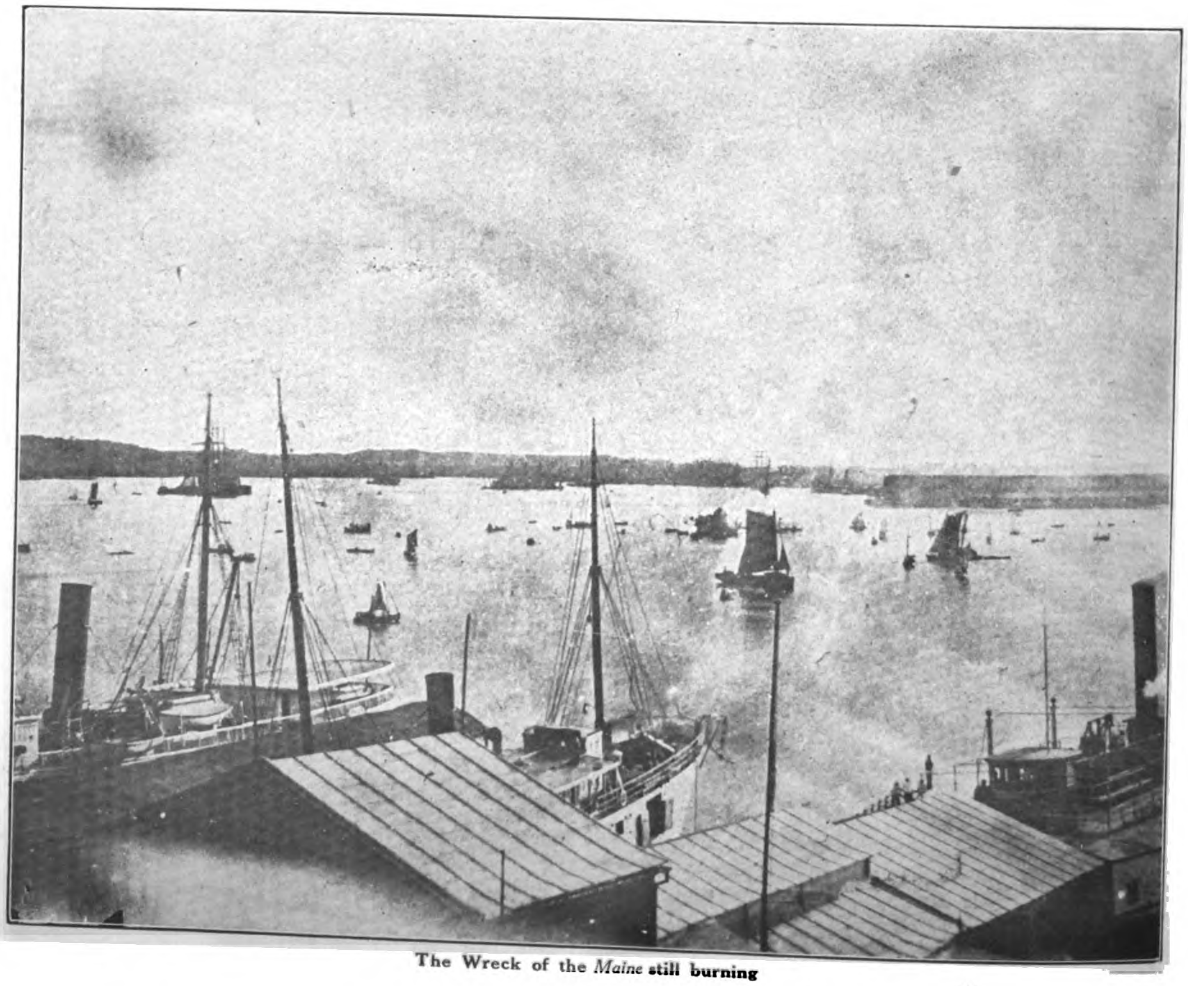
Supplement to
THE FAR EASTERN REVIEW
February Nineteen Hundred and Eleven



The Spanish Cruiser *Alfonso XII* — The U. S. Battleship *Maine*

Havana Harbor

The Morning of February 15th 1898



The Wreck of the *Maine* still burning

The Morning of the 16th

From Original Photos Taken by the Writer from the Roof of the Hotel Mascotte

THE FAR EASTERN REVIEW

COMMERCE ⊛ ENGINEERING ⊛ FINANCE

VOL. IX. MANILA, P. I., SHANGHAI, AND YOKOHAMA, FEBRUARY, 1911 No. 8.

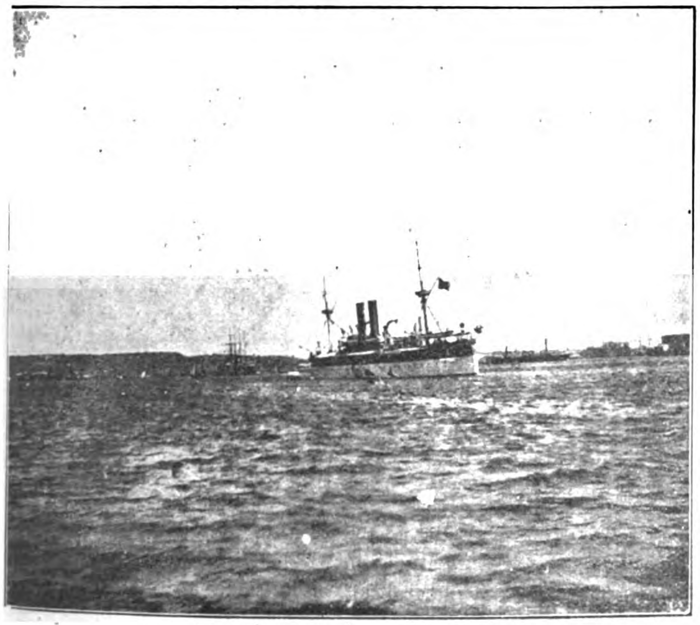
THE *MAINE*: THIRTEEN YEARS AFTER

A TALE OF TWO CORRESPONDENTS

A TRIBUTE TO ONE OF THEM FROM THE OTHER

Foreword.

The story of the Maine has been told and retold, and little remains to be added to Captain Sigsbee's final word on the sinking of his ship, published two years ago. There is only one obscure point that requires explanation, and that is the persistent story that the Maine's officers were on shore the night of the disaster, enjoying themselves. This story is still given some credence in the United States, while no contradiction can shake the Spaniard's belief in its veracity. Captain Sigsbee wrote with some feeling on this point, and briefly explained that there was a seeming basis for the belief, being cognizant of the facts herein related. The personal movements of correspondents, serving their papers in war time, are not published as news, and modesty forbids writing

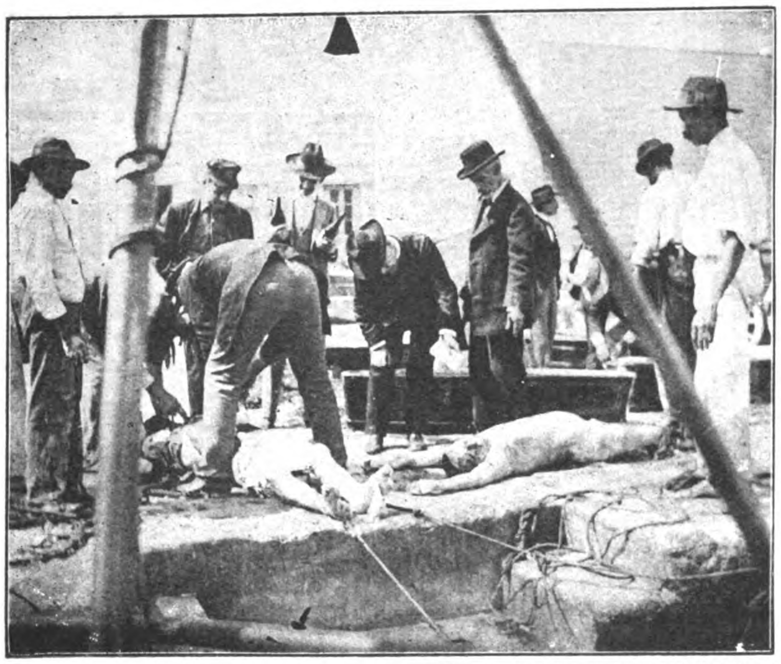
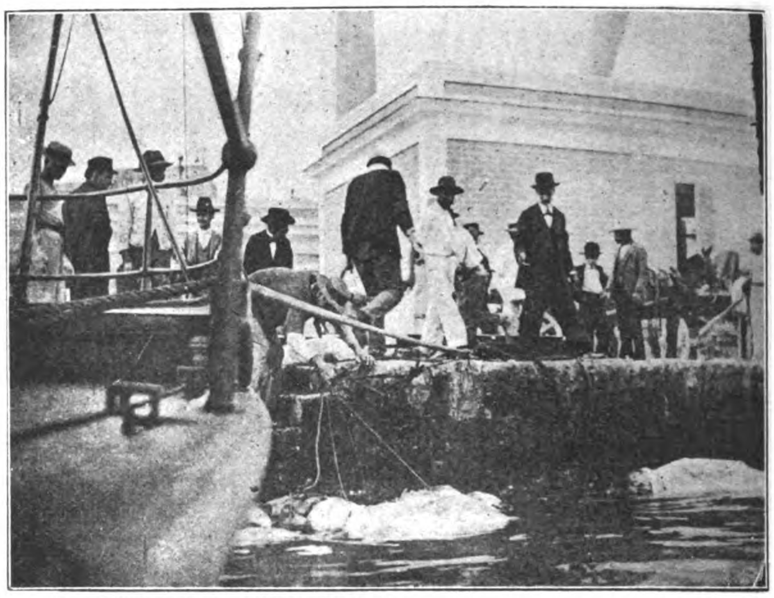


THE MAINE IN HABANA HARBOR

THE SPANISH AND AMERICAN DIVERS' BOATS

LOOKING INTO THE MASS OF TWISTED WRECKAGE

LOOKING FORWARD FROM THE STARBOARD QUARTER

RECOVERING AND IDENTIFYING THE MANGLED BODIES AT THE MACHINA

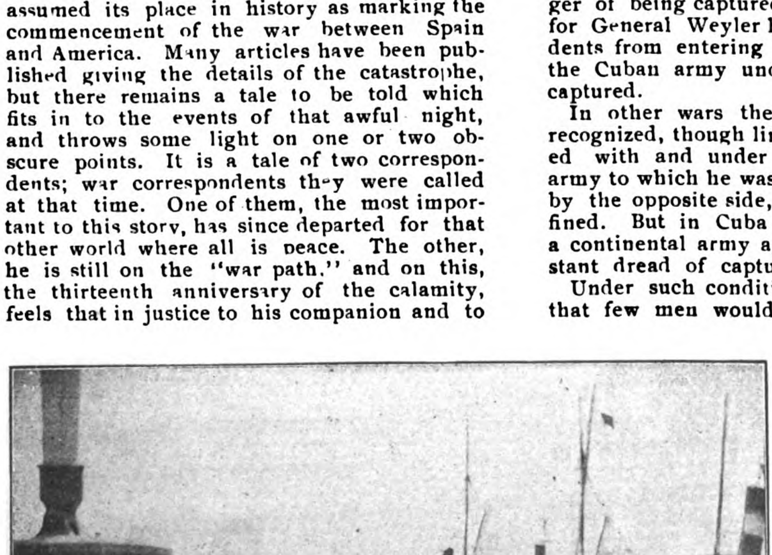
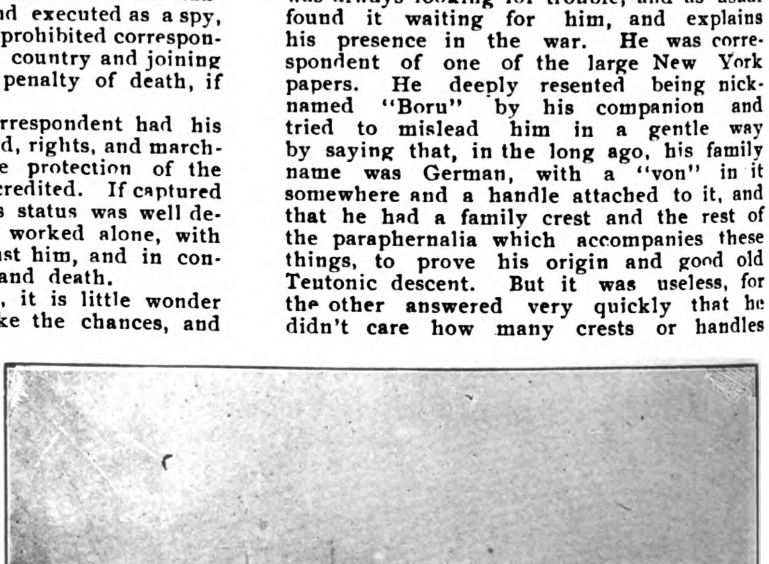
about one's own adventures. For this reason neither of the correspondents responsible for the story that threw discredit on the officers of the Maine felt inclined to write the details. One of them has since passed away. In memory of and in justice to his companion, and the officers of the Maine, the following tale is told by the other.

Feb. 15, 1911.—Thirteen years ago, to-day, the American Battleship Maine went to her last resting place in Havana harbor. Inside the steel-ribbed casket repose the bones of some 200 wearers of the Blue, whose lives were suddenly extinguished by the rending of the magazine, or the strangling of the waters that swirled in as the illfated ship sank to her mud coral bed of the tropical harbor. The tragedy was quickly over, and assumed its place in history as marking the commencement of the war between Spain and America. Many articles have been published giving the details of the catastrophe, but there remains a tale to be told which fits in to the events of that awful night, and throws some light on one or two obscure points. It is a tale of two correspondents; war correspondents they were called at that time. One of them, the most important to this story, has since departed for that other world where all is peace. The other, he is still on the "war path," and on this, the thirteenth anniversary of the calamity, feels that in justice to his companion and to round out Captain Sigsbee's narrative, the following tale should be told.

Back in the early nineties, while the Cuban insurrection was at its height, when massacre, murder, pillage, incendiarism, rape and highway robbery held high carnival in the Island, and passed as incidents of a righteous rebellion against the dominant power of Spain, there were few newspaper correspondents who braved the dangers of the open country, and saw for themselves the actual conditions, or who witnessed the savage battles, guerrilla fights, ambuscades and bushwhacking which made up the war. In addition to the ordinary hazards attached to the mission of a war correspondent—which is all in the day's work—there was the further danger of being captured and executed as a spy, for General Weyler had prohibited correspondents from entering the country and joining the Cuban army under penalty of death, if captured.

In other wars the correspondent had his recognized, though limited, rights, and marched with and under the protection of the army to which he was accredited. If captured by the opposite side, his status was well defined. But in Cuba he worked alone, with a continental army against him, and in constant dread of capture and death.

Under such conditions, it is little wonder that few men would take the chances, and it explains why during all that long drawn out nightmare of butchery, only three American correspondents entered the field and witnessed the bloody struggle that was slowly but surely exterminating the Cuban people. Of these three men, one campaigned in the East with Calixto Garcia and Gomez, being present at the hottest fights in that section, while the others passed through the brunt of the struggle with Gomez and Maceo, and between them participated in over 100 engagements, and traversed the unhappy Island from end to end. This story has to do with these two. Their names—it doesn't matter. To each other they were known as "Brian Boru" and "Face". Boru was a New Yorker, a wild, red headed chap, who in those days was always looking for trouble, and as usual found it waiting for him, and explains his presence in the war. He was correspondent of one of the large New York papers. He deeply resented being nicknamed "Boru" by his companion and tried to mislead him in a gentle way by saying that, in the long ago, his family name was German, with a "von" in it somewhere and a handle attached to it, and that he had a family crest and the rest of the paraphernalia which accompanies these things, to prove his origin and good old Teutonic descent. But it was useless, for the other answered very quickly that he didn't care how many crests or handles

AT THE MACHINA; TWO DAYS AFTER

there might have been to the name long ago, anybody could readily see by a look at the "mug" now that it had the map of Ireland stamped indelibly on it, and if there was any family crest at all, which he doubted, it traced back to his lineal ancestor, Brian Boru. The argument was closed after the usual Celtic manner of settling affronts of that nature in which the Celt was worsted. So he accepted the situation, and the name stuck.

The other was a graduate of a college in the middle West, a manly, handsome chap, and all round general athlete. He represented another of the great New York papers. An intense professional rivalry existed between the two, as was only natural when their respective papers demanded the news first. For a long time Boru called his companion by his first name, but all the while seeking for a fitting sobriquet to offset his own. The two had been separated for a month and Boru was on the trail of the other, trying to catch up with him in the mountains of Pinar del Rio. Halting for lunch at a lonely farmhouse, he enquired if an American passed by the day before. In the family were three pretty daughters, who all answered at once that he had been there and remained for several hours and marched on with his escort. And they went into raptures describing his good looks, and kept repeating again and again, "What a face he has". So Boru reciprocated by calling his companion "Face", as the most appropriate nickname to fit his well known qualities.

For a long time the latter fondly accepted the term as the compliment it originally meant, and was accordingly pleased, but one day it dawned on him that it had another meaning, and referred to his "Cheek", which of course was exactly what Boru had in mind.

For if any man in the world possessed this quality, it was Boru's companion. For cool, unadulterated, downright nerve, he has rarely been equalled in the journalistic field. With a little more leeway he would have managed the entire Cuban insurrection and had Gomez obeying his orders and following his plan of campaign. Audacious, nervy, reckless, impetuous, rash—yes, he was all of these, but at the same time he was one of the truest friends and bravest men that ever stood in shoe leather. He also keenly resented his nickname, and, in the middle of a march, dismounted from his horse, and demanded that Boru should never again so address him. Boru also dismounted, and in this occasion had the best of the argument, so the name stuck, and to each other for ever afterwards it was "Boru" and "Face". But no one else ever dared to so address them.

Standing by the side of Gomez, together they witnessed the heaviest fights of the invasion, and riding with Maceo, they took part in the mad cavalry dash through the many batallions of Spaniards into Pinar del Rio, leaving a trail of fire and death behind them. At the bloody machete charge at Mal Tiempo where the Spanish regiment of Canarias was annihilated they were present; through the hell at Cacarajicara, the fierce attacks at the Tapia Hills, at the rout at Morales, the surprise at La Luz, the victory of Cabañas they were side by side. Through scores of other engagements they faced death on the firing line at the side of Gomez and Maceo, and other Cuban chiefs. Together with their personal escort of eighteen veterans under command of the noted bandit Mirabal, they traversed the provinces of Havana and Pinar del Rio, and met with many a hair-breadth escape. Together they crossed and recrossed the Spanish lines, stealing into Havana and other heavily fortified towns to place their dispatches into friendly hands, and as silently departing again for the country, with the entire machinery of the Spanish Police force and Secret Service in motion to capture them. Together they crossed the famous "trocha" or fortified line in Pinar del Rio, with their escort of eighteen men, a feat accomplished by only five parties during the war, and which resulted in disaster to the others. Together they faced death more times than it is seemly to brag of or to write about. When death seems sure, and no escape possible, the real natures of men arise to the surface. And so Boru and Face came to know each other's hearts, and were drawn together in a bond of friendship that bitter professional rivalry could not shake. For each had saved the other's life on various occasions.

When Boru was nearly dead with fever and dysentery in the hills of Pinar del Rio, it was Face who came along with medicines at the critical stage and nursed him back to strength. When their escort foolishly ran into an entire Spanish regiment at Quivican, ambushed and awaiting their approach and Boru's horse was shot under him, and held him pinioned to the ground, and the Spanish guerrillas were not 100 yards behind, charging with flashing machetes to dispatch the prey, it was Face who, in the midst of a withering fire, reined up, dismounted and assisted Boru to disengage his imprisoned leg, and to mount again behind his horse, and escape to the shelter of the cane fields beyond. And the Bravo that the crime hardened guerrillas gave at this exhibition of sheer nerve, and the Vivas of the regulars in ambush showed that they appreciated. The Victoria Cross and the Medal of Honour were designed for deeds like this. When Boru was down and out with fever and lost his nerve at the crossing of the "trocha", after three days in the Majana Swamp with the alligators and constrictors, it was Face who cheered him up, gave him brandy, and lent a helping hand over the dangerous places and when at the critical moment of dashing between the forts, and the air was seething with the hiss of bullets, Boru slipped from the slimy tree trunks and went down into the mud and water over his head and thought the end had come, it was Face who halted, reached down and put his arm around him, and pulled him out, and steadied and guided his half blinded companion over the quivering network of logs and brush through the zone of fire into the safety of the forest. "Buck up, Boru, you red headed Irishman" was all he said. When Gomez first ordered Boru from his camp, and threatened to shoot him as a spy, because he possessed a Spanish military pass, it was Face who interceded and calmed the irate chieftain, and led the old warrior to offer Boru the command of the Cuban Engineer Corps. When at La Luz, the charging Spaniards again disabled Boru's horse, Face stood by and saw him through and out of the cul-de-sac. When Boru was wounded, and his horse again killed, and his clothing and hat riddled with bullets, it was Face who was at his side and gave him the first aid, and forced a reluctant cavalryman to dismount and give up his horse for his wounded companion. And, when it looked as though the last hour had struck for Face; well that is another story. Face has since faced the reaper, and been gathered in, and can't speak for himself, so that story will never be told. But Boru evened up the tally.

It was carnival time in the gay capital of Cuba. The streets of Havana were filled with merry makers and pleasure-loving Cubans intent upon enjoying the last days of the Lenten season. Beneath the grotesque masks and dominoes of the moving throng, the onlooker who knew his Havana might recognize some of the turbulent intriguers of the many political factions into which both Spaniards and Cubans had split. Under cover of the carnival disguises, many otherwise prudent Cuban patriots were flitting about the streets intent upon dangerous missions impossible of execution if their faces were recognized. Cuban officers from the country, who had slipped in through the lines for a sight and touch of their loved ones, risking death at sunrise if recognized or betrayed, braved it all, and joined the procession on the Prado. The jests and quips, mirth and laughter, the chatter and banter of the groups of passers-by, the antics of clowns, the glances from the langourous eyes of beautiful women, all seemed strained and unnatural. Something was lacking. The old fashioned Carnival spirit seemed absent this year. The political cauldron was seething and boiling over in its stead, and a feeling of impending disaster was in the air. Two weeks previous a bomb had been thrown in the leading theater of the capital, and rumours were rife that the next one would find lodgement in the Palace of the Captain General or the American Consulate Since the arrival in the harbor of the Battleship Maine, the feeling against the Yankees had crystallized into an intense hatred, and threats were freely indulged as to the fate in store for them, after the Consulate had been destroyed. Trouble had been brewing for months, and under cover of the Carnival it would come to the surface. And Boru and Face, whose mission in life at that time was to be on the spot where trouble was liable to break out, were there together.

On Weyler's departure, and under General Blanco's rule, they had patched up their differences with the Spanish authorities and permitted to reside in Havana, after promising the Chief of Police to cause him no more trouble. Col. Paglieri, of the Guardia Civil—the crack corps of the Spanish Army—had held the post of Chief of Police in Havana for over three years. He was an old friend of Boru's and in the days before the war, when "Old Pag" was in command of his corps in Havana Province, Boru had hunted bandits with his men in the mountainous wilderness back of Aguacate. Boru and Face, tired of being shot at in the country, had settled down to a more enjoyable and safer existence in the capital. Together they plied their calling in all the out-of-the-way and suspicious corners of Havana; they visited the Maine, and guided Lt. Jenkins, the intelligence officer of the ship, to where he could secure the data about the new fortifications. Together they sat on the night of February 15, 1898, at a table in the arcade of the Pasaje Hotel watching the passers-by. Face's wife, an intrepid and handsome girl, and the "Skipper," who represented another New York paper, completed the group.

Boru and Face knew their Havana, and knew Cuba and the Cubans. Fresh from the country and two years of campaigning with the insurgents, they knew them also, and their friends and sympathizers in Havana. Boru had been invited by Lieutenant Jenkins to dine aboard the Maine that evening, but something occurred which prevented his going, and now after dinner at the Pasaje the little party described were seated at one of the small, round, marble topped tables in the Arcade, sipping the "refrescos" and watching the kaleidoscopic changes of the crowd. A few of the maskers nodded or whispered some slight words which revealed their identity to Boru and Face, who nodded in return, as the spoken name if overheard would have meant instant arrest and execution in the morning. The night was dark, and the thick clouds wafted out to sea by the light land breeze, shadowed the few stars that showed at intervals through the fleeces. Out in the bay the merchant ships and men-of war lay peacefully at anchor, and as two bells struck (9 p.m.) the bugles sounded " taps " and the boatswain's whistles shrilly " piped down " for the night. Aboard the Maine, the crew turned in at the regulation hour, and the night watch was set. Although nothing had as yet occurred to indicate the possibility of war with Spain, the Captain of the Maine considered he was in an enemy's harbor, and was prepared for eventualities. It might be said that the Maine was cleared for action, for rapid fire ammunition had been brought on deck ready for serving the guns at an instant's warning, and the men held under the strictest discipline. None of the crew had been permitted shore leave, and few officers enjoyed the privilege, and on that night all the officers except four were on board.

For weeks the Maine had swung idly at her

buoy in the tideless harbor of Havana, with her bow to the light breeze, from the North and East. But on this eventful night, the land breeze shifted to the Southwest and the battleship slowly swung round to meet it, the first time since her entrance into the harbor that her bow pointed toward the Havana water front. In the light breeze she lazily swung into line and took up the slack of the mooring cables and steadied down to her new and permanent position. Here the end came and found her.

Forty minutes past nine. A terrific explosion shook the city, windows were broken, doors shaken from their bolts, and merchandise in the stores thrown from their shelves. The shock broke the gas mains along the water front, and extinguished the electric lights and plunged that section of the city into darkness. The sky was lit up with an intense lurid glare, while high above could be seen innumerable coloured lights resembling rockets.

The first explosion was followed immediately by a second, terminating in a grating rending metallic sound as though heavy anchor chains had been quickly dragged across a corrugated iron roof. The sounds of revelry ceased before the unknown horror. Women screamed, faces paled, and strong men shook with terror. Face and Boru jumped up together. "The Palace," said one. "No, the Consulate," answered the other, for neither realized what had happened. "To your room, my dear," said Face to his wife; and he and Boru made a dash for the nearest carriage. It was a handsome private victoria, owned by an aristocrat of the city, with a uniformed driver on the seat, holding the reins over two blooded Andalusian horses. He was paralyzed and blanched with fear, but mustered up sufficient courage to say that the carriage was private and could not be used. Boru and Face had worked so long together that a glance or word in such emergencies was sufficient for each to take up his share of a difficulty, and here was a situation that demanded instant and urgent action. As Boru sprang into the carriage, Face jumped on the box, grabbed the reins and before the astonished coachman at his side could remonstrate the thoroughbreds were dashing around the corner and headed towards the lower part of the town. The coachman regaining his courage laid his hands on Face to check the mad rush of the carriage, but Boru from behind slipped his arm around the flunky's waist, and jerked him bodily in the cushioned seats behind, and then sat on him. Boru tried to explain and sat matters right with the enfuriated Spaniard by offering him some gold, but he spurned the "centenes" and demanded to be released, and then lustily screamed for the Police. So there was nothing else to do but muzzle him, and knead some sense into his head. With Face standing in the driver's seat, bending low like a charioteer, lashing the terror struck steeds, the carriage turned into Teniente Rey on two wheels, and was nearly dashed to pieces against the corner. Ahead, the street frowned like the mouth of a dark canyon. Not a light or sign of life was visible. Over the great paving blocks, the carriage bounded, swaying from side to side of the narrow "calle", now on one wheel, now on two, and at times the four wheels seemed to leave the ground altogether. The coachman had been quieted and lay huddled and thoroughly subdued on the floor of the victoria. Dark forms were distinguished in the doorways of the stores, and above the hoof beats of the steeds, and the rattle of the carriage, the word "Maine" was continually repeated. It was only then that the truth flashed across Boru's brain. Up to that time they were directing their course towards the American Consulate which lay a few blocks ahead. "Great God, Face, it's the Maine! To the Machina! Faster old man, faster." And Face urged the animals to further speed. "Take the whip, Boru!" And while Face bent low and held the reins in a firm grip, Boru, with one hand holding on, lashed them into a frenzy. How Face kept his feet was a miracle. Boru expected every moment to see his companion hurled to the street in one of the violent lurches of the vehicle, and for a time held him by the waistband of his trousers. But Face was in his element and performing in grim earnest now what he had frequently practiced in the past. For at one time he had been a member of a crack Cleveland Cavalry troop that was escort to Governor McKinley—and fancy bareback riding was one of his many accomplishments. Boru had witnessed him on several occasions standing balanced on the back of a restive charger in the midst of a heavy engagement so as to get a better view through his field glasses. Boru always called it playing to the gallery, and d—n foolishness, but Face never minded his criticisms. The Cubans liked it, and thought he was a great man, so Face was satisfied.

And the distance was soon covered. Probably never before or since has the staid old capital witnessed such a mad race. As the carriage swung around in front of the Custom House, its course was abruptly checked, for ahead the street was packed with a wild mob of Spaniards hurrying around the corner by the old Post Office into the little square where the water front gate lets into the Machina, and the Landing Stage. Only by pulling the animals back on their haunches and swerving them around against the stone walls of the Custom House was their career checked, and just in time to avoid running down and over the crowd ahead. Face and Boru jumped out, and the latter threw a couple of gold pieces into the coachman's hat, but instead of accepting he loudly yelled for the Policia. The two companions cared nothing for the police now. They were intent in getting around the corner and out on the wharf, where the truth and extent cf the calamity could be verified. Ahead surged the crowd of excited Spaniards. Delay meant quick arrest, so into the mob they jumped. They pushed, elbowed, kicked, and fought their way through the jam. Loud and deep Spanish curses were flung at the two. A blow from a heavy cane directed at Face's head was caught by Boru on the arm, and they both ducked and escaped another attack from a justly indignant Hidalgo, when Face had jabbed in the small ribs to push him aside. It seemed an hour, but it was over in a few minutes, when the two stood together on the other side of the mob, fought their way through hundreds of excited Spaniards only to find the big gates of the Machina closed, and a guard of soldiers already stationed there with fixed bayonets holding back the people from the water front beyond. Behind them the outraged mob were hurling curses and clamoring for satisfaction for the manner they had been handled.

"Open the gate!" said the two at once. "Back!" said the Guards, "no one passes here tonight." To go back meant arrest by the Police for stealing the carriage and assaulting the driver. It meant delivering them to the tender mercies of the excited crowd. To go back when out in the bay, now plain before them, their fellow countrymen and friends were struggling to save their lives, and there was a chance of doing something. Every instinct in them revolted, but there seemed no way to break through. The heavy iron gates were closed and locked, and the Guards there to perform their duty, and let no one to pass.

Who was it that spoke first, or did they both speak together. Boru does not remember, but they both lied. "Open the gates—we are two officers of the Maine, and must get through". What was a lie to them at that moment. They were accustomed to lie to the Spaniards in passing through their lines, and this was only a little white lie anyway. Little did they think that the lie thus uttered to gain their own ends would travel so far and cast discredit on the discipline and morale of the officers of the battleship. They could not see then that the mob would repeat the circumstance, and enlarge on it, or that the Spanish papers the next day would publish the story that the Maine's officers were ashore that night carousing and drinking, instead of being aboard their ship. But that is what happened, and although it has been officially proven that only four officers (an engineer, two cadets, and the gunner) were on shore that night, the Spaniards always remember the two Americans who acted like drunken men in the wild ride and fight through the mob, and who stood disheveled and excited before the sentries at the Gate, saying, "Let us through, we are officers of the Maine".

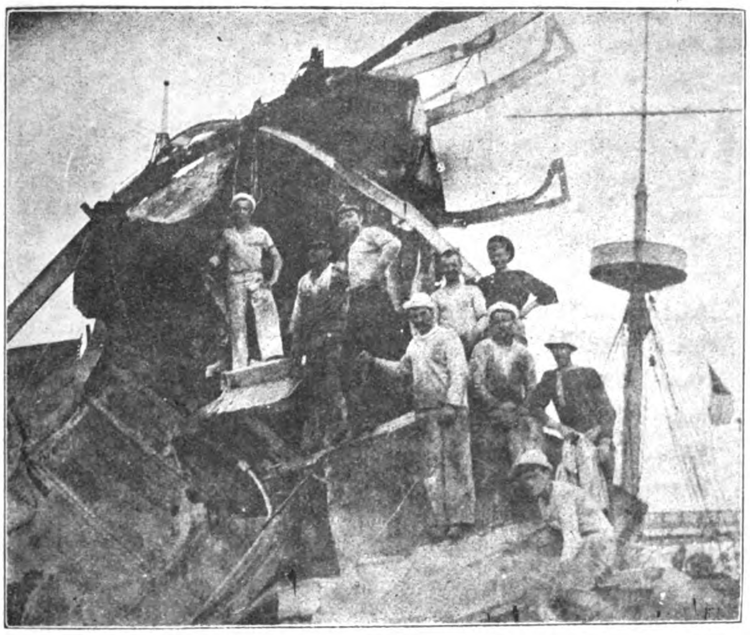
The Guards stood erect, saluted, and the gates were unbolted and swung open about a foot, or enough for them to squeeze in "Pase, Oficiales del Maine", and the crowd outside echoed "Oficiales del Maine".

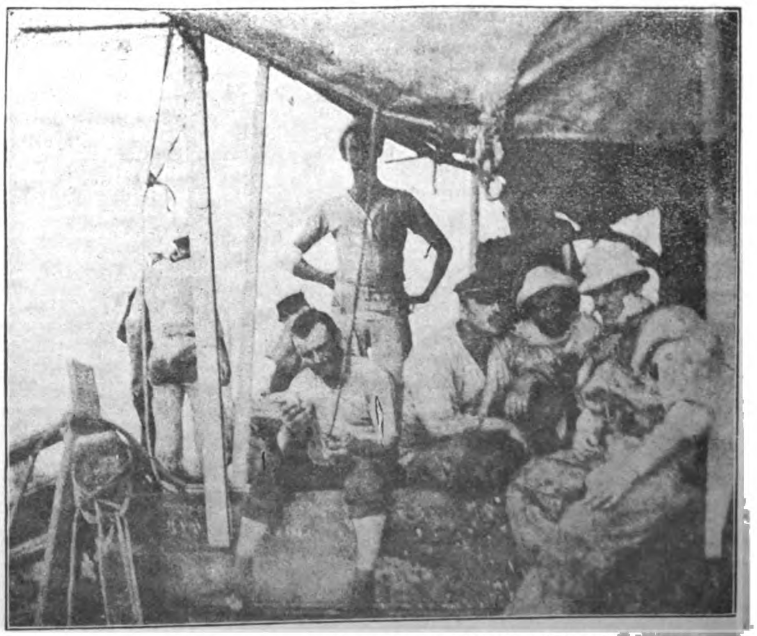
The two companions sprang through the old Baggage Inspection shed, and out on the wharf, and the drama in the bay was unfolded to their gaze. The Maine had sunk, and the cellulose had started to burn with a dull red flame. Inside the circle of light, the boats of the Spanish cruisers and others could be seen darting here and there on their mission of rescue, but the rest of the bay was wrapped to darkness. Under the Customs shed along the wharf, it was impossible to distinguish faces, and there wasn't a boatman in sight. A few persons had entered on the wharf before the Guard was posted at the gate, and were silently watching the scene in the bay. Boats there were in plenty, tied up for the night, but no one to man them. After stealing a carriage, the temporary confiscation of a boat did not trouble the conscience of the two companions, and they made for the lightest one, which like all the harbor boats of Havana was fitted with a small mast and sail. As they were undoing the painter from the mooring ring on the string piece, a form came running through the darkness, loudly commanding everybody to leave the wharf. Behind him followed a file of police. "Back out of here everybody, no one must leave the wharf tonight," and the police roughly pushed the onlookers towards the gate. In an instant Face and Boru recognized their old enemy Col. Paglieri, the Chief of Police. Waving his cane and swearing roundly at the two forms, he ordered them back. It was a chance in a thousand, but the two took it. They were used to lies by then, and remembering how the Guards had saluted, and let them pass, they repeated the lie, and as "Old Pag" ordered his men to take them away, they again said, "But we are two officers of the Maine, and must reach the wreck."

Instantly the demeanor of the old soldier changed The stern and relentless police official before whom all Havana stood in dread, dropped his official mask, and the traditional Spanish cavalier and gentleman stood revealed. His hat came off, and with a profound bow he said, "A thousand pardons, gentlemen, but to prevent confusion and facilitate the work of rescue, orders have just been issued that no boat shall leave the water front tonight. My own boat is here, and I am just leaving for the scene of the disaster. I beg you to accompany me".

It was no time to consider the question of ethics. By fair means or foul, it was the duty of the two companions to reach the wreck, and into the boat they jumped along with the official. Two brawny Spaniards took up the oars and the boat sped out into the darkness of the bay. Face took up his position in the bow, standing on the little forward deck, with one hand steadying himself by the fore stay, and with the other shading his eyes and peering into the darkness, on the lookout for some poor fellow who might need help. In the stern sheets, under the awning lattice, sat Boru and "Pag" with the latter holding the tiller ropes. There was no conversation. An occasional, Ave maria! from the Colonel, were the only words to break the silence. The boat sped onwards under the strong strokes of the oarsmen.

The fire on the Maine burned up brighter and fiercer as it caught the dry cellulose in the twisted upper works, and then reached the rapid fire ammunition which had been

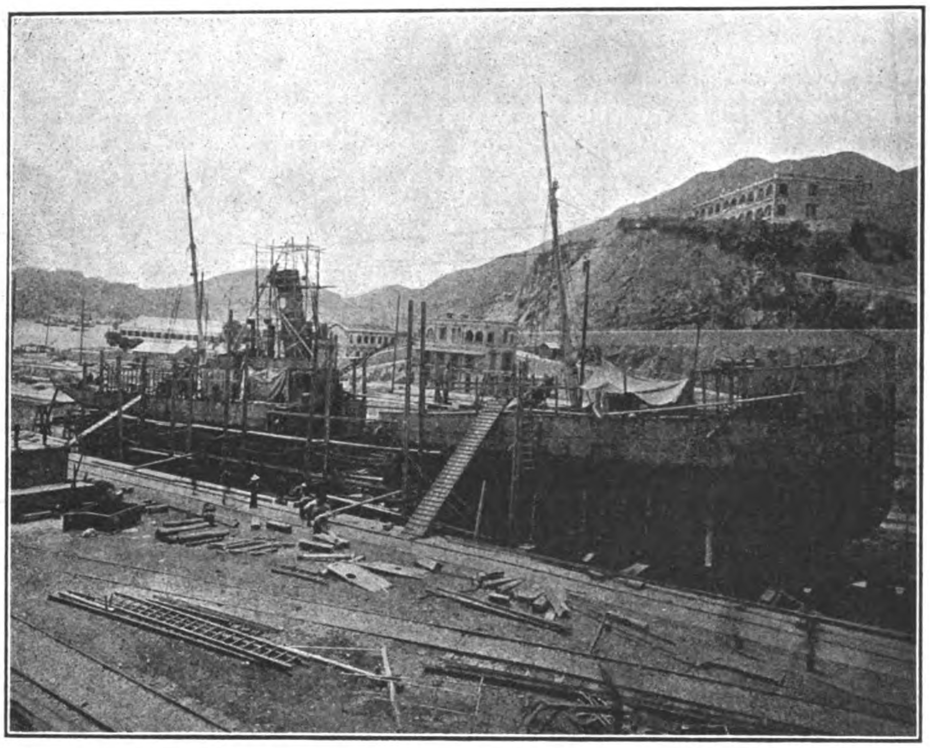




GROUPS OF THE AMERICAN DIVERS ON WHOSE DISCOVERIES THE FINDING OF THE COURT OF INQUIRY WAS BASED.

The Lengthening of a Steel Steamer at the Taikoo Docks

To the Taikoo Dockyard & Engineering Company of Hongkong Limited falls the credit of being the first firm to execute the lengthening of a steel steamer in Hongkong, which work was contracted for and executed on the S. S. "Union," owned by the Compañía General de Tabacos de Filipinas, Manila, P. I., during the summer of 1910.



THE S. S. UNION ON THE SLIP CUT AND DRAWN APART

The steamer, which is employed in the inter-island trade of the Philippine Islands, was built in Leith, Scotland, in 1891, was of 615 tons gross, and 177'0" long between perpendiculars, and was of the type known as flush deck with top gallant forecastle. Before proceeding with the lengthening, the whole of the deck houses and upperworks were removed, as the scheme of accommodation, which was entirely new, would not work in with the original. Immediately thereafter the vessel was placed on the patent slipway and severed just forward of the boiler space, and when all was ready the upper part of the slipway carriage, which had been disconnected for the purpose, was hauled up with the forward end of the vessel resting on same, until the desired amount of new length was reached, the time occupied in this drawing apart being only three minutes.

The new part was then built in, great care being taken to maintain the fair alignment of form; and in addition to the work of lengthening, a partial double bottom for water ballast, a new watertight bulkhead, and a complete shelter deck joining up with the forecastle, were constructed. At the same time the whole of the hull was carefully surveyed and brought up to the requirements of Lloyd's so as to maintain the full class with that Society.

The accommodation for passengers, which was fitted up in the new shelter deck space, consists of 12 large staterooms luxuriously fitted up and upholstered, the floors of same, as also the entrances and alleyways, being of inlaid woods of handsome design. All the staterooms have electric light and fans, fold up lavatories, etc., and convenient to the staterooms modern bathrooms and lavatories are situated. The officers' accommodation and crew spaces are also contained in the shelter deck, and the remainder of the space will be utilized for the carriage of troops or for light cargo. On the shelter deck forward is a large steel house, which contains the dining saloon, owner's cabin and bathroom, stateroom entrance and pantry. The dining cabin is handsomely panelled in polished hardwood and is well lit with large sliding windows; seating accommodation for 32 people is arranged for and numerous electric fans, electric lights, bells, etc., all contribute to the comfort of passengers. This

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stored on deck ready for emergencies. Explosion followed explosion, and thousands of fragments of the bursting shells shrieked through the air, and ricocheted over the water. For a few minutes the bombardment was terrific. Countless jets of water were thrown up on the bosom of the bay as the missiles plowed the surface. The situation was one of great peril. And as the little boat sped on under the hail of fire, the Spanish cruisers and merchant steamers could be seen slipping their moorings and moving out of the zone of danger. Face and Boru had passed through many artillery fights in the insurrection, but always felt that when a Spaniard took real aim at any object, the object was safe. And so they were callous. But the few minutes in Havana Bay, while the Maine was delivering her farewell salute to the world, surpassed anything in their previous experience. The spray from the fragments of shell hitting the water fell into the little boat, a hurtling missile splintered the mast and another tore a hole in the gunwale.

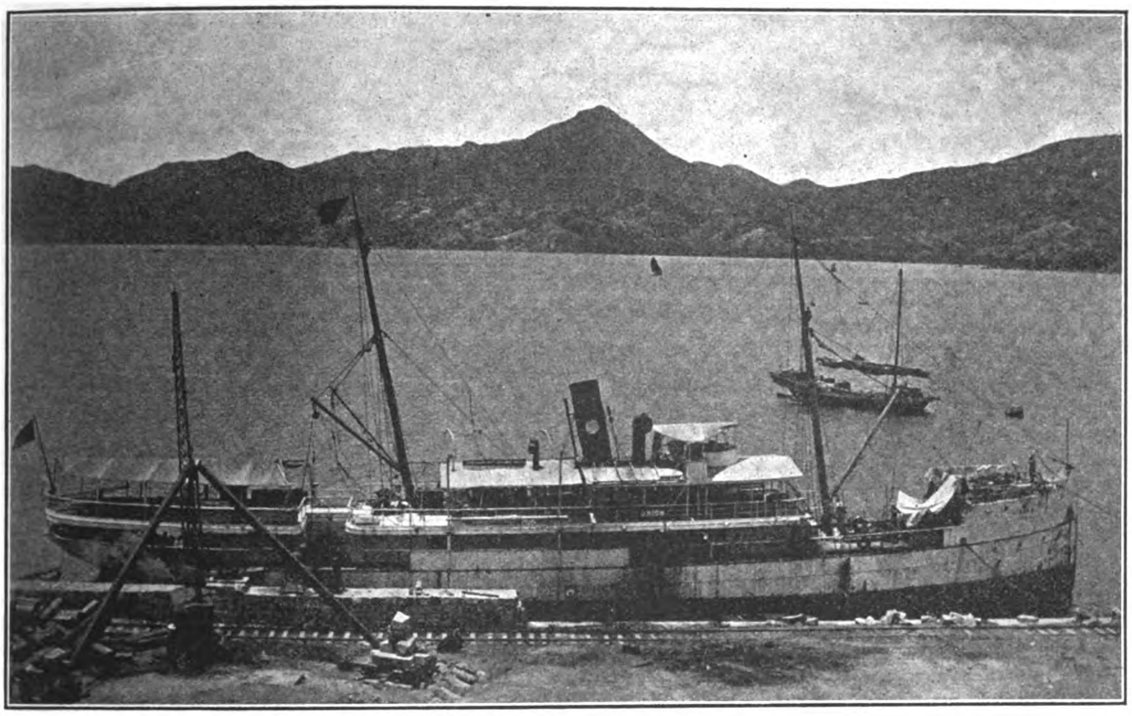
"Jesus Maria! Virgen Santísima!" cried the boatmen, and dropped under the thwarts palsied with fear. Here was a predicament. The little boat was now within a few hundred yards of the Maine, and entering the circle of light. Ahead Face discerned some one in the water, and was crying out "Pull! Pull!" And then the stern, silent old Spaniard awoke to action. "Get up! pull——you!" and with his heavy cane he beat the frightened oarsmen to their places. Boru assisted with a rope's end, and Face stood in the bow throwing sulphurous epithets on the entire breed of Havana boatmen. And so, in the midst of the incident, with a rain of missiles shrieking overhead, the boat came within the circle of light. "Pag" had finished persuading the boatmen that they had better stand the uncertainty of being hit by the shells than the certainty of being beaten to death if they didn't pull. And the boat sped onwards once more. Face and Boru had now forgotten all about the incident on the wharf, and were intent on reaching the wreck. Suddenly, however, the old Colonel gave the abrupt order for the starboard oar to back water, and, jamming the tiller over, the little boat swung around and turned again towards the water front. Face yelled. "What the devil are you doing, there is a man there in the water", and Boru made to take the tiller ropes away from the Colonel. But the old soldier held up his hand and very quietly but firmly said, "We will return to the Machina. You have imposed on me, and not acted the part of gentlemen." "What's the matter with you," said Face, "head the boat around, quick." "Gentlemen, you assured me you were two officers of the Maine, but you," pointing his finger at Face, "are Mr............ correspondent of the New York............," and turning to Boru, "you are Mr. .... of the New York ....You have caused me trouble enough these last two years, and now you go back."

Boru knew the old Colonel meant what he said, and realized the only chance to avoid losing the night's work was to promptly apologize. But to do it properly and safely he had to lie. And in his finest Castilian, he said, "Why, if this isn't my old friend Colonel Paglieri! I didn't recognize you in the darkness. I thought it was another official, for I would never have imposed on an officer of your rank, and one whom I esteem so highly as an old friend. Colonel, I sincerely apologize to you on behalf of my companion and myself."

And once more the finer instincts of the old warrior revealed the true gentleman. Time and again had the two correspondents eluded his vigilance, and laughed at the traps he set for them, and brought down on his head the sharp reprimand of his commanding general, and here on this night they had again outwitted their old foe. But he generously accepted the apology so spontaneously tendered, and turned the bow again towards the wreck. And so Face, Boru, and the Chief of Police arrived at the Maine, just twenty minutes after the explosion, the first boat from the Havana shore It was all over. The cutters of the Alfonso XII, the Spanish Mail, and the City of Washington had gathered up the survivors. Charley Thrall, of the Electric Light Co., and Von Vechten, of the Standard Oil, had come out from Regla in their launches, and done noble work. As the three companions came alongside, Captain Sigsbee was entering the boat to take him with other survivors to the City of Washington. The full significance and awful horror of the scene overwhelmed the correspondents, and the old Spaniard. Instinctively they uncovered in the presence of the great death. Face and Boru choked down a sob, and the grim Colonel muttered a prayer for the souls of those imprisoned in the mighty casket. Sigsbee beckoned to Boru to follow him to the City of Washington, and on the landing stage of the gangway, Col. Paglieri, in the name of the Spanish Government, offered his sympathy and assistance to the American Captain. The rest is history. Captain Sigsbee not daring to trust any of his own men ashore that night confided to Boru his official dispatches to place on the wire, and Face was with him at the cable office when the line was opened for Boru by order of the Captain General.

apartment, as also the owner's cabin, is luxuriously upholstered and has an inlaid wood floor

Over the dining saloon is a spacious promenade deck for passengers, and on this deck there is also the navigating officer's cabin, chart house, and steering gear.



THE S.S. UNION AS SHE ARRIVED ALONGSIDE THE DOCKYARD

The vessel as completed presents a very fine appearance, having one pole mast forward with signal yard, derrick posts and winches for the quick working of cargo at all the hatches, steel lifeboats, awnings all fore and aft, and generally is equal to any first class modern steamer suited in every respect for a tropical climate.

As lengthened the vessel is now 204′6″ between perpendiculars and the gross tonnage has been increased by 396 tons.

On a trial which was made on the measured five miles at Hongkong, the speed attained was over 11 knots, which, according to the data of the original vessel, is about the same as she did prior to being altered, thereby showing that the lengthening of the vessel has not in any way reduced her speed.

THE YUNNANFU ELECTRICITY WORKS.

Yunnanfu, the capital of the province of Yunnan, has a population of 60.000 and is situated in the table lands region to the north east of that province. Its walls enclose an area rectangular in form running 1.5 miles N. S. and one mile E. W. There is little industrial activity, commerce being its main support. The installation of an electric light plant now under way, however, is an indication of the progressive character of the inhabitants. This plant originally proposed for the lighting of the numerous yamen, schools, police stations and main streets, will no doubt be appreciated by the inhabitants as they become familiar with this kind of lighting.

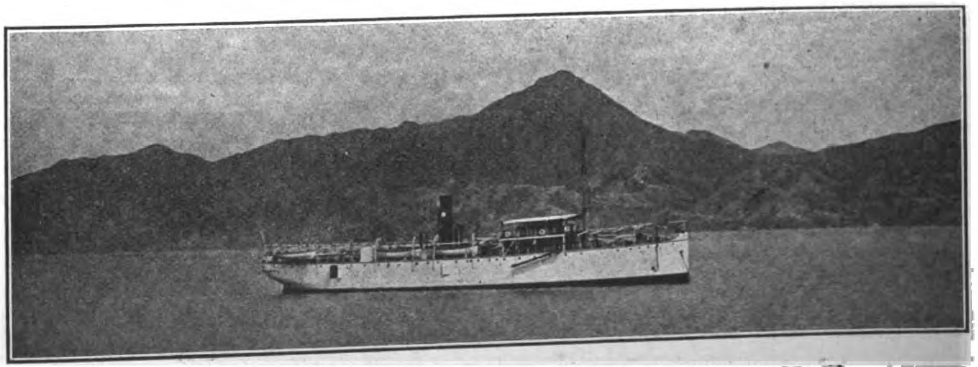
Water power will be used for generating purposes and the head is located on the Tsin-yu-tan about 15 miles distant from the city. This outlet is surrounded by rice fields and the clay bottom of the Tsin-yu-tan is covered with a green turf, the result of atmospheric conditions. It is at the point where the outlet from the lake reaches the hill Tsin-yu-tan that the channel to the power station will be cut through the rocky sides of the mountain. This channel will be lined with quarry stone and water cement mortar, the materials being available in the vicinity and broken stones easily secured from the blastings. The power house will be located at a sharp angle of the hillside on the right bank of the outgate.

The power plant will be equipped with two water-wheel turbines developing 300 h. p. each at a speed of 375 r. p. m. supplied by the wellknown firm of J. M. Voith, Herdenheim on the Brenz, Germany. They will have direct coupling with two three-phase current generators for 275 K V. A and a circuit of 10,000 volts; two exciting machines for direct coupling to the generators, with all the necessary measuring and controlling instruments will also be installed.

The high tension line from the power house to the city will be fitted on timber masts and connect with the transformer house at the Great West Gate of Yunnanfu where the current will be reduced to 3 000 volts. Two switch boxes will be installed here to serve the main-ring line in the inner city. Mast transformers will be fitted to timber poles and a larger transformer will be erected near the Viceroy Yamen. The whole line will be provided with safety net-work.

The three-phase current system with effected zero position will be used on the low tension line with a circuit of 110 Volts between zero and phase-line. The low-tension side of the transformers are to be protected on the timber poles by means of triple-pole fuses, which are watertight and fitted into iron-boxes. High and low-tension lines will be fitted on wooden poles of 11 meters 8 meters from the ground, so that crossings can be made on the existing protecting network of high-tension line.

All branch lines to the houses, etc., will be protected by means of overhead line fuses. The contractors for the work are the well known firm of Carlowitz & Co.



THE S.S. UNION LENGTHENED AND READY TO PROCEED TO SEA

THE WEST SIBERIAN RAILWAY

The difference of opinion over the route of the new railway in West Siberia has been adjusted. The commission consisting of the representatives of six ministries which met last autumn to discuss the matter has come to a decision. The project is now before the Imperial Council and the Council of Ministers, but it is not believed that these two bodies will raise any further objection.

The new West Siberian main line begins at the town of Uralsk, proceeds via Orenburg and Akmolinsk to Semipalatinsk in a due east direction; thence north-east to Barnaul, from which a short branch will run to the prosperous town of Biisk. From Barnaul it proceeds due north to the Great Siberian Railway joining it at Ob or Novo-Nikolaievsk. The town is already regarded as the center of the Siberian grain trade and the opening of the new line will give an impetus to its still more rapid development.

It is believed construction will begin immediately, for the reasons the Commission has given for the railway are sufficiently convincing to exclude Governmental opposition. The principal arguments presented in support of the construction follow:

1. The line is of great strategic importance.

2. It is absolutely necessary in the interest of the colonization of Siberia; for it runs through country that is very fertile and well suited for immigrants, thus aiding the settlement of the agrarian question, not only in Siberia but also in Russia.

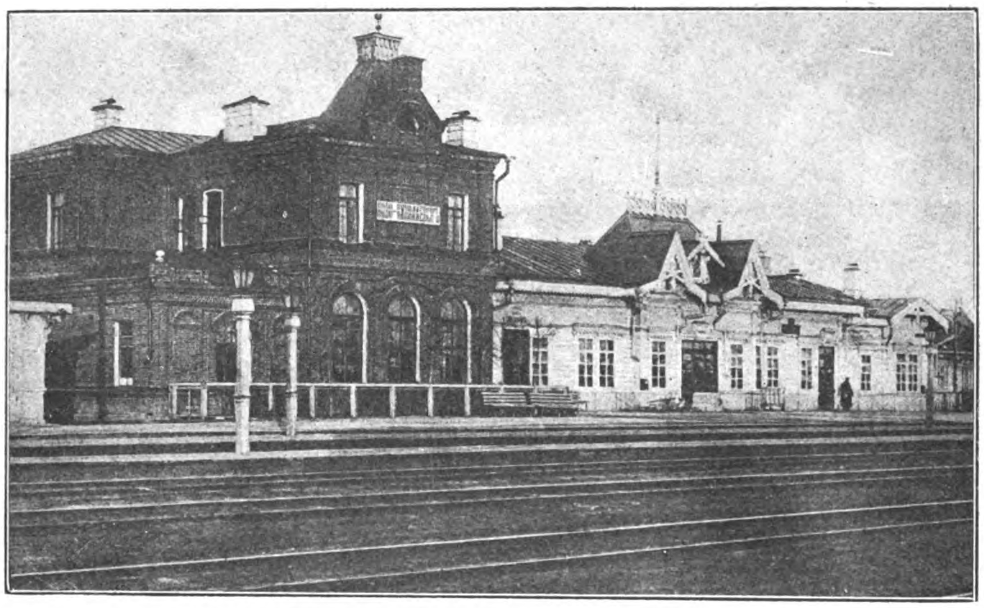
3. It traverses a region of four million square versts that is now sparsely inhabited but is capable of producing largely both grain and other natural products.

4. Above all, it opens the enormous natural wealth of the Altai mountain region which, according to the latest researches, will be worth many millions to Siberia. Besides the mountain forests, that are still vaguely known, mines of iron, copper, silver, lead and zinc have been in operation for many years, but have never been properly worked, in spite of the richness of the ores. Freight and other expenses have swallowed up the profits. The new line will transform all this like an enchanter's wand.

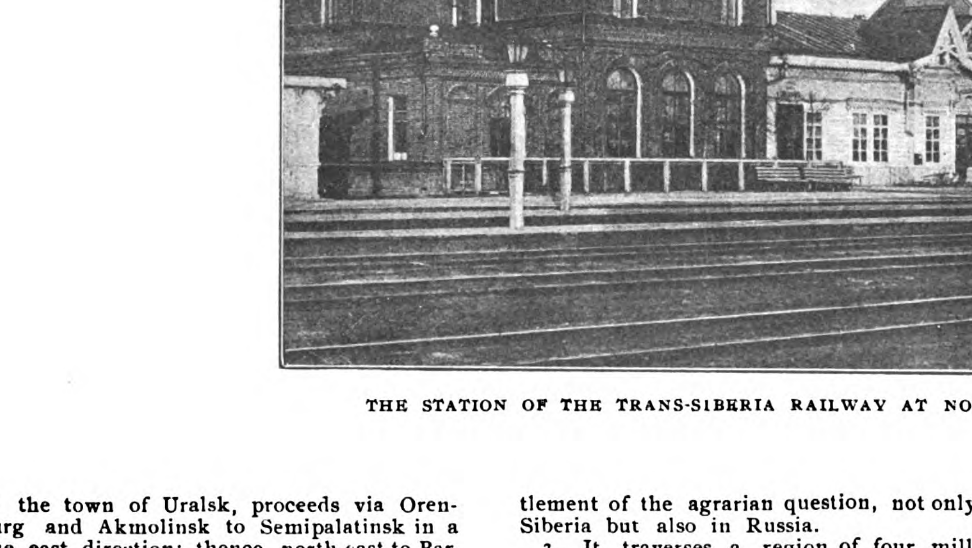
The new line will be more than 2,200 versts (the verst is nearly the same as the kilometer and equals two-thirds of a mile); the expenses are estimated at 186 million roubles, of which 170 millions will be the bond-issue.

If the construction is begun in the spring of 1911 or even in the previous winter it is to be hoped that it will be open to traffic in five years at latest, as it can be begun at both ends at once.

The same Commission has decided on a line in Trans-Caucasia, from Aryss, a station on the Orenburg-Tashkend Line, via Pischpek to Verny. This line will be specially serviceable to the cotton and silk industry in Ferghana Province and will fill wants that should have been attended to decades ago.



THE STATION OF THE TRANS-SIBERIA RAILWAY AT NOVO NICHOLAIEVSK



NOVO NICHOLAIEVSK: THE GREAT GRAIN AND FLOUR CITY OF CENTRAL SIBERIA

WATER-TUBE STEAM BOILERS

Of recent years the water-tube boiler has come to the front so rapidly that no doubt a few particulars of the leading type as made by Messrs. Babcock & Wilcox Ltd. will be of interest to our readers.

The standard land type of boiler is shown in fig. 1, the sectional construction and staggering of the tubes, points which are essential to ensure high working efficiency and provide for unequal expansion, should be noted.

Of late years, owing to the demand for higher boiler efficiencies and smokeless combustion, this firm have made a specialty of superheaters and mechanical stokers; as we shall probably return to these subjects at a later date, we refrain now from going fully into the question. But fig. 2 will give our readers a very good idea of the arrangement of one of these boilers fitted with an integral superheater and mechanical chain grate stoker.

Fig. 3 shows a boiler of the marine type such as supplied regularly to the leading Navies and the Mercantile Marine, whilst fig. 4 illustrates the "White Forster" boiler, of which Messrs. Babcock & Wilcox Ltd. are the sole licensees and makers, for tor-

pedo boats, torpedo boat destroyers, scouts and vessels of light draught.

It is also interesting to note that a specialty is made of boilers for transport up country and to places difficult of access; in such cases a weight limit of 250 lbs. can be obtained.

The advantages claimed for these boilers are: Safety from Disastrous Explosion, High Efficiency, Low Cost of Upkeep, and Steaming Capabilities.

SAFETY.—In these days one of the first considerations of a steam user is heating surfaces. The design is also such that the volumes of water in contact with the heat are small, and receive the flames at right angles to their course. The tubes are staggered, the gases are thoroughly broken up as they rise, and passing into the combustion chamber under the drum, they expand and combine again before passing a second and third time through the tubes. Complete combustion, rapid steaming, and consequent economy are thus facilitated. It may be added that in thirty tests, extending over twelve years, under a great variety of conditions and cir- the Babcock & Wilcox boilers were superior both in efficiency and steaming capabilities. The results of the tests were as follows;

	One-fifth Power		Full Power	
	Cylindrical.	Babcock & Wilcox	Cylindrical.	Babcock & Wilcox
Indicated Horse-Power........	3 634	3,759	6,686	7,510
Coal per indicated horse-power..........	1.8	1.74	1.88	1.67

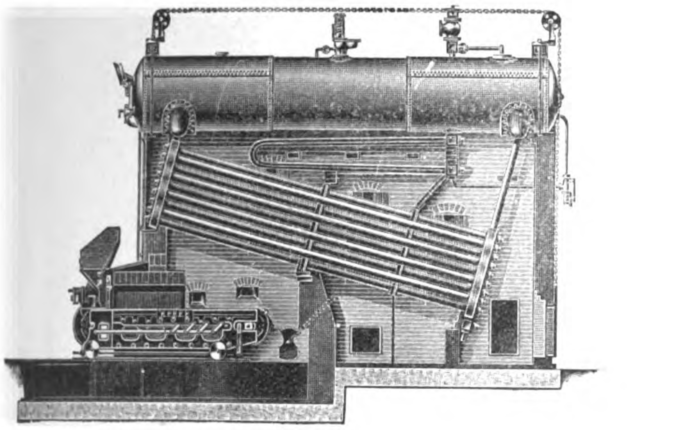


FIG. 1

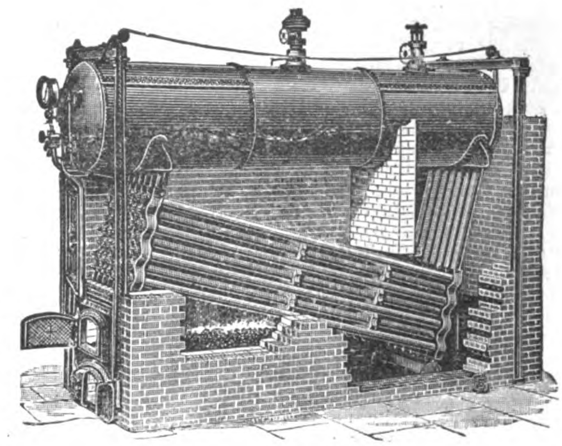


FIG. 2

the element of safety. The importance of this cannot be too greatly emphasized and attention may at once be called to the fact that it is a strong point in favor of the Babcock & Wilcox boiler. Being composed of wrought steel tubes, with a drum of comparatively small diameter, it possesses a great excess of strength over any pressure that it is desirable to use. As the rapid circulation of the water ensures equal temperature in all parts, the strains due to unequal expansion cannot occur to deteriorate its strength. The construction of the boiler, moreover, is such that, if unequal expansion does occur under extraordinary circumstances, no objectionable strain can be caused thereby, ample elasticity being provided for that purpose in the method of construction.

Amongst the numerous instances to be found in the Company's records, in which this has occurred it will not be out of place to quote one of the most remarkable of them. It shows incidentally how the Babcock & Wilcox Boiler may even be left in the most inexperienced hands without fear of serious disaster. In the case in question the boiler was installed at a county gaol and was in charge of one of the convicts, who, after starting the fire as usual in the morning, was surprised not to observe, after an hour or so of waiting, any signs of activity in the steam gauge. This fact was disclosed to some of the officials of the prison, and an investigation was instituted to ascertain the cause, disclosing a fact that at once relieved the boiler from any responsibility for the absence of steam—for there was no water in it. It also showed that the blow off cock was wide open, and had been since the night before. After the officials had opened the furnace door and seen the white hot tubes, it was thought a good idea to get some water in the boiler as quickly as possible; so that they shut the blow-off cock and turned on the city water. The result justified their expectations, steam was made very quickly; for a moment it roared through the safety valve with a fearsome sound; and that is all that happened, beyond the renewal of a few of the tubes and one steel casting.

EFFICIENCY.—The *economy* that results from the use of these boilers is undeniable. It is largely attained by the provision of thin

cumstances, by no less than twenty different engineers, and with only two exceptions on boilers in daily use for manufacturing purposes, with all descriptions of coal and at varying rates of combustion, covering an aggregate of nearly three months regular working and evaporating over 3,000 Tons of water, gave an average evaporation of 11.-4217 lbs. of water per lb. of fuel. It is pretty safe to say that no other boiler similarly tested has ever beaten this record.

As bearing on this subject the following extract from an article written by Lieut. H. C. Dinger, U. S. N., regarding the round the world cruise of the United States Fleet in 1908, will be of interest. Two types of shell boiler and three types of water-tube boilers were in use. Lieut. Dinger states that after reducing all the figures to a common basis, the Babcock & Wilcox Boilers were by far the most economical, the figures

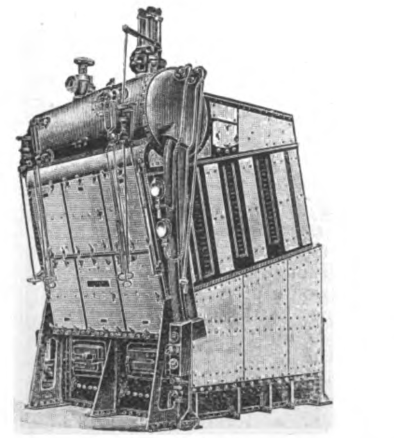


FIG. 3

showing a saving in coal consumption of from 8 9 to 16 per cent in their favor and that as regards repairs at the end of the voyage, practically none were necessary.

The British Government made extensive trials with the Battleship 'King Edward VII." This vessel was fitted with Babcock & Wilcox and Cylindrical boilers and after very careful tests it was proved conclusively that

The best proof of the reliability of the Babcock & Wilcox Boiler lies in the fact of their very wide adoption by both large and small steam users, witness such plants as, Manchester Corporation Electricity Works who now have over 55 of these boilers, Glasgow Corporation Electricity Works 45, Underground Electric Railway of London 65, Manhattan Elevated Railway of New-York 64, Interborough Rapid Transit Co. of New York 60, Third Avenue Railway Co. of New-York 31, City of London Lighting Co. 45, Metropolitan Electric Supply Co. of London 64, Metropolitan Railway of Paris 20, etc.

The Babcock & Wilcox Marine Boiler has been adopted and is being regularly fitted in the Navies of the British, United States of

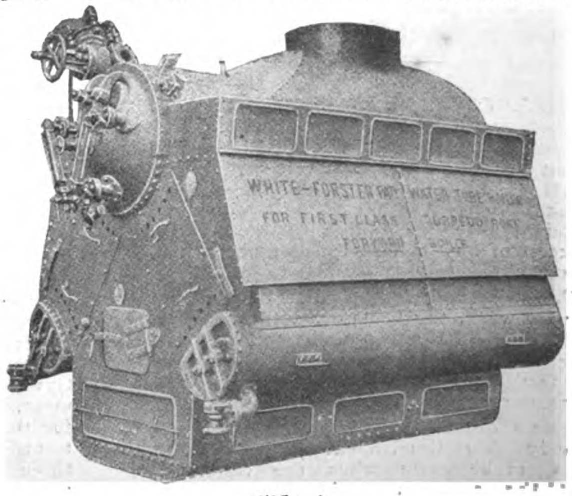


FIG. 4

America, Italian, Danish, Norwegian, Brazilian, and Argentine Governments. A large number of cargo and passenger steamers, tugs, yachts and dredgers also have been fitted with these boilers.

LOW COST OF UPKEEP.—The British Admiralty Boiler Committee, reporting on the

THE TAAL DISASTER

At two-oclock, Monday morning, January 30, a fearful explosion occurred at the active volcano of Taal, the denotaion being heard at the most extreme points of the Philippines and many leagues to sea, and when the mists cleared away from the island and lake of Taal, the surrounding country was found desolate with many hundreds of bodies of natives killed by the gases, hot mud, and falling stones, with many buried under debris and mud who will never be numbered. Never in the history of volcanic activity in the islands has there been recorded a more serious loss of life. Even at the hour of writing the extent of the fatalities is not definitely known. Conservate estimates place the number at 800, while others claim that the list of the dead will reach 1300. The Burial Corps of the U. S. Army, Military, and Constabulary have been active for over a week seeking out the dead for burial and the injured for the hospital, while every effort has been made to succor the homeless and destitute. For miles around Taal Lake, volcanic mud covers the earth, fruit trees and crops have been destroyed, and what was once a prosperous thickly populated district, is now the picture of desolation.

Volcan Island, in the center of which the volcano of Taal is located, was inhabited by 400 to 600 natives living in several small barrios. Some reports place the number at 800, but of them all there were only ten accounted for and only one able to relate his experience.

But the devastation did not stop with the island. It was carried to the opposite shores of Lake Taal. Immediately following the terrible eruption, the waters of the lake were disturbed and a great wave swept the exposed barrios on the shores of the lake and, amid the showers of hot mud and stones, carried death and destruction in its wake.

Of six barrios on one side of Volcan Island all had been entirely obliterated but one. The houses and occupants were completely buried.

The damage from the eruption and rush of waters on the lake shore is variously estimated, but as the relief parties extend their investigations the greater the evidence of damage to life and property. The barrios along the west shore of the lake and nearest the crater suffered most. Barrios were wiped out by the rush of waters and the natives living there died almost without warning. It is in this section, not yet fully explored, that the large increase of fatalities over the first reports published are being uncovered. In one barrio alone 57 bodies were found by Captain Willis C. Metcalf, U. S. A., and as he proceeds up the west more and more bodies were found.

While the number of natives on Volcan Island is variously estimated the Bureau of Health reported 800 vaccinated there recently. If this be true there is a p obability that list of fatalities on the island exceeded the number estimated above and with the dead found on the west coast the figures up to

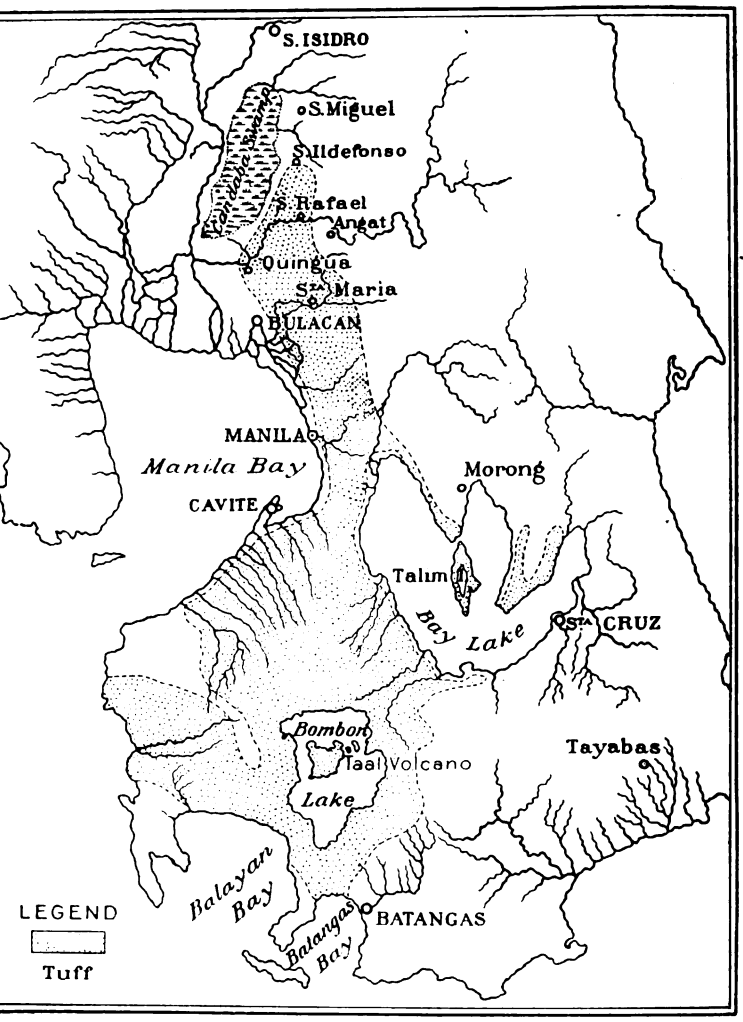


FIG. 8.—SKETCH OF THE TUFACEOUS AREA OF TAAL VOLCANO, AS MAPPED BY CENTENO

1,000 might be considered conservative. The truth will no doubt never be known. Especially is this true of Volcan Island where the towns were buried completely many feet deep.

Taal became active several days before the terrible eruption January 30. Father Algue, Chief of the Manila Observatory, reported over 300 shocks, 54 of which were severe, previous to that time. These shocks were felt in Manila and the surrounding country but no damage resulted. Taal has always been more or less active and the natives paid little or no heed to its unusual activity. Since 1754 there has been no serious eruption. At that time damage was caused as far as Santo Tomas but the loss of life, due to a limited population, was very small. The natives in the vicinity were removed and for many years that section was deserted. The long period of quiet following this activity resulted in their return to this fertile region and probably no part of Luzon was more thickly populated when the disaster occurred.

Babcock & Wilcox Boilers in the S. S. Martello trading between England and the United States say: "This vessel has run about 91,000 miles since the boilers were put in and has usually been less than a week in port at either end, the only repairs required have been those of the ordinary upkeep of any boiler such as firebars, brickwork, etc.

For shallow draught steamers for river or estuary work, tug boats, dredgers, ferryboats, etc., this boiler is especially suitable, as for a given power it is lighter and being more economical of fuel than the ordinary boiler a greater radius of action can be allowed.

Steam can be raised in these boilers in a very short time, about ¾ hour, so that fires can be drawn when the vessel is at rest, thus saving a considerable amount of fuel and labour. In this connection it is interesting to observe that the London & India Joint Dock Committee fitted these boilers in their twin-screw tug "Hotspur" over twelve years ago and as the result of experience gained have since built three more tugs having these boilers. The London & India Joint Dock Committee have now been taken over by the Port of London Authority and they have recently ordered three more tugs of 1,000 Horse Power each to be fitted with the Babcock & Wilcox Boiler.

Over 10,000,000 Horse Power of the Babcock & Wilcox Boiler are at present in use or under construction, and at the present time the firm inform us that they are executing orders in their marine works alone for boilers for the following, three battleships of the improved Dreadnought type for the British Government, two cruisers for the British Government, one battleship for the Italian Government, two for the Argentine Government, one for the Brazilian Government, one for the United States Navy, some sixteen torpedo boats, as well as a cargo steamer, three tug boats, a ferry steamer and a floating dock, totalling about 500,000 Horse Power.

The Babcock & Wilcox Cos. have works at Renfrew in Great Britain, Oberhausen in Germany, Bayonne in the United States, and at Paris in France, and it is interesting to note employ some 8,000 men.

The interests of this large concern are represented in China by their office in Shanghai at 1a Jinkee Road.

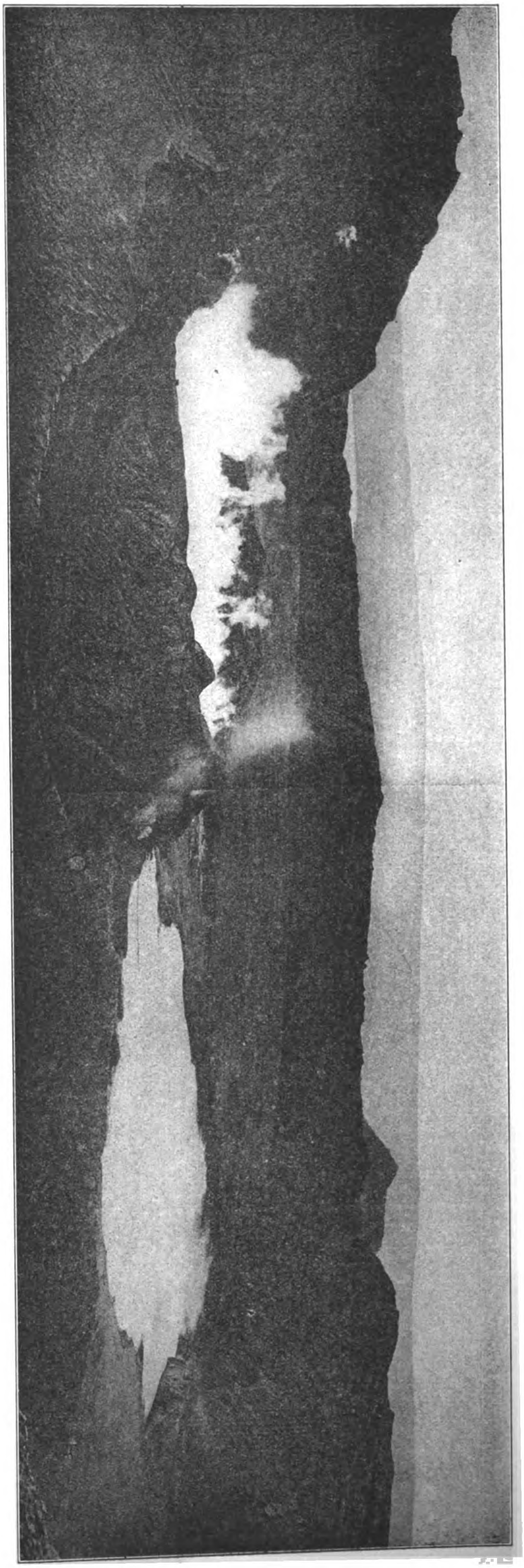


FIG. 1. CRATER OF TAAL VOLCANO SEEN FROM THE EAST

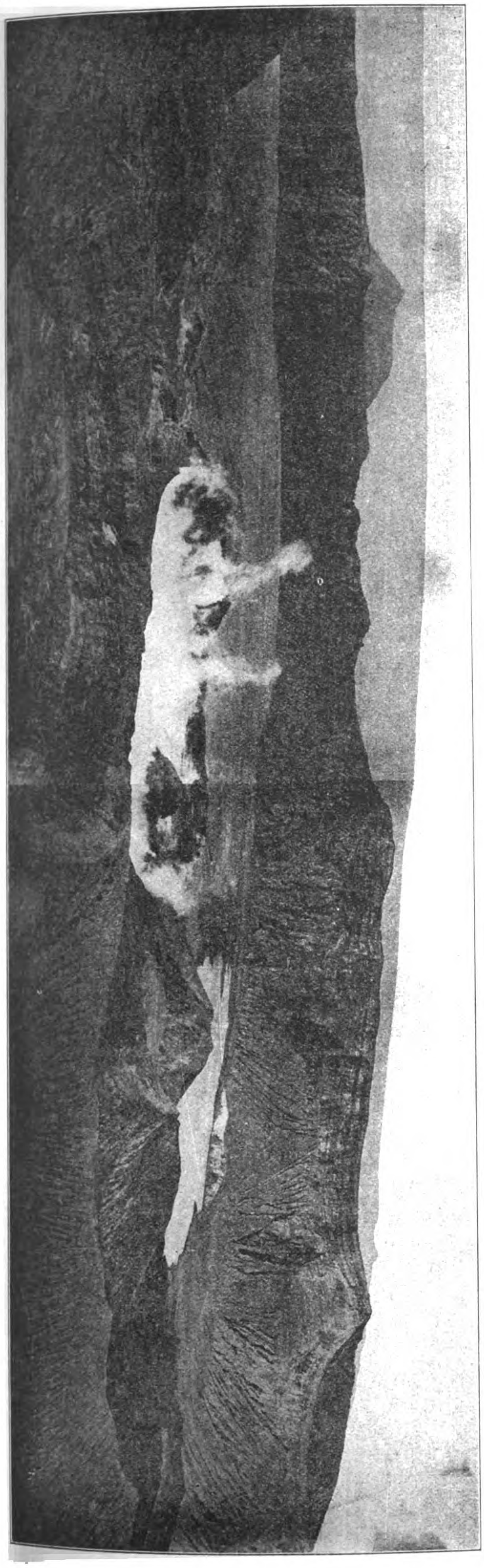


FIG. 2. CRATER OF TAAL VOLCANO SEEN FROM THE SOUTHEAST, THE 1904 CRATER IN THE LEFT FOREGROUND

Up to the present time over 900 seismic shocks have been recorded at Manila Observatory. Father Algue, who is an authority on earthquakes, is not convinced that the worst is yet over and provision has been made to prevent anyone from returning to the danger zone.

One striking feature of the recent explosion was an electrical display directly over the crater lasting over two hours. Of the 1754 eruptions Father Buencuchillo writes that for 70 days a similar electrical display prevailed throughout the entire period, many days being so dark that candles were necessary in midday. Father Algue reassured the inhabitants of Manila that while heavy shocks might be experienced the city would be in no danger but he reiterates the necessity of keeping away from the vicinity of the volcano.

HISTORY OF TAAL VOLCANO

In his paper on a "Geologic Reconnaissance of Southwestern Luzon", published in the Philippine Journal of Science in March, 1910, Mr. Geo. I. Adams, of the Division of Mines, covering a comprehensive description of the Southwestern volcanic region which includes Taal. Included are maps and illustrations which we reproduce through the courtesy of the Director of the Bureau of Science.

The southwestern volcanic region is described by Mr. Adams as consisting of "plains of volcanic tuff sloping towards the sea, Bay Lake (The Laguna de Bay) and Manila Bay". Again within this region "there are conspicuous mountains of eruptive rocks, volcanic peaks, the active volcano of Taal, a number of small crater lakes, and some extinct cinder cones." Among these Mr. Adams refers to the extinct volcanic cone northwest of Banahao, with three small lakes in its crater and Mount Maquiling near Los Baños on Laguna de Bay, all retaining some evidences of former volcanic activity.

The active volcano of Taal, which is located near the center of Lake Taal, would appear to be the center of this region. Mr. Adams describes the location as follows:

"Taal Volcano, surrounded by a number of small extinct parasitic cones, is near the center of an island in Lake Taal. The highest point of the island is on the southwestern rim of the crater, which reaches an elevation of 320 meters. The floor of the crater is about the same level as the water of the lake and but little above sea level. The country lying between Maquiling and Sosoncambing on the west and Cristobal and Banahao on the East may be called the crater lake area. "Within it, distributed in an irregular way, there are twelve of the lakes varying from a half to more than one kilometer in diameter. They lie in the tuff plains, their rims rising but a few meters above the general level of the country. Coconut groves and other vegetation disguise their presence so that passers-by on the road within a minute's walk of one of these lakes may not know of its existence."

Cinder cones are found northeast of Batangas, north of Rosario and south of Lipa. Tulic Hill, between Santo Tomas and Calamba, is probably a cinder cone. Mr. Adams says: "Indeed, Taal Volcano and Lake, the hot springs at Los Baños, the crater lake country and falls and gorges, combined with the imposing views of the volcanic mountains, make this region one of the most inviting to tourists in the Philippines".

The extinct crater of Banahao has a large crater 210 meters deep and, according to the Estado Geografica, has been extinct since 1730 when it broke out in its southern part "vomiting torrents of water, hot lava and stones of monstrous size", but that there was really an eruption at the date mentioned there is much doubt. In 1909 an avalanche of water mud and stones descended from this crater into the town of Savaya, doing much damage but without evidence of eruption, the cause being laid to the choking of the outlet of the crater by a landslide. It is not improbable that the same causes led to the impression that an eruption occurred in 1730.

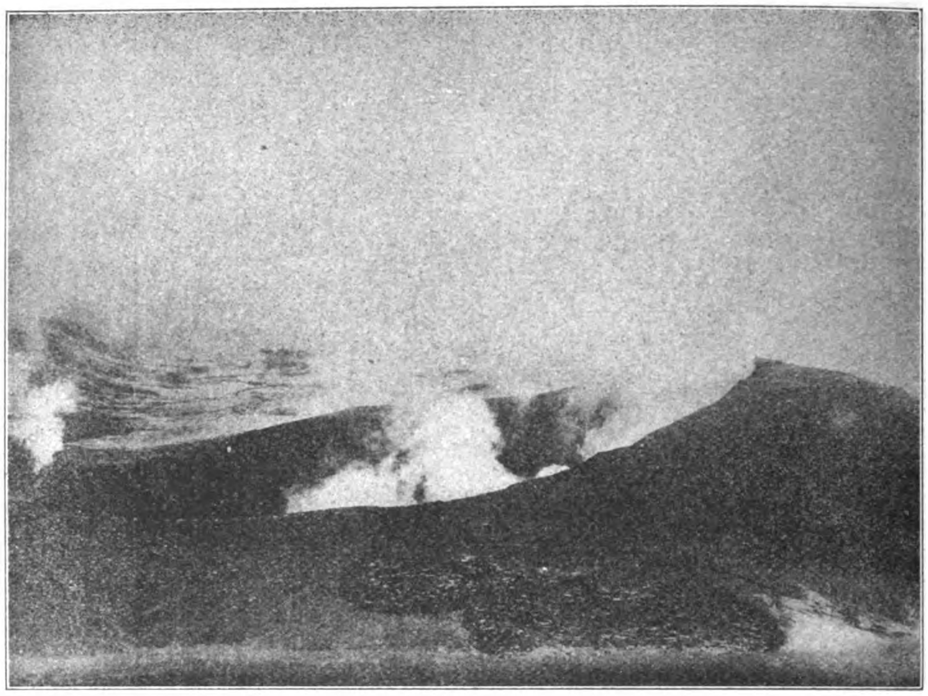


FIG. 1. THE 1904 CRATER, SHOWING ERUPTED MUD.

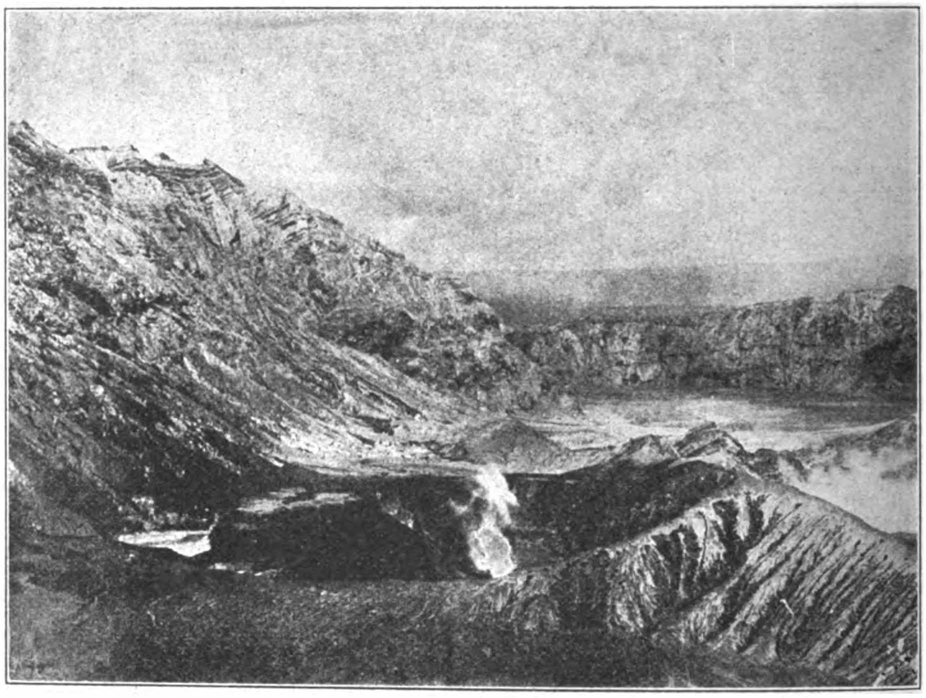


FIG. 2. THE 1904 CRATER QUIET.

Cristobal has a crater containing three small lakes and alleged activity of this extinct volcano is also explained by the breaking of natural dams at the outlet as with the Banahao.

Mount Maquiling is also considered an extinct volcano and is indicated by Abella as having the appearance of a crater broken down by erosion. Evidence of volcanic activity here is the crater lake called Laguna de los Caimanes on the border of Laguna de Bay west of los Baños and probably occupies the crater of an extinct cinder cone.

The Active Volcano of Taal.—Mr. Adams in his reference to Taal says:

"Taal Volcano is situated on an island in Taal or Bombon Lake. The island, on which are found a number of extinct cinder cones and the active crater, has been built near the center of the lake by late volcanic activity (Plate III). The main crater which is situated near the center is usually referred to as Taal Volcano. It is approximately circular in form. The southwestern border of the crater rim rises to an elevation of 320 meters, which is the highest point on the island. The lowest points on the rim are about 130 to 150 meters in elevation. The lowest points on the floor of the crater are about on a level with the water of Taal Lake. Visitors usually ascend the eastern side of the crater rim where it is low and near the shore; the most desirable time to make the ascent being about dawn and the rim should be reached by sunrise. The descent into the crater is by a steep zig-zag path, but presents no serious difficulties. During the first cool hour or so of the morning the vapors lie low over the lakes in the crater On sunny days as the sun warms the air, the steam begins to ascend and the vapor and sulphur fumes are wafted about so that the view is not so clear and travel in some parts of the crater is made difficult and even dangerous. When the atmosphere

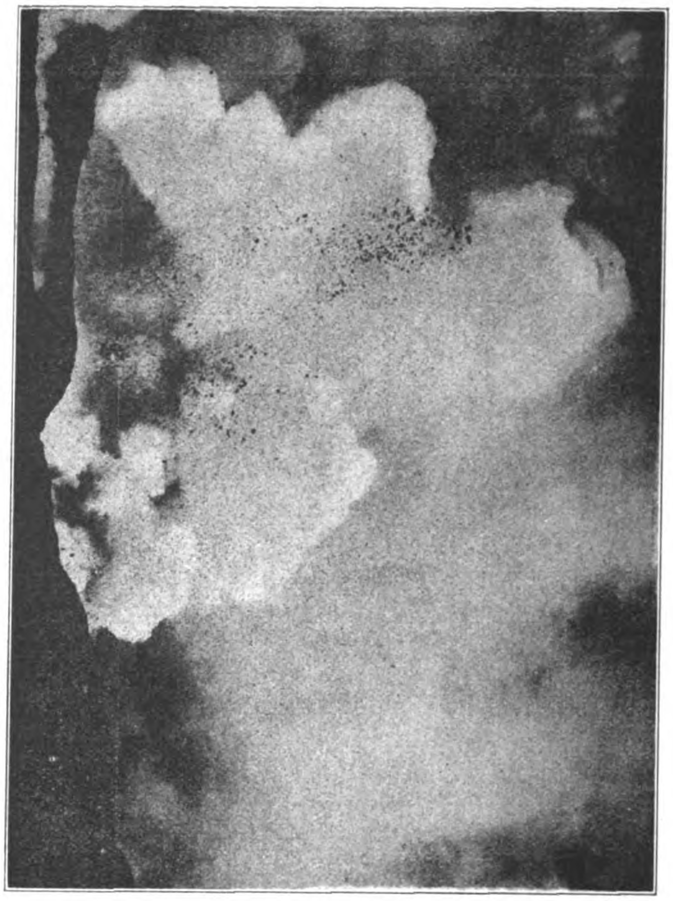


FIG. 1. THE 1904 CRATER BLOWING OUT STEAM AND GASES JULY 4. RED LAKE IN FOREGROUND

FIG. 2. THE 1904 CRATER ERUPTING STONES. JULY, 1901

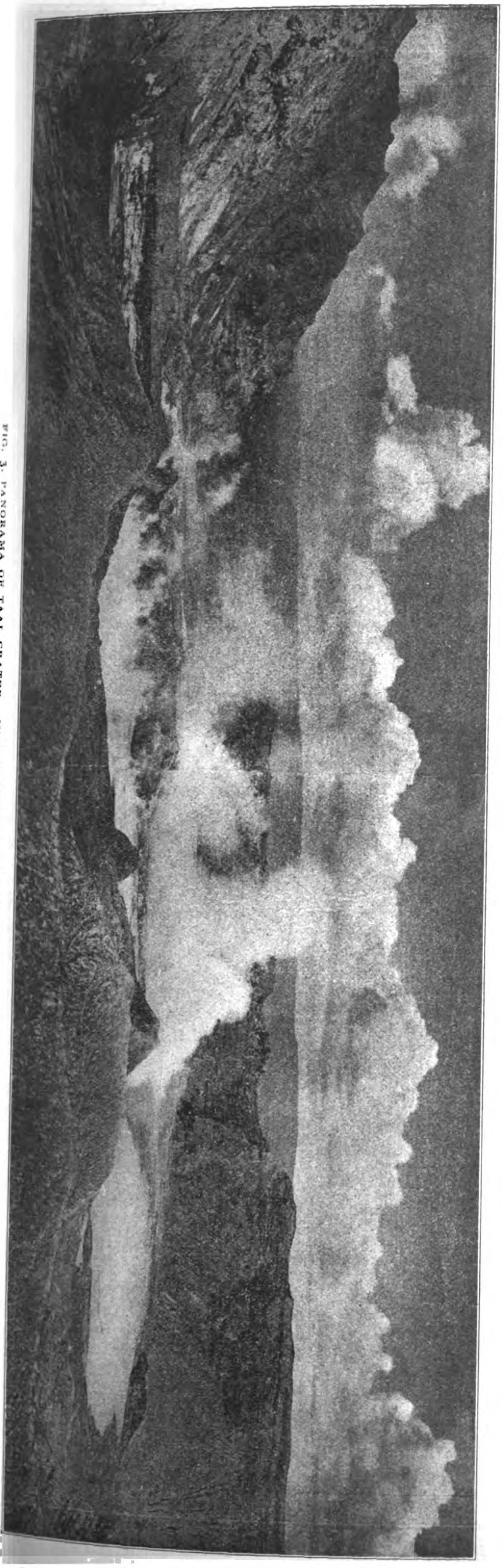


FIG. 3. PANORAMA OF TAAL CRATER. NEW CRATER FORMED IN 1904 SHOWN TO THE LEFT

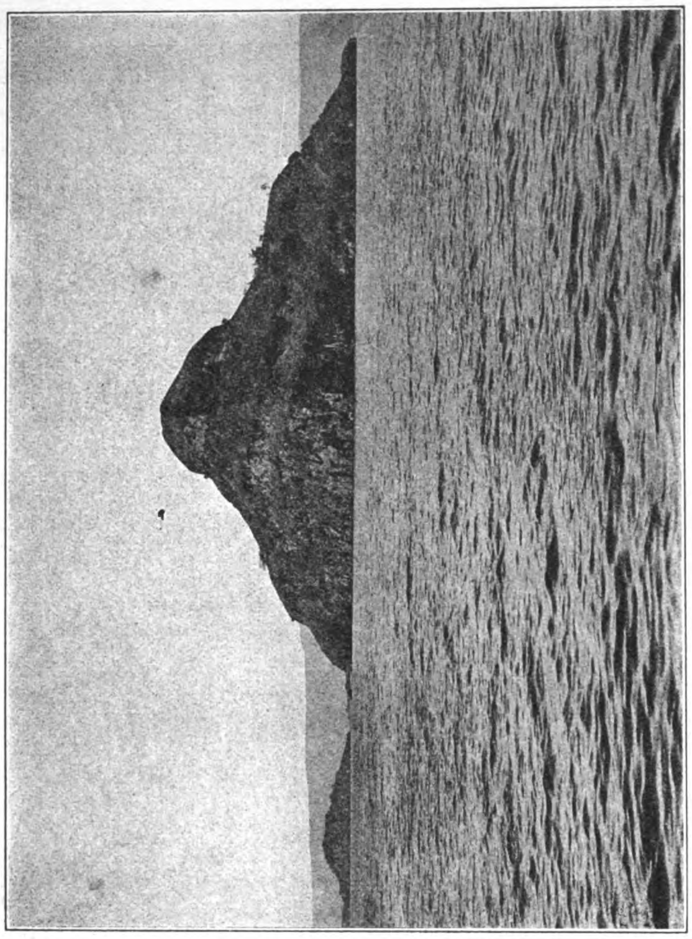


FIG. 1. NAPAYONG AND BUBUING ISLANDS IN TAAL LAKE, AS SEEN FROM LIPA POINT.

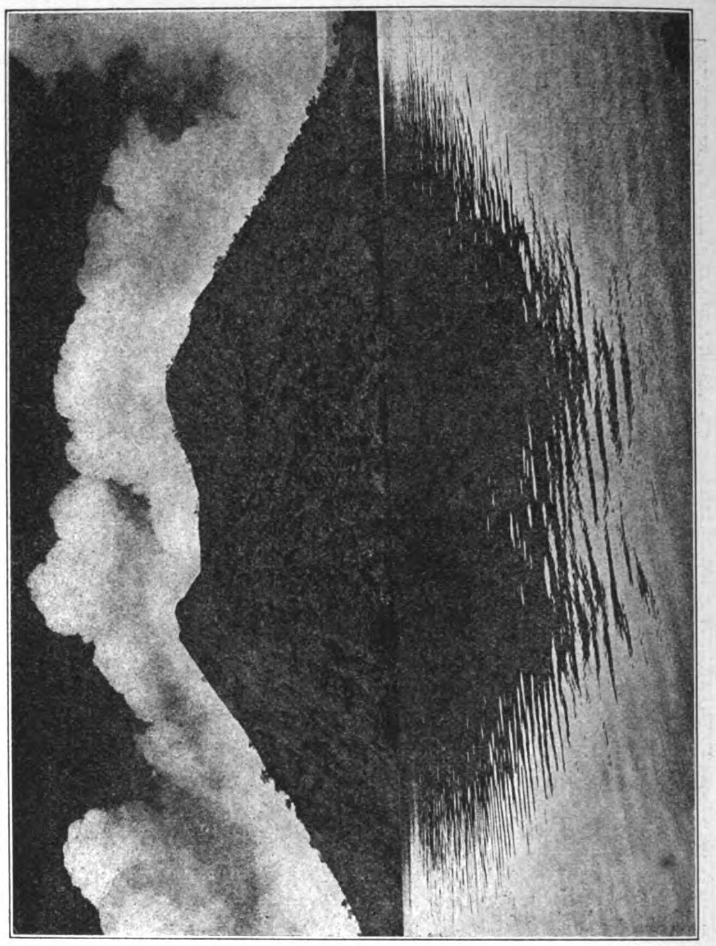


FIG. 2. THE CONE BININTIANG MALAQUI ON THE NORTHWEST POINT OF TAAL ISLAND.

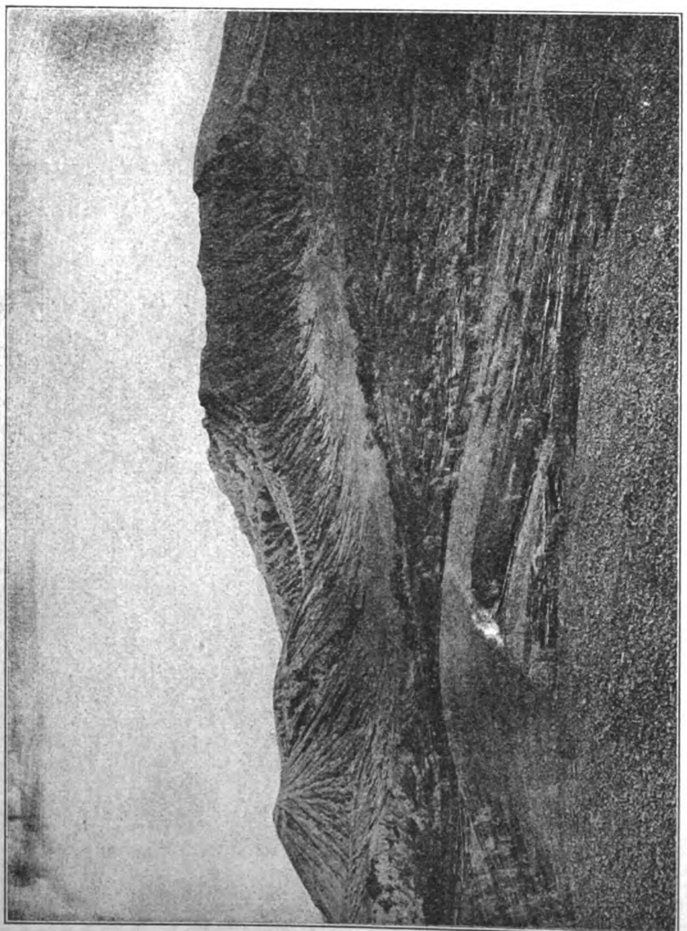


FIG. I. EROSION ON OUTER SOUTHERN SLOPE OF THE CRATER OF TAAL.

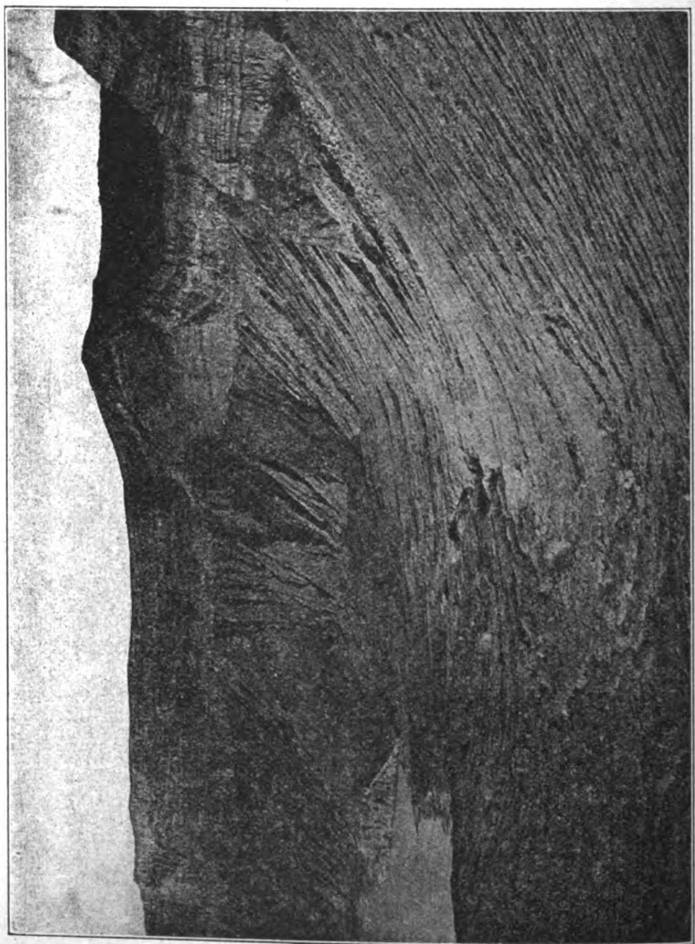
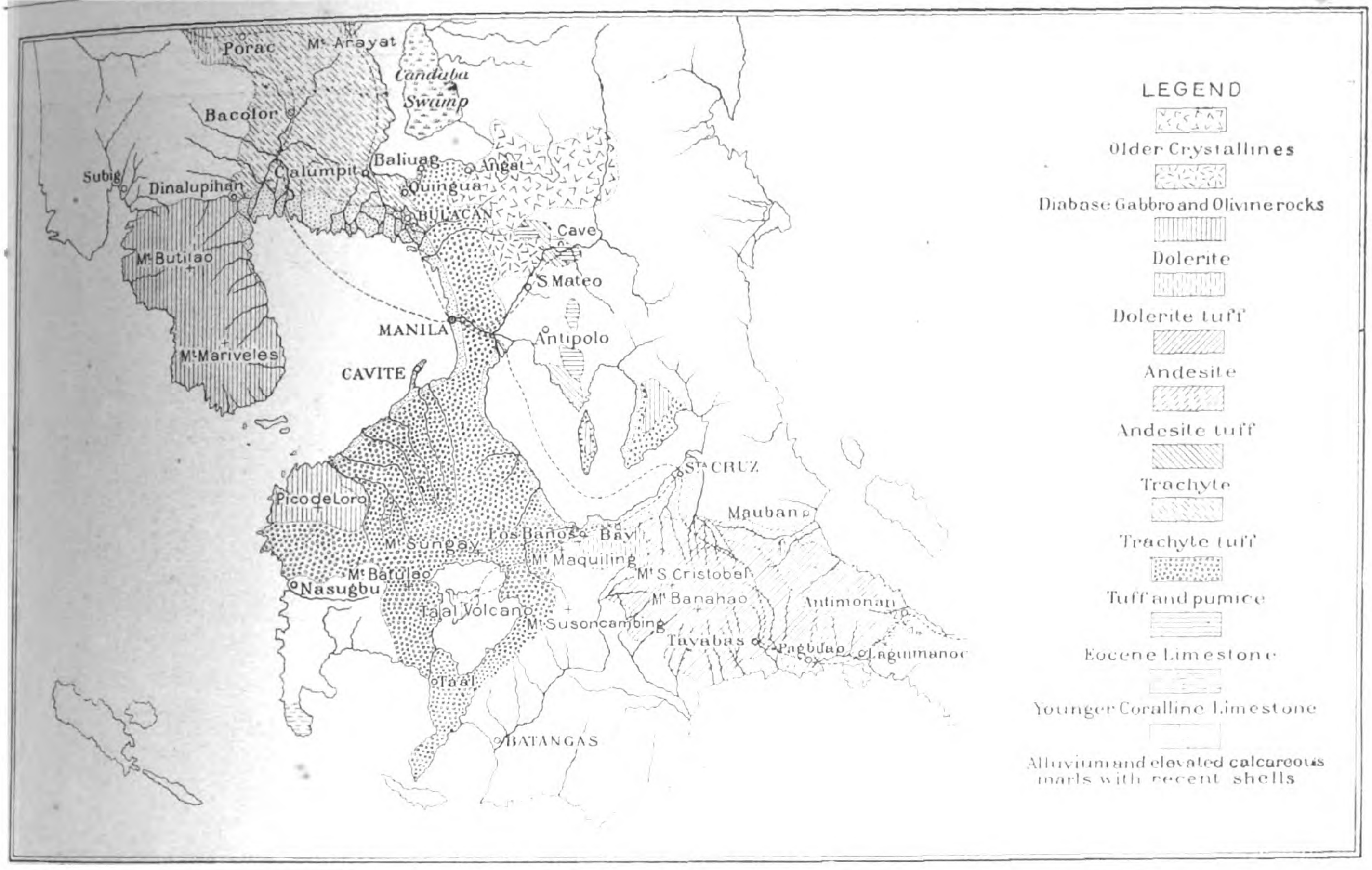


FIG. 2. EROSION ON EASTERN INNER SLOPE OF TAAL, SHOWING BEDDING IN CRATER RIM.

is warmed by the sun, the steam from the green lake usually rises and forms a mushroom shaped cloud which soon becomes detached from the column of vapor which forms its stem. As the heat of the day advances the vapors become more attenuated and are blown about the rising wind, but before this time the visitor should have left the crater if he wishes to avoid an arduous climb in the hot sun. On days when the sky is cloudy, the crater may be explored more at leisure.

"Two lakes lie within this crater. They are usually called the yellow lake and the green lake. During the rainy season there is a third temporary red lake. The yellow lake receives the natural drainage of the crater. It appears to be shallow and is hot, but does not boil. The green lake gives off steam from its surface and near its southern border boils violently as if over a vent. A circular crater is located to the south of the green lake. On its floor there are several boiling mud spots from which but little vapor rises. On the south border of the yellow lake there is a cone, called the red cone, because of the color of its crater. It is broken down on the south side and drains around its eastern base into the yellow lake. A vent from which steam issues with great force occurs on its northern outer base. The yellow lake now extends to this vent but formerly was



SKETCH SHOWING THE GEOLOGIC MAPPING OF SOUTHWESTERN LUZON, BY VON DRASCHE

separated from it by a narrow isthmus. There is a remnant of an older, large crater rim which forms a crescentic ridge rising southeast of the yellow lake and curving around to the south of the green lake, passing between the green lake and the crater with the mud spots. Visitors to the volcano usually travel on this ridge when exploring the crater of Taal, since it affords a fine view and an easy means of approaching the principal points of interest. The ridge is very narrow between the green lake and the crater containing the mud spots and care must be taken that the wind is not blowing the steam and sulphur fumes in such a direction as to cause them to inconvenience or overcome the visitor. There are small cracks in this ridge from which sulphur fumes issue and at its western end, which is south of the green lake, a descent and detour may be made to the south to reach the remnants of some extinct cones which have level floors Sulphur fumes and a little steam rise from the cracks in their walls and floors.

"The layers of tuff exposed in the inner wall of the outer crater exhibit bedding and show a banding of colors varying from whites and grays to yellows and reds. The colors are especially vivid on the walls near the points of activity where the hot acid vapors are sublimed on the rocks, forming an efflorescence of iron, aluminium and magnesium sulphates and chlorides producing variegated white, yellow, red, blue and green effects. Small amounts of native sulphur occur in crevices and cavities, but it is inconspicuous.

"In 1880 Centeno visited Taal Volcano while studying the effects of the severe earthquake of that year, and found that the volcano showed no signs of increased activity. From his sketches of the appearance of the volcano and his description we learn that there was at that time one active cone sending up a great quantity of vapor. This active cone seems to correspond with that of his description written in 1882 and is now the crater containing the mud spots. Near the active cone there were some smaller ones which are shown on one of his sketches as giving off thin columns of vapor.

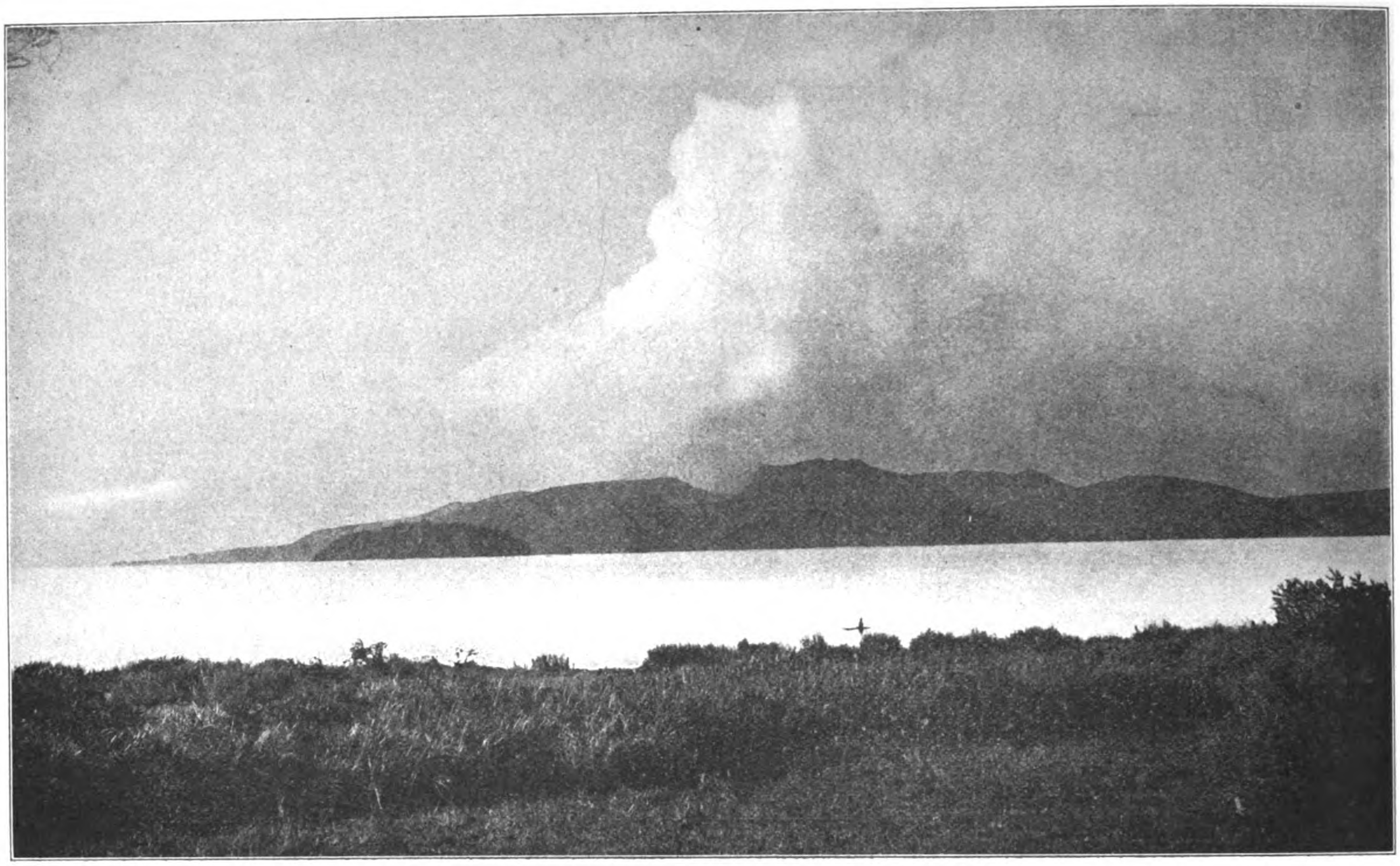
"The yellow lake is described as containing a place near its center where the water boiled up violently and occasionally threw up black mud and sent out waves which agitated the surface of the lake.

"In 1882 Centeno made a study of Taal Volcano and his report is accompanied by a small hachured map which shows most of the features quite clearly. A model of the volcano inherited from the *Inspección de Minas*, is in the division of mines. It is probable that the model was based on the map or was made at about the same time. Studying the model, which is somewhat clearer than the map, but one defect is found which can not be reconciled with the present features of Taal or be accounted for by subsequent changes. The model shows the crater of the red cone as being broken down on the side toward the green lake. As it now exists, it is broken down to the south and drains around its eastern base to the yellow lake.

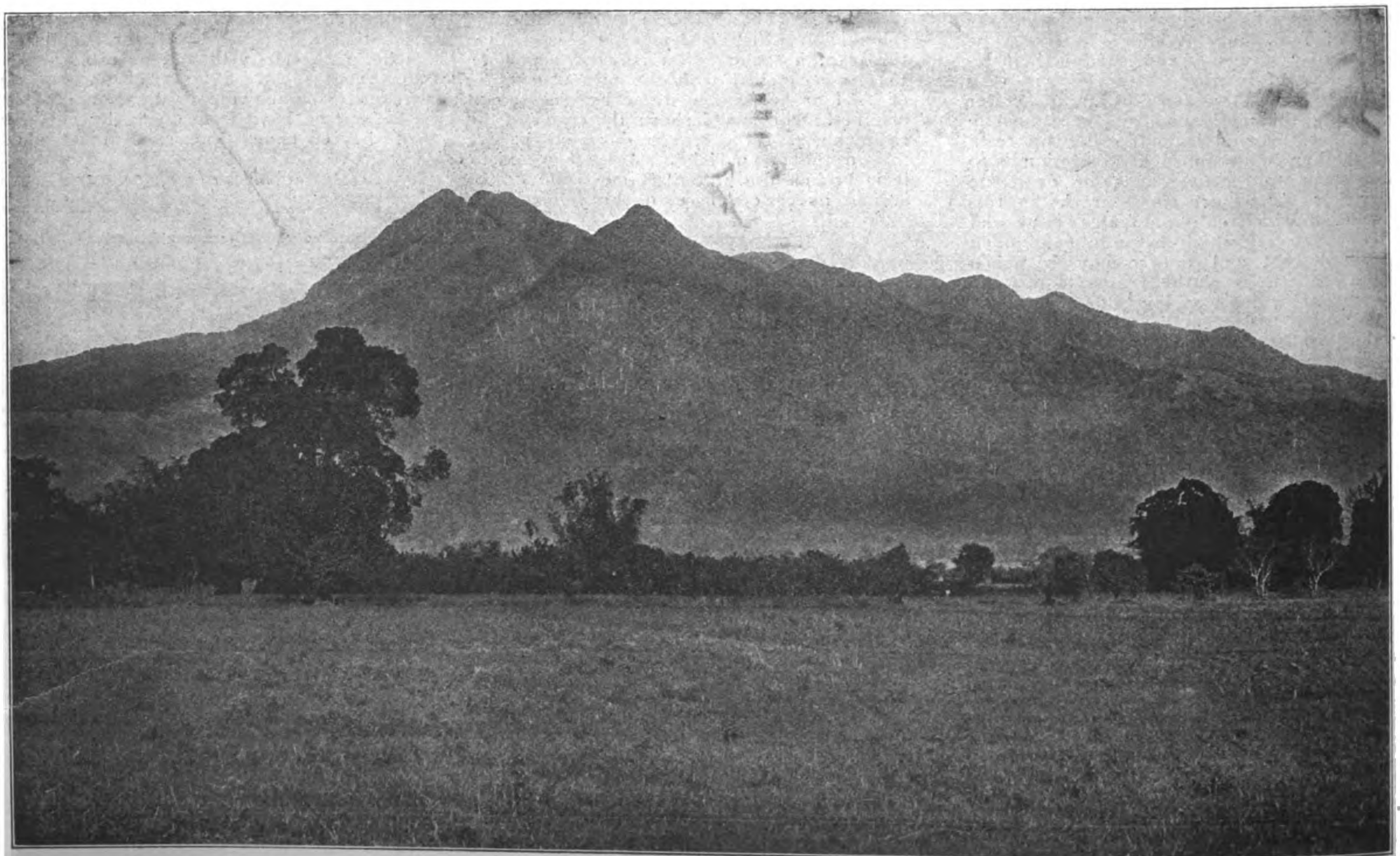
"Making due allowance for the imperfections of the model and map certain changes have taken place since Centeno described the volcano. The green lake has extended its area to the southward and contains a point where there is violent boiling. The neck of the peninsula which extended into it from the east has been eroded, leaving the point as a pyramidal rock or island in the lake. A steam vent and a sulphur dioxide gas vent separated by a distance of about 15 meters and evidently not connected near the surface have formed at the north base of the red cone. The small inactive cones

(Continued on page 322)

FIG. 6.—SKETCH MAP OF THE GEOLOGY AND TOPOGRAPHY OF MOUNT MAQUILING AND THE SURROUNDING COUNTRY, AS MAPPED BY ABELLA



TAAL VOLCANO AS SEEN FROM BAÑADEROS WHEN THE STEAM RISES IN THE MORNING.



MAQUILING MOUNTAIN AS SEEN FROM THE RAILWAY STATION AT SANTO TOMAS.

THE FAR EASTERN REVIEW

GEO. BRONSON REA, M. E.
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AMERICAN CAPITAL IN THE PHILIPPINES

With one exception it may be said that Philippine development schemes have met with a cold reception from the financial interests of America, and the repeated failures in promoting or financing any project for the Islands is a matter that must receive the serious consideration of the Philippine Commercial Community with a view of improving the condition and eradicating the obstacles. The Islands present opportunities for rapid and profitable development unequalled in the world. The wealth of the tropics is concentrated within their limits. Rich mineral deposits abound, the forests of valuable hard woods are inexhaustible, the sugar lands yield a high average, the hemp monopoly is source of never ending profit, rubber and gutta percha thrive and give handsome returns, but with few exceptions these immense natural resources, after twelve years of American rule, are still worked in the old primitive, wasteful manner which marked the industry of a century ago. It is a severe criticism and reflection on American energy, which permits such untold wealth to remain undeveloped, and is a striking anomaly to American enterprise in Alaska, Hawaii, Porto Rico or Cuba, and a contrast to the methods of Europeans in neighboring countries and Islands. Java is a tropical paradise, and yields immense wealth to the Dutch investors, made possible by the paternal solicitude of the Government. Borneo is forging ahead, and many large enterprises are in successful operation. The story of the industrial development of the Federated Malay States reads like a chapter from a romance, or the Arabian Nights, and rubber kings have supplemented the old time tin millionaires.

Sumatra is famous the world over for its cigar wrappers, and tobacco plantations have spread to neighboring isles. Petroleum abounds, and even Shanghai has its quota of millionaires made rich over night as it were, by the marvellous wells. Indo-Chine is the rice granary of the Orient and exports its products to the Philippines, and Formosa under Japanese rule, contending with adverse climatic conditions, has developed a modern sugar industry, which shames the Philippines and bids fair in time to rival Java. Not one of these countries can compare in natural gifts with the Philippines, yet they progress and prosper, while the Islands fail to keep pace with the procession. It is time for those who have cast their lot with the Islands to face the problem, seriously consider the question, and try to overcome the difficulties surrounding the investment of American capital in the Philippines and divert the stream which flows so freely into other territorial possessions.

The lack of confidence in the Islands may be traced to various sources, each of sufficient importance when considered by themselves to weigh against the investment of capital. First, and most important, is the political phase. The promise of the Government that the Islands will be granted full independence when, in its opinion, the people are educated and prepared for self government, underlies the entire fabric of native politics and gives strength to the anti-imperialists at home. Native politics, stripped of all superfluous verbiage, is reduced to the issues of immediate independence as against following the tutelage of the United States, until its Government is ready to redeem its promise. Every native office holder, elected by the various independence parties, during his term of office makes some play to the gallery to preserve his reputation and insure re-election, and at regular intervals this takes the form of an appeal to America for immediate independence. And the anti-imperialists and democrats at home for political purposes indorse the appeal to embarrass the Republican Administration. The papers seize on it as important news, and keep the issue before an indifferent public, who, after reading, promptly forget that there is such a group of islands as the Philippines. But when someone approaches the investor with a Philippine development scheme, his brain is stirred to action, and forgetting the details, he remembers the essential fact, that the Islands are to be granted Independence someday and he forthwith refuses to entertain any proposition not likely to remain under the flag. And no amount of explanation or argument can shake that fundamental fact. So at the root of all the trouble lies the professed policy of the Government.

Another and more serious aspect of the political phase is the constantly recurring war scares with Japan. About the time an issue of Philippine bonds is offered for sale, or a promoter is striving to interest capital in Insular ventures, the newspapers at home publish some highly important interviews, disclosures or articles by special writers, to the effect that war between America and Japan is inevitable, and as a first step the Philippines will be sacrificed or captured. And the price of the bonds fall in consequence, and the promoter sees the hard work of months disappear, and has to begin all over.

Notwithstanding that no issue exists between Japan and America calling for a break in their friendly relations, and despite the fact that the higher officials of both nations realize the danger of such unprovoked and unnecessary scares, which only excite public opinion and create distrust when none before existed, the "advance agents of Armageddon" return to their obsession, and keep the public mind inflamed. When no legitimate issue or cause for friction can be discerned, along comes a writer who unhesitatingly declares that the genesis of any war between America and Japan will arise out of Manchuria, and then proceeds to prove his conclusions, winding up with the capture of the Philippines by Japan. When the first issue of Philippine railway bonds was on the New York market, and conditions seemed favorable for a successful and profitable flotation, Mr. Millard's articles appeared in a leading *New York Daily*, and their price dropped several points and has never recovered. Again when the market was tranquil, war scares forgotten, and another issue ready for subscription, America was invaded by the English writer "Putnan Weale" who in lectures and articles revived the issues, and told the country that "America must curb Japan."

Why America should assume the sole responsibility for preserving the integrity of China, when all powers are equally interested in maintaining the status quo, is something only writers like Mr. Millard or "Putnan Weale" can explain. And when no definite issue is discernible, the war mongers revert to the supremacy of the Pacific. Some gifted editorial writer, a few years ago, coined the phrase, "Hegomony of the Pacific," and now when all other arguments fail, the Hegomony is duly resurrected, brushed up, and made to do extra duty in explaining why America must defeat Japan. America has survived for over a century, without the Hegomony of the Atlantic or coming in conflict with or disturbing the power that holds this traditional advantage. Why America should go to war to preserve in the Pacific, something she does not possess in the Atlantic, is a point which seems to be overlooked, for the same strategical reasons apply to both Coasts. But these arguments are highly instructive and make fine reading and do no harm—except to the Philippines.

This phase of the situation is therefore serious; and one which the Government and Insular interests are powerless to check.

Another reason why capital is reluctant to enter the Islands for industrial enterprises, is the difficulty of securing an adequate and continuous supply of labor. There is no use in disguising this fact, and deluding ourselves that it does not exist, for it does. Labor exists in the Islands for all practical purposes, but it has to be educated, and forced to recognize the advantages of honest toil. Americans in the Philippines are just commencing to learn what the British and Dutch forgot a century ago—that the Malay won't work. And so long as he can recline in a hammock under the shade of a banana tree and reach up and pluck a meal overhead, or dig a yam or sweet potato out of the ground with his toes, and force his wife to catch a few little fish to mix with his mess of rice, there is little inducement for him to be otherwise. The Dutch solved the problem in Java by compelling them to labor, and in the Malay States the Chinaman has been the mainstay of all industry. This is an another obstacle to the investment of capital in the Islands, and is traceable directly to the altruistic policy of the Government, which says that the land must be preserved for the original inhabitants, and not delivered over to the Chinese and other industrious Oriental laborers. And until Congress modifies its general policy, our only hope lies in the industrial education of the people, and the awakening of them to a realization of the opportunities they are wilfully neglecting.

Another potent factor operating against the investment of American capital in the Islands is the loss of confidence in Insular securities due to their decline in value. When the investor sees Philippine Government 4% Gold bonds decline from 114 to 100 within a few years, he naturally associates this apparent waning of the credit of the Islands with some important political complication, for which the Japanese war bogey and Manchurian nightmares are largely responsible. The Philippine Railway 4% bonds, which are guaranteed, and which sold at 96.5 and interest in 1908, at present have no market at 87. This great decline in values, without any logical cause or disturbance of the Insular credit, is a serious handicap to the further progress of development, for it is quite clear that the holders of these securities have a most unfavorable opinion of investment in the Islands. As these securities are largely held at home and abroad by investors whose influence is of some weight in financial circles, their pessimism has influenced many others against taking up Philippine investments, thus creating a condition that no amount of "boosting" or publicity propaganda can overcome.

This decline in the price of standard government guaranteed bonds to the extent that no market exists for their sale, makes it next to impossible to secure new capital for Philippine enterprises. Here is a situation which must be faced, and some remedy applied to the evil. Nearly all Philippine enterprises in the very nature of things are industrial or construction propositions which limit the market for their securities. The geographical location of the Islands makes it impossible for the average investor to have any accurate knowledge of the actual condition of affairs, or the value of the securities offered, and when he is approached by the promoter to participate in some venture, he naturally turns for guidance and advice to those who are already heavily interested in Insular securities. This rule holds good all over the world, for we find that the enterprises of different countries must be financed by or have the approval of the certain group of bankers who specialize in the securities of the respective countries. All propositions of a special character inevitably find their way directly or indirectly to these financial interests, either for cooperation or indorsement. Investors come to look to them for guidance in investments in these special fields, and refuse to consider any proposition which does not emanate from, or at least have their cooperation. And Philippine investments follow the rule of the world, and have their recognized financial authorities at home, whose cooperation is necessarily vital to the successful flotation of any large enterprise for the Islands.

The bankers and their friends who have been interested in the largest and most important undertakings thus far financed at home, have not only found indifferent success in placing Philippine securities, but have met with loss in their ventures. Not only have they contended with a limited and unsympathetic market, but have had to fight against the unfavorable impression created by the falling prices of the Philippine Government Bonds, and witness their own securities decline far below the prices which they paid for them. And now when new Philippine enterprises are placed on the market, and the investor turns to them for advice, is it reasonable to hope that they will be loud in their praise of the Islands, or that they will feel inclined to take the initiative or cooperate in further financing under present unfavorable conditions?

So we find that the various political phases of the situation have resulted in a material decline in the value of Philippine securities. The bankers and their friends who purchased the bonds are in turn unsympathetic, and their attitude finds reflection among the "men in the street." Many who might consider Philippine Bonds at current prices as a cheap investment, are deterred from purchasing them by the knowledge of the difficulty they would experience in selling, if they should later require the money for other purposes. And we cannot delude ourselves with day dreams or be led astray by the temporary hurrah of a publicity meeting or a successful carnival, for so long as these conditions continue to exist it will be practically impossible to secure adequate support for the numerous enterprises and developments which must be undertaken if we are to witness in the next decade

the material development of the Philippines which all interested are working so hard to bring about.

COMPARISON OF GOVERNMENT BONDS

	%	Average Annual Price 1909.	Present Market Price.	Average Annual Price '09 Reduced to a 3% basis. %	Present Market Price Reduced to a 3% basis. %	Real Interest earned at 1909 average Market Price. %	Real Interest Earned at Present Market Price. %
English Consols.......	2 ½	83.76	79	100.52	94.94	2.98	3.16
Fr. rentes......	3	97.20	97.97 ½	97.20	98.04	3.09	3.06
German Imperial loan..	3 ½	95.11	92.	81.52	78.12	3.68	3.84
German Imperial loan ...	3	81.71	83.	84.71	88.18	3.54	3.61
U. S. Debt......	4	119.11	11[illegible] ¼	106.17	103.53	2.62	2.70
"	2	101.47	100 ¾	118.45	116.72	1.92	1.96
"	3	101.75	100 ¾	101.75	100.75		
Panama.......	2		100 ½		120.27		1.98
Panama....... (1936)	2		100 ½		120.27		

It should be noted that there has been no fundamental change in the intrinsic value of Philippine bonds. The question of whether any remedy can be found for these conditions is one of pressing importance to the commercial interests of the Philippines. Fortunately, we find in the conduct of the United States government finances a parallel and example which seems to offer an adequate solution of the difficulties which confront us here. For many years the United States treasury has been able by a very simple but arbitrary method to sustain the prices of its bonds, advancing them whenever it had any to sell.

The prices of the United States government bonds are not determined by the ordinary investment demand, which supports the interest bearing debt of other countries. The credit of the United States, although admittedly the highest in the world, does not warrant the sale of United States Bonds at prices yielding 2% and less, while British Consols sell on a 3.16% basis and French Rentes on a 3.06 basis, and other absolutely safe investments yield at least twice as large an income.

STANDARD RAILROAD BONDS YIELDING OVER 4%.

	Present Price.
Atchison, Topeka & Santa Fé General 4s......................	98¼
Chicago & North-western General 4s......................	98¾
Reading Co. General 4s............	98
Union Pacific First & Refunding 4s......................	96¾

It is only possible for the United States to borrow money at such low rates because of its national banking system, under which the national banks can issue currency secured by an equal par value of Government Bonds, and through the policy of the United States Government in depositing its surplus funds in national banks and requiring Government bonds as collateral. It is this latter feature which has given the Government in the past a powerful lever on the market for its securities.

Before examining the mechanism of this system it would be well to refer to a few figures. The interest bearing debt of the United States now approximates $913,317,490, of which $696,200,790 bonds or about 76% of the total debt is on deposit at Washington to secure circulating currency; a large proportion, which cannot be estimated exactly, is held by estates and individuals who desire the "safest investment obtainable" no matter what the price. In a general way, the proportion of bonds held to secure currency and for private investment is constant. Between these two classes of holdings there is what may be termed the floating supply.

The surplus funds of the United States are not permitted to lie idle in the treasury but are deposited in the national banks. It is this system of depositing government moneys against suitable collateral which forms the powerful auxiliary to the currency system in regulating the demand for, and the price of, government bonds.

The Secretary of the Treasury has the absolute power of determining what collateral he will accept to secure these deposits. Of course United States bonds are always given the preference, but when the government's deposit with the banks is so large as to cause United States bonds to sell at too high prices he may order the acceptance of other securities as collateral, including territorial, state, municipal and railroad bonds. A few actual operations of the Government will serve to show how this system works in practice.

In 1906, when the first issue of Panama Canal 2% bonds was offered for sale, the then prevailing prices of United States 2% bonds indicated that the Panama bonds would only bring a very small premium as they would undoubtedly sell on a parity with the Consol 2s. The Secretary of the Treasury thereupon issued an order that banks having bonds other than United States government bonds or territorial issues to secure their deposits must substitute for such issues United States government or territorial bonds. The effect of this action upon the market for government issues was instantaneous and advanced their prices so materially that the Panama sale was extremely successful and netted the government a premium of over four points.

A short time after the Panama sale, government deposits increased to such an extent that it was considered reasonable to again accept railroad, state and municipal bonds as collateral. Then came the acute monetary situation which culminated in the panic of 1907. Government deposits with the banks were immediately increased for the purpose of relief to an unprecedented figure, reaching a total of $223,117,082 in December 1907. At that time the prices of United States bonds would of course have been advanced to unusually high levels had not the Secretary of the Treasury accepted state, municipal and railroad bonds as collateral.

The effect of the panic upon the government's income was no less marked than upon the industrial income of the country in general. Imports decreased heavily and the monthly treasury statements showed a rapidly increasing deficit. Consequently it became necessary to withdraw government deposits from national banks. Within a period of seven month sdeposits fell from a total of $223,117,082 to $118,576,923, and by September 1909 had fallen to $35,228,921, which was as abnormally low as the former figure was abnormally high. The rapid withdrawal of deposits resulted in flooding the market with government bonds. This was due to the fact that the banks naturally preferred, as their deposits were reduced, to withdraw and sell their government bonds and leave the state, railroad and municipal securities, which yield twice as much income to secure the balance of their deposits.

Here again the power of the government to sustain the prices of its bonds is illustrated. Secretary Cortelyou, in order to relieve the pressure upon the government's bond market, issued an order requiring banks to release railroad, state and municipal bonds prior to government or territorial issues as their deposits were reduced. The text of this order follows:

"The Treasury Department, when the deposit of public moneys with the various national banks is reduced, will require that bonds other than the following be first withdrawn: United States, Philippine, Philippine Railway, Porto Rican and Hawaiian."

When Mr. MacVeagh became Secretary of the Treasury he reinforced this order by giving notice that thereafter only United States government and territorial bonds would be accepted as security for deposits. The arbitrary power of the government in these matters is best shown by the terms of the ruling, as follows:

"The Secretary of the Treasury today announced, in accordance with the act of Congress approved March 4, 1907, that when further public deposits are made with banks the following named bonds and no others will be accepted as security for such deposits:

"United States, Philippine, Porto Rican and District of Columbia bonds at par: bonds of Hawaiian Territory at 90% of par: bonds of the Philippine Railway at 90% of market value, but not exceeding 90% of par.

"No additional deposits are, however, in contemplation.

"All banks holding deposits of public funds secured by any bonds other than those above named as acceptable will be required to withdraw such bonds on or before February 1, 1910, and substitute therefor bonds desciibed above."

These measures, however, have been of no avail because at the present time government deposits amount to but $36,836,471 and are too small in relation to the floating supply of government bonds to do much towards sustaining their market. This situation is largely due to the use of the government's current receipts to build the Panama Canal. Practically no improvement in the situation can be looked for until the United States treasury is again in funds sufficient to deposit in substantial amounts.

It would be well to point out here that even if the United States government were to make large deposits, accepting the bonds declared to be suitable collateral in the recent order given above, the Philippine securities would not be benefited materially thereby. This would be due to the fact that under this order a bank is given the privilege of choosing between United States and Philippine bonds when selecting the securities to be used as collateral for government deposits. In selecting bonds for this purpose a bank considers first, marketability; second, stability of price; third, opportunity for profit.

United States bonds of course have a wide and active market capable of absorbing with ease the sale of a large amount of bonds at any time. Banks buy them in anticipation of their use as collateral for government deposits. They have shown an excellent record in respect to their prices which are practically unaffected by market conditions, having regard only to their use as security for government deposits and for the issuance of banknote currency. Turning to the Philippine bonds, we find that the purchase by a bank of these issues at present prices would be a much more profitable operation than the purchase of United States government bonds. The difficulty, however, which precludes all possibility of a bank selecting these bonds for this purpose is that they do not have the first two requisites, namely marketability and stability of price.

Having seen how the United States regulates the prices of its securities through the medium of its deposits with the banks, and realizing that practically no assistance can be looked for from that government, it is important to learn how this system could be applied by the Philippine government to the advantage of its own securities.

The means at the disposal of the Philippine government should be effective for this purpose. At the present time the Philippine government has $15,000,000 on deposit with banks in the United States. The total funded debt of the Philippine government, including the Land Purchase and City of Manila bonds, amounts to about $16,000,000, and the bonds which are guaranteed as to interest by the Philippine government to $9,943,000, making a total of $25,943,000 bonds now outstanding.

Of the former it is safe to assume that at least 50% are securely placed in the United States and would not be apt to come into the market. Of the latter probably an equal proportion was placed in Europe by bankers, and the class of European investors who purchased these bonds are notoriously close holders. In short, it is probably a very excessive estimate to say about 50% of the funded obligations of the Philippine government is likely to contribute to the floating supply, and of course, only a small percentage of this amount would be likely to come into the market at any one time. Consequently it will be seen that a moderate amount of purchasing power would be apt to advance very quickly the prices of these securities.

If the Philippine government were to profit by the example of the United States government and give preference to its own securities in naming the collateral acceptable as security for its deposits, the problem of prices for its bonds would be largely solved. It would be well to note here that at the present time only $441,000 Philippine Government and $252,000 interest guaranteed bonds are among the collateral securing the deposit of about $15,000,000 of Philippine funds. This fact proves that a bank will not buy Philippine bonds unless the government requires their use in preference to other securities. It would not be necessary to insist arbitrarily that the only acceptable collateral would be Philippine government or interest guaranteed bonds. It would be sufficient for the Insular Treasurer to require that the deposits be secured preferentially by

(1) Philippine Government bonds.

(2) Bonds guaranteed as to interest by the Philippine Government.

(3) United States Government bonds.

and if necessary a fourth class for other securities could be created. It would then be left to the discretion of the Secretary, as is the case in the United States, to determine when securities other than the first and second classes would be accepted. In this way there would be no injustice in forcing the banks to buy Philippine Government or interest obligations at a time when the prices of such bonds were prohibitive. On the other hand, under normal conditions, a good market would be created for the Philippine bonds and depositaries would use collateral which would yield a materially larger income than United States Government bonds and which as government obligations would represent a stronger security than the railroad bonds accepted at the present time.

The Insular Government now receives 3% interest, which is practically in the nature of a tax upon its deposits. Even if the restriction of the collateral to the advantage of the Philippine securities might necessitate a slight reduction of this rate, this would be fully compensated by the advantages of the plan to the Philippine Government. It may be pointed out that this rate could be lowered substantially and still be larger than the rate received by United States deposits, viz., 1% per annum. There would probably be little difficulty in obtaining an intermediate rate of say 2% on Philippine deposits, owing to the fact that they are of a relatively permanent character, and by placing deposits for definite periods, which would be tacitly understood, although not absolutely agreed to by the Government, the average interest rate should be sustained at a fairly high level without difficulty. In this connection it should be noted that Philippine bonds would yield the banks a higher income than the United States bonds held by depositaries for United States Government funds.

The advantages accruing from this plan would be four-fold:

First: The prices of the Philippine obligations now outstanding would be advanced to their former levels, which would give a distinctly better tone to the credit of the Philippine Government, and when it becomes necessary to issue additional bonds their sale would be assured at a good price. A bill to authorize $5,000,000 additional bonds has already passed the Senate, which makes this a very important matter.

Second: The very favorable sentiment created by a recovery in the prices of Philippine securities would be of pronounced assistance in placing bonds to which the Government may give its guarantee as to interest for the construction of additional railway lines. The Government has been given the right to guarantee the payment of interest on a total of $30,000,000 4% bonds, but at the present time guarantees the interest on only $9,943,000 of bonds. Under the plan proposed this guaranty would insure the successful financing of any enterprises thus favored by the Government.

Third: A market would be created for the securities of Philippine industrial enterprises. It is of utmost importance to the development of the resources of these Islands that it should be possible to obtain American capital for Philippine enterprises. Under the proposed plan the present floating supply of Philippine securities would be permanently cleared out of the market. With the market improved through the removal of these bonds and through the effect of their higher prices it would be possible to finance new Philippine industrial enterprises under the most favorable conditions.

Fourth: There would be a direct advantage to the Philippine Government which has invested funds of the Postal Savings Bank and the Philippine Government's sinking funds in the Philippine Railway Company interest-guaranteed First Mortgage 4% Bonds. These bonds, which were originally purchased at various prices ranging between 96 and the present market, and which are now quoted at about 86 to 88, would unquestionably find their former levels, which would result in a substantial increase in the market value of the Government's investment.

In conclusion, it is apparent that the Philippine Government should employ these most effective means to support its own credit and thereby remove the conditions which at present prove to be an unsurmountable barrier against the investment of American capital in these Islands.

THE TWIN SCREW MOTOR LAUNCH "SUMATRA"

MOTOR LAUNCH "SUMATRA" BUILT BY THE VULCAN IRON WORKS LD. OF SHANGHAI, FOR THE ASIATIC PETROLEUM CO. LD.—DIMENSIONS, LENGTH 66'-0" OVERALL, BREADTH 11'-0", DEPTH 5'-3", DRAUGHT 4'-3".

The twin screw motor launch "Sumatra" built by the Vulcan Ironworks, Ltd., of Shanghai for the Asiatic Petroleum Co., Ltd., is constructed of steel plates and angles of light scantlings suitable for the work, the lines are fine and very easy, the decks are laid with best selected teak. The planks are narrow giving a handsome appearance. The main accommodation of foreign passengers is placed forward and can seat 10 persons comfortably. A small toilet room opening off the saloon affords a convenience rarely found in launches of this size but one appreciated by passengers. Access is gained to the saloon by two entrances, one forward and one aft, this will give a through draught of air in hot weather and is also advantageous in case of accident as it will rarely happen that both doors would be blocked at one time, a state of affairs always possible when there is only one entrance. The saloon is neatly upholstered in rexine and linoleum with the teakwood highly polished.

A wheelhouse is placed amidships with steering gear and a reply telegraph connected with the motor room. The usual gong and jingle has been abandoned as being unsafe with twin engines. Abaft the wheelhouse a room has been provided for Chinese passengers.

The motors which are placed just abaft midships are Gardner motors manufactured by Messrs Norris & Hently, England. They are rated to develop 50 brake horse power each on a very low consumption of kerosine. As they are started with this fuel, no petrol is required, thus eliminating the danger from the presence of that highly inflammable fuel on the vessel with the consequent anxiety to the owners. A further advantage is that as kerosine can be obtained locally all over China there is no probability of the boat being "hung up" miles from home for want of fuel. The lamps for heating the vaporizers are noiseless, being of a special construction.

Accommodation is provided for a Chinese crew of five aft decks at bow and stern in quarters roomy and clear of obstructions.

Taken as a whole the launch has a highly pleasing appearance combining grace and adaptability. The "lines" are specially designed to afford quick maneuvering capabilities, a feature which is highly necessary in the crowded waters of the Whangpoo.

In the yard, among other works under construction is a large pontoon, 225' x 30' x 6'-0", the contract for which was signed on the 20th of December last. The bottom is laid, frames and beams are in place and part of the side plating in position. It is proposed to launch this pontoon this month, and give complete delivery including mooring in place, before China New Year. Two steel pontoons 60' x 15' x 4' 9" were lately constructed and delivered complete in 18 days. These performances speak for themselves and require no comment at our hands.

MOTOR LAUNCH "PONG FEE"

This launch was built for the Asiatic Petroleum Co., Ltd., by a Chinese boat builder to the design of Mr. F. O. Reynolds, Resident Engineer to the Company, for ferry work on the river at Newchwang.

Its dimensions follow: Length, 36'-0"; Beam, 8'-0"; Mld. Dept. 4'-10"; Draft, 3'-10". The "Pong Fee" is constructed of teak and is very strong and substantial throughout. It is engined with one 30 B.H.P. kerosene oil "Kelvin" Motor which gives her a speed of 9½ miles per hour. This launch will run for two hours at full speed on one tin of ordinary kerosene oil. The cost of this launch complete and ready for work was $4000. In the designing of the "Pong Fee" special attention was paid to producing a boat that could go out in rough seas and during cold weather. The high bow forward, which contains the crew's quarters enables the boat to keep dry in a choppy sea such as is experienced in a river where strong tides and winds prevail. The cockpit aft gives open but sheltered accommodation to the passengers. The steersman is also well sheltered in the pilot-house amidships.

BRITISH AND FOREIGN SHIPPING FOR 1910.

A review of the annual report of Lloyd's Register of British and Foreign Shipping for the year ended June 30, 1910, shows new tonnage classed by the society during the year of an aggregate of 929 946 an increase of 64 962 tons over 1908-09 which was the lowest registry of new vessels recorded during the decade. The year 1906-07 was the banner year with 1,484,722 tons to its credit. This evidences renewed activity which may continue until the usual over a million tons annually are resumed.

The year 1909-10 indicated a marked falling off in sailing craft classed the total being 6,243 tons as against 9,265 in the previous year and as against 26,916 tons in 1900-01. The lowest year's register during the decade was 4,066 tons in 1905-06

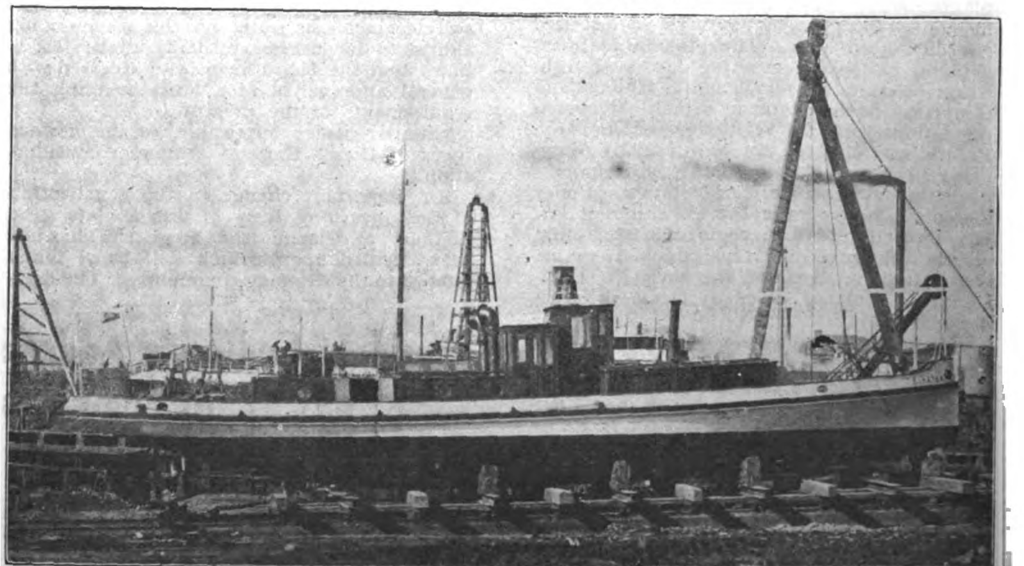
For the year the total number of vessels classed by the society was 540 of which 461 were steamers and 79 sailing ships. Of these 66% were built for the United Kingdom and 34% for the British colonies and foreign countries.

The total number of merchant vessels registered at the close of the year were 10,302 with an aggregate tonnage of 20,500,000. These may be divided into iron and steel and wood and wood and composite as follows:

Iron and steel: Steam—British 6,081, tonnage 12,346,171; Foreign 2.911, tonnage 6,436,-533; total 8.992. tonnage 18.782. Sail—British, 430, tonnage 691,287 Foreign, 702, tonnage, 1,034.547; total, 1,132 tonnage, 1,725 834.

Wood and Composite: Steam and Sail—British, 169. tonnage, 23.704; Foreign, 9, tonnage 3,241; total 178, tonnage, 26.945.

The revised rules which were put in effect July 1, 1909, after careful consideration and investigation into the requirements of the shipping trade have given satisfaction both in the United Kingdom and abroad. The Secretary says:



THE LAUNCH "SUMATRA" ON THE WAYS

"While maintaining the Society's high standard of efficiency, the Rules are adapted to provide for vessels designed to meet all the varied requirements of the world's shipping trade".

Since these new rules were promulgated approval has been given plans for the construction of vessels aggregating nearly 2,000,000 tons.

A large measure of space is devoted by Secretary Scott to consideration of rules governing internal combustion engines, the use of which is assuming large proportions in other than yachts and small craft. With reference to these engines the following interesting excerpt from the report is of special interest:

One feature of the year was the registration of 34 steamers of upwards of 5,000 tons in the 100 A-1 class of which two were owned by the Union-Castle Mail Steamship Co. Ltd. of 13,361 and 13,326 tons and the Orvieto 12,130, and Otranto, 12,124 tons for the Orient Steam Nav. Co. Ltd. Two vessels, the Franconia and Laconia, of about 19,000 tons each, of the Cunard line are included in this over 10,000 ton class referred to. Of the different types building subject to Lloyd's are an oil steamer for the British Admiralty, a screw steamer for the Canadian government, a dredger each for the Australian and United States Government, the last for the Panama canal works.

Plans submitted for new vessels included 720 of steel, 58 of wood and four composite, in all 782 vessels, an increase of 34% over the previous year. During 1909-10, 759 987 tons of ship and boiler steel were tested by the surveyors of the society, an increase of 282,474 tons over 1908 09.

Statistics show 72 steel manufacturers in the United Kingdom and 164 abroad recognized by the committee for the production of steel and machinery for ship construction.

Reference is especially made in the report to the classification of the vessels plying on the Great Lakes. During the year an investigation was under way under the direction of Mr. Buchanan, Principal Assistant to the Chief Ship Surveyor, and a draft of proposed rules are now under consideration. One vessel 600 feet in length is being constructed under Lloyd's survey for these waters and plans for others have been approved. A Senior Ship Surveyor has been stationed at Cleveland, Ohio.

Including Cleveland there are now 60 Exclusive Surveyors representing the Society in the different ports outside Great Britain.

The testing of chain cables manufactured by annular process is now arranged for under the provisions of the Anchor and Chain Cables Act. In all 304.505 fathoms of chain cables and 6,843 anchors were tested at the Public Proving Houses of Great Britain and in all there are 21 testing machines throughout Europe and 19 in the United States recognized by the society.

Cargo vessels equipped with refrigerating plants holding Lloyd's R. M. C. have increased in number to 128 and 677 surveys were carried out during the year. The proposal for international agreement covering load line regulation received encouragement. Holland and Denmark have adopted British freeboard regulations, and the regulations of Germany, France and Holland are now formally recognized in Great Britain. Other governments have the subject under consideration. Under the provisions of the French shipping law Lloyd's certificates are recognized as exempting vessels from government inspection. The same recognition is accorded the society's certificates in Norway, Sweden, Denmark, Russia and Spain.

The installation of wireless and submarine signal apparatus has been marked during the year, the Society's Register containing reference to 702 vessels equipped with the former and 459 with the latter.

The largest yacht constructed during the year was the steel schooner Westward of 300 tons, the first built under the international rating class in America for racing. During the year eight scholarships granted by the Society were taken up as follows: Three in naval architecture at Glasgow University; three in naval architecture at Armstrong College, Newcastle-on-tyne, and two in marine engineering in connection with the Institute of Marine Engineers.

"The use of Internal Combustion Engines for marine purposes has hitherto been confined to small vessels and yachts, but the possibility of the use of this description of engine as the motive power of large vessels is now becoming a question of immediate and practical importance.

"The Internal Combustion Engines in most general use on land and also those fitted in small vessels are worked upon the 4-stroke cycle principle, and are single-acting, so that with each cylinder there is only one impulse for two revolutions of the shaft. With this type of engine there is considerable difficulty in effecting the reversal of the direction of rotation of the engine, and when these engines are used for marine purposes the astern motion of the screw has usually been obtained by the use of toothed wheel gearing.

"Comparatively recently there has been a development in the Diesel Oil Engine for marine work. A 2-stroke cycle has been successfully adopted, and the reversal is effected in the engine itself, the crank shaft being directly coupled to the screw shaft. The Diesel Oil Engine is now being fitted to three fairly large vessels being built on the Continent under the supervision of the Surveyors to Lloyd's Register. One set is being constructed on the older principle of the 4-stroke cycle with single-acting cylinders, and will be of about 450 I. H. P. Another set is being made on the 2-stroke cycle, also single-acting, and is intended for a twin screw vessel, the power being about 900 I. H. P. on each shaft. The third set is being made on the 2-stroke cycle double-acting system, each cylinder providing two impulses per revolution; this also will be fitted in a twin screw vessel, the total power being about 1800 I. H. P. In each of these cases the engines will be directly coupled to the screw shafts.

"In a set of Internal Combustion Engines, which is being constructed under the Society's survey in this country for a vessel of about 260 tons, there are several novel features. The engines are intended to work with gas produced on board from anthracite coal. The cylinders are of comparatively small size, and the engines are intended to run at a high rate of revolution, and will not be reversible. The connection with the screw shaft will be made by means of a hydrodynamic transformer in which a turbine coupled directly to the screw shaft. The arrangement is such that the screw shaft will rotate at a much less rate of speed than the engines, and provision is also made for reversing its direction of rotation.

"The experience which will be obtained from these four applications of the Internal Combustion Engine is being looked forward to with great interest and will provide data of extreme value.

"During the past year Rules have been adopted by the Society for the Survey of Internal Combustion Engines using petrol or paraffin fuel; and whilst the Committee realize that they must look forward to modifications and developments in these Rules as experience shows to be necessary; it is gratifying to know that the Rules have been received with general approval as very fairly meeting the requirements of the present time.

"Similar Rules applicable to the various types of Diesel Engines are under consideration."

An important change in the constitution of the governing body of this Society (the "father" of Classification Registries) has just been decided upon, which will be of much interest to the shipping community. The decision in question, which has not yet been carried into effect, is to give direct representation to Shipbuilders and Engineers.

The Society, which, we may remind our readers, was established on its present basis so long ago as 1834, has up to the present been under the control of a Committee composed of Shipowners, Underwriters, and Merchants elected by public bodies in London and the other great shipping ports of the United Kingdom. In those earliest days of the survey and classification of shipping, it was thought with some reason that a Committee so composed was fully representative of all the interests concerned. The rapid growth of great shipbuilding yards and engineering works, forming as they have done what are practically universities of naval architecture and marine engineering, introduced, however, a new factor in the world of shipping, and the Committee felt that the usefulness of the Society would be greatly enhanced if the scientific knowledge and practical experience which had contributed so largely to the building up of these enterprises could be enlisted in its service. Accordingly, in 1890, a Consultative Committee was formed, elected by the principal British technical institutions, of gentlemen whose ability and attainments entitle them to be ranked among the foremost authorities on everything pertaining to the technical side of the Society's work.

Mr. Devitt, the Chairman of Lloyd's Register, in his speech at a recent meeting, referred to the valuable work which the Technical Committee, thus brought into existence, had done for the Society. Since its formation, it had considered and reported upon every proposal for the various amendments which had been made in the Society's Rules, and not one of these alterations had been carried into effect without first receiving its approval. He wished to express on behalf of the General Committee their appreciation of the high value of the services rendered in this way by the Members of the Technical Committee, particularly in the consideration of the Society's new Rules which were published in July, 1909, and embodied the results of the most advanced theory and practice in shipbuilding and marine engineering. The general approval accorded to these Rules was sufficiently evidenced by the fact that since their introduction the plans of over a thousand vessels, amounting to 2½ million tons of shipping, had been submitted and passed with a view to the classification of the vessels in Lloyd's Register. The Committee had recently given their earnest consideration to the question of a more direct representation of the shipbuilding and engineering interests, and he was pleased to say that a definite conclusion on the subject would be shortly arrived at.

The decision thus foreshadowed by Mr. Devitt was come to at a Meeting of the Committee on the 15th instant.

The world-wide operations of Lloyd's Register, which has placed the hall-mark of its classification on nearly 21 million tons of the shipping now in existence, of which over 7½ million tons represent foreign ships, render it of the highest importance that the governing body of the Society should be representative of every interest and of the latest progress in the mercantile marine world. It is therefore matter for congratulation that it has, in this decision to broaden its base, furnished fresh evidence of the large and catholic policy which has enabled it to render in the past such valuable services to the shipping community.

President Godfrey's Address Before the Shanghai Society of Engineers and Architects

"I think it is certain that the change will come sooner or later—I mean that the British and American Governments will be compelled to legislate for revision of their systems of Measures and Weights, and fall in line with other nations.

"In a cosmopolitan community like ours in Shanghai, with a population of seventeen of nationalities other than Chinese, it should not be so difficult to introduce the change, particularly as the greater number of them already work on the Metric System. It is not really a difficult matter to bring oneself to think and work in metrics concurrently with our own ponderous systems of measures and weights, and once one gets into the Metric System, he will be only too glad to forget all about the others.

"The question of currency and coinage is perhaps somewhat outside our province, although standards of measure and weight have considerable bearing thereon."

With the above striking paragraphs, Chas. Henry Godfrey, Assoc. M. Inst. C. E., Mu- nicipal Engineer and Surveyor of Shanghai, concluded an able address before the Shanghai Society of Engineers and Architects in No- vember, when Mr. Godfrey was elected pres- ident of the society. They closed an in- telligent discussion of the desirability of adopting the metric system of weights and measures in Shanghai, in which he pointed out the advantages of the decimal system and the necessity of proceeding slowly and intelligently. In this regard he said:

"Changes such as I refer to cannot be brought about in a day nor a year; they must be brought about in the first place by a gradual, very gradual, means working up to time when with the least possible incon- venience the final step may be taken." Seeking a simile to more effectually demonstrate his point, Mr. Godfrey quoted from the memorandum of Chief Engineer Cole, of the Mutual Telephone Co., covering the transfer of the local exchange from one building to another involving service to 4,400 subscribers which necessitated months of preparation and organization to effect with the minimum of inconvenience. For a time all the lines were connected to the two switchboards, the old and the new and when the hour arrived to take up service at the new exchange, the lines were gradually disconnected in the street from the old switchboard and the new connections made permanent. So it should be in superseding the old British and American standards by the more modern and convenient metric scale.

Referring to the growth of sentiment favoring concessions in Great Britain, Mr. Godfrey mentioned that Kynochs of Birmingham was now prepared to execute orders in either British or International Standard Measures. The speaker made reference to the attitude of China towards the ultimate adoption of the metric system and said "We know that reforms in China are not quickly brought about, but it does not follow that on this account, if we are satisfied that the adoption by China of the International standards would be of general benefit, we should not do what we can in securing their adoption".

After giving examples of simple subtraction covering a difference of one inch in lineal and square measure with its cumbersome time consuming process, and comparing them with a similar example using Chinese Land Measure worked on decimal lines, he said:

"Now, bearing these examples in mind, I think we may ask ourselves whether British and Americans here or elsewhere are not lagging behind on at least one point when we should be setting an example to China generally.

"Are we to continue in our old fashioned methods and to try to convince the Chinese that our standards are right, or are we to stand by and see China give us a lead in adopting the standards of other countries? If China is blind to reform it cannot be led by those who are equally or more so, and I leave it a question for future discussion as to whether Great Britain and America should not join hands with the advocates of the Metric System, when the question comes to be taken up, as there is every prospect that it will be in the near future. As a local paper said recently—'It would be a grim piece of humour if China were to wake up and set Great Britain and the United States an example in this regard.' As far as we in Shanghai are concerned I think that a great deal can be done. We don't know what we can do till we try. I can quote at least one great engineering firm, Kynochs in Birmingham, which is prepared to execute orders in either British or International Standard Measures. If this can be done in Birmingham, the workshop of the world—perhaps as conservative a town as may be found in England, at any rate as far as politics are concerned—it can be done in Shanghai where we have people from almost every country under the sun, and with the exception of Great Britain, America and to a certain extent Russia—brought up to deal in decimal and metric units. Lord Kelvin said that he could not get through his laboratory work if he had to deal with British units, and I do not hesitate to say that most of our greatest scientists, if not all, will endorse his views."

He quoted from the resolutions of the Federation of Master Cotton Spinners Association published in the *North China Daily News* to show how the desirability of the decimal system appealed to that body. In effect the resolution provided that in quoting prices all interested in cotton transactions be urged to express all fractions of a penny in hundredths instead of vulgar fractions and that on and after a certain date no contracts were to be expressed in tons, hundredweights and quarters but in 100 lbs. or multiples thereof.

Mr. Godfrey also made a strong appeal to the members for their active interest in providing technical and professional education and especially having reference to engineering and architecture in Shanghai. He reviewed the experience of young men starting on an Eastern career and the lack of facilities to keep from growing rusty after he has added years of apprenticeship to his theoretical training. Of his position with regard to this question, we quote:

"An engineer or an architect must always be a student to keep abreast of the times; it is difficult enough at home but it is infinitely more so in the East. At home, to a certain extent, one may unconsciously be acquiring information on new problems and methods from being brought into every day contact with men who have fresh knowledge to impart, the daily press, the best technical magazines, and the latest works on special subjects can be consulted free. Conditions in the East are very different. We have to make the best of our own company and to take advantage of whatever technical information we can gather from papers to which we subscribe ourselves, or which we can borrow from others. I do not mean to say that, as a rule, we are groping along in serious ignorance of the march of events, but I do say, and I say it emphatically, that there is room for more concerted action in the matter of keeping ourselves up-to date.

"At the present time serious efforts are being put forth to establish two new Universities in the East, one at Hongkong and another at Hankow. In advocating the Hongkong University scheme Sir Frederick Lugard said that it will be kept free from the baneful influence of Chinese officialdom, and the University curriculum will be carried on in the English language. On the other hand, Lord William Cecil's scheme for the establishment of a University for Central China provides that the Chinese (mandarin) language is to be adopted. The main difference is that one university will be a secular one and the other unsecular. This, however, has nothing to do with my address this evening. I only wish to refer to the technical—the engineering and architectural side of the question. Assuming that both these Universities will become accomplished facts in a very short time—as we must all hope they will—we in Shanghai will have to see to it that the magnetising influence of two such institutions does not jeopardise our position here.

"The recent discussion on these two new University schemes in the East leads one to suggest that Shanghai, situated as it is at about even distances from either, and moreover at the very gate of the Chinese Empire, would not be the natural site for a technical school, physical laboratory and technical library. I make the suggestion for what it may be considered to be worth, but I think it is one which might be taken up by some of the engineering companies and firms in Shanghai."

Mr. Godfrey's presidential address marked the conclusion of the tenth milestone of the society which had developed from an initial membership of 40 in 1901 to 143 in 1910. In assuming the chair for the evening President Godfrey reviewed the history of the Society and pointed out that its success was due to the interest taken by its members in the contribution and discussion of papers of very high merit and he hoped that this interest would continue. Throughout his address, great interest was taken by the members and general appreciation of the importance of the subjects dealt with, was manifest.

The Present Status of Mining in the Philippines

By Russel Y. Hanlon*, E.M.C.E.

So far, in the development of the dredging industry in the Philippine Islands, only two districts have been exploited to any extent, namely: the Paracale District on the South-East coast of the island of Luzon, and the Nueva Ecija about 80 miles North and to the East of Manila.

In the Paracale District dredging has been carried on in a desultory fashion for the past four years, first with a New Zealand dredge of doubtful age and antiquated design, and later with two New Zealand and one Risdon dredge. The first dredge from New Zealand was renewed within the past year.

The returns from these machines to date have not been satisfactory mainly due to the fact that the machines were not designed to handle ground of the character upon which they have been working, but also to the fact that more attention has been paid to the purely mechanical part of dredging than to the metallurgic problems envolved.

At present only one of these dredges is using mercury in the sluices and this improvement was instituted but very recently. Another dredge is using one large sluice directly from the bucket hopper and relies solely upon the water flowing through the sluice to break up the clay in the deposit and to save the values. As a result, the clay carries off practically all the fine gold and an unwarranted percentage of the remainder. The actual extraction upon this dredge probably does not exceed 50%. Upon the dredge operating at the mouth of the Paracale River, a very fair system of sluices is in vogue, but this ground has an overburden of from 20 to 30 feet of sticky loam and vegetable decomposition. With a headline dredge it is practically impossible to avoid mixing this super-soil with the bottom pay gravel, consequently, a large proportion of the salvable gold is carried into the tailings.

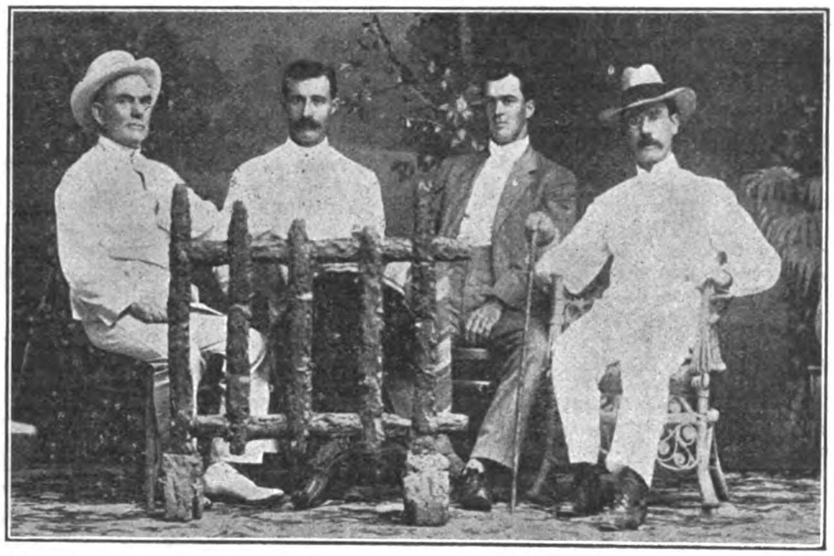
All of these dredges are equipped with loose connected or link bucket lines which detracts at least 30% from their digging capacity and possess no advantage in ground of the character found in that district. The Paracale District should have large capacity, 7½ or 8½ cubic foot dredges, equipped with spuds in order that the top strata might be run through independent of the lower gold bearing gravels. Further more, the various interests at present engaged, or about to engage, in dredging in the district should consolidate their holdings and operate under one head, thus effecting a large saving in operating cost and a central machine shop and foundry could be erected to cover the entire field of some 1500 acres.

A large portion of the alluvial deposit is covered with a thick growth of manglar timber which far from detracting from the value of the property, I should consider an asset as the wood when dried makes excellent fuel and for this purpose would more than cover the cost of clearing it from the land. The disadvantages of the district are poor transportation facilities, distance from any large base of supplies, and clay or guluto in the top strata. The first two of these could be greatly alleviated by the amalgamation above suggested and the last named may be greatly nullified by designing machinery to fit the ground under consideration. Another and an important phase of the situation in retarding the development of Paracale District has been the near sighted policy of the claim holders in refusing to grant to capital its proper share in the ground. In these days it is difficult to induce capital to invest in dredging propositions in remote places unless a concession of at least 75% of the property is vested in the people furnishing the capital. In only one or two instances has such a concession been made by ground holders in the district.

* Graduate of Yale University, class '01; actively identified with the mining industry since graduation on the Pacific Coast and later with the Oriental Consolidated and other mining interests in Korea.

However, a consolidation scheme is on foot which bids fair to rectify all present and past mistakes and put the district on its proper level as a successful dredging field, as the main factor in dredging, the gold itself, is undoubtedly there in paying quantities.

The Nueva Ecija District is in the formative state at present, but possesses two of the most important characteristics necessary to successful dredging of low grade deposits, i. e., good transportation facilities and excellent hydro-electric sites. Properly exploited and managed ground containing 15 cents gold per cubic yard should yield a good dividend and if the lower gravel afford as good results as the surface indications would lead one to believe, a field of several thousand acres should be developed in a few years' time. Some parts of this district have shown good returns, but as compared to the total alluvial area, the district remains practically a virgin field.



FROM LEFT TO RIGHT: MR. BAGG, REPRESENTING AUSTRALIAN CAPITAL; MR. BRUCE, OPERATOR PARACALE DREDGE; MR. RUSSEL V. HANLON, MINING ENGINEER, AND MR. JAMES PEARSON, PROMINENT NEW ZEALAND MINING MAN INTERESTED IN PARACALE.

The gravel is a good clean wash, free from clay or cementing material over a soft, easily dug bedrock and practically free from large boulders.

A New Zealand company has acquired an option upon about 1500 acres and is about to begin systematic prospecting but, to date, this is the only company that has commenced development along consistent lines. If the values are proven to be in the deposit, it will be an ideal district for large dredges of the Fulsom California type operated by electricity, and is capable of being worked at a very low per cubic yard cost.

More or less preliminary prospecting is being done in several parts of the islands, notably on the East coast of Luzon, on Mindoro, and Mindanao, but as yet, very little data is available upon which to base an opinion. There are apparently many streams in the islands containing gold, but it remains to be proven whether they are dredgable or merely small shallow deposits.

All branches of mining in the Philippines are of course handicapped by reason of their distance from the source of capital available for their development, the local supply for this class of work being necessarily comparatively small, but no good property need remain long idle if the owners will meet capital half way and refrain from placing a valuation on their property far in excess of the ore in sight or the profits to be derived from the land. Heretofore, immediately upon the arrival of an engineer representing capital, prices of options, participations, etc., have soared to high heavens and the engineer has returned to his principals thoroughly disgusted, and with his hammer out against the whole archipelago.

Lurid exploitation and moves bordering upon sharp practice sometimes termed "high finance" have also been responsible to a certain extent in retarding the development of the mining interests in the islands. Certain companies have been formed locally upon claims or groups of claims almost, or entirely, undeveloped and the funds derived from selling such stock have been frittered away in futile, aimless work, often by men who know no more in regard to the nature of the work that they were undertaking than a babe in arms. I have in mind one such company recently formed, the officers and directors in which, presumably acting absolutely in good faith towards the stockholders and the general public, have a man upon the properties, who incidentally is the owner of some of the claims, which are spread over an area of some 200 square miles, supervising the expenditure of the funds, who is no more capable of undertaking such a piece of work than I am of operating an aeroplane. Consequently, the funds are being scattered to the four winds instead of being expended in work concentrated upon one or two promising properties.

Apparently, it has never occurred to the majority of promoting and developing companies that the cheapest and wisest course is to employ a competent engineer to report upon their holdings and advise as to the best methods, if any, to be employed in developing the claims and in directing the disbursements.

There is undoubtedly a future for mining here. The present stagnation and the failures of the past have been due principally to one or all of the causes enumerated above but several companies are, and have been operating upon correct lines, and these certainly deserve credit. Others are gradually falling in line, and the next year or two should find several of them paying substantial dividends. The experience and precedents of the past few years of building mills upon a mere prospect and dredges upon untested ground, have proven so costly that few are likely to tempt Providence to such an extent in the future. Fancy exploitation will die a natural death as soon as people learn that there are reputable businesslike companies operating in which they may invest their money.

Many are sceptical in regard to the political situation in the archipelago, but from what I can gather from reputable sources there is not the remotest possibility of any change for decades and every dollar of outside capital invested strengthens the present status.

REVIEWS.

The International Relations of the Chinese Empire, by Hosea Ballou Morse, issued by Messrs. Kelly and Walsh, Limited, has reached our desk. This volume may be said to be the most complete review of Chinese international relations during the period intervening between 1834 and 1856, generally overlooked by casual writers who have been inclined to devote space to the more striking events. Uncovering his motive for the exhaustive work, the author explains:

"Writers of all classes have been impelled to make much of salient and picturesque events, such as the imprisonment of the foreign merchants and the seizure of the opium in 1839, and the episode of the lorcha Arrow in 1856, and to make but passing reference to humdrum events of the intervening years."

The author's special purpose therefore is to cover all the events of importance during this period in a comprehensive manner, and this he has done in twenty-six chapters with citations from official records, and with appendices covering negotiations and correspondence, etc., between the representatives of foreign powers and the Chinese Government. Maps and illustrations are included. This volume will be welcomed by every student of Chinese history.

Practical Stamp Mining and Amalgamation, by H. W. MacFarren, has been issued from the press of the Mining and Scientific Press, San Francisco, and the Mining Magazine, London, and the purpose of the writer is to present the result of his own practical experiences, together with that of other millmen and metallurgists in a wide field of activity. The volume comprises ten chapters of most valuable information to the practical mining man and should receive a warm welcome among those active in the industry. Price $2.00. Postpaid.

Testing for Metallurgical Purposes, by James A. Barr, from the presses of the Mining and Scientific Press, San Francisco, and the Mining Magazine, London, is a compilation of notes on experiments made in the laboratories of the Michigan University, and covers a wide field of experience in this line of work. It will be found of practical value not only to the student but to the mining engineer. Price $2.00. Postpaid.

THE TAAL DISASTER

(Continued from page 313)

G and H of Centeno's description have been largely obliterated by erosion. The active cone which was described as being about 15 meters high, quite perfect and the point of most activity, giving off great masses of water and vapor, is now broken down, but there are some vents in the remnants of its walls. The inactive small cone F of his description has disappeared.

In 1904 Taal was reported to be in eruption and many people visited it then and photographed it. Dean C. Worcester, Secretary of the Interior, has some good negatives taken during this active period and they furnish a better idea than descriptions of what took place during July, which, stated briefly, was as follows.

"Besides giving off a greater amount of steam and sulphurous vapors at all points where such actions had usually occurred, the new crater formed in 1904 sent up great columns of vapor and intermittently ejected mud and stones to a height of at least 150 meters. The activity of this crater soon diminished and in December, 1905, its floor was covered by a boiling lake. In March, 1907, the lake had disappeared. The crater now contains some hot mud spots which are in a state of very moderate agitation and give off but little steam and gas. The temporary red lake in the southeastern part of the main crater floor seems to have first been mentioned during the eruption of 1904.*

"*Historic eruptions of Taal.*—The following summary of the historic eruptions of Taal is taken from Centeno's monograph published in 1882. At the time of the Spanish conquest, according to various ancient documents, the place of activity of Taal (or perhaps better, a place of activity) was on the northwestern point of the island in a small cone, Bininting Malaqni. There are no records of eruption from it, but in 1880, when it was visited by Centeno there were some small vents of vapor and gas in its crater and one on the southeast border of its rim. There are now some similar phenomena at this cone, but of diminished importance.

"In 1680 Taal is described as having occasional eruptions which destroyed many fields on the island. At that time there were two vents, one of sulphur and the other of green water. They are interpreted as being the yellow and green lakes which exist to-day.

"In 1709 1715 eruptions produced some damage on the island.

"In 1716 there was an eruption accompanied by earthquakes, and a disturbance in Taal Lake between the island and Mount Macalod. The waters of the lake were so agitated that waves cut away the outer shore of the lake, injuring the *convento* at Taal which was then situated on its border. There are some sunken rocks in the lake between the volcano and Mount Macalod, but whether or not they originated at the time of this eruption is not known.

"In 1731 there was an eruption in Taal Lake east of the island, forming a new island the larger part of which subsided, leaving remnants which are known as Bubuing and Napayong Islands.

"In 1749 a violet eruption began on August 6 and continued about three weeks. Some settlements near the shores of the lake suffered damage from the seismic disturbances and falling ashes. There were no flows of lava, but incandescent stones were thrown out. Eruptions took place in the lake to the north and east of the island.

"In 1754 the greatest historical eruption took place, lasting from May until December. The towns of Sala, Lipa, Tanauan and Taal, then on the border of the lake, were destroyed, and Balayan, Bauan, Batangas, Rosario, Santo Tomas and San Pablo suffered great disasters. The rain of scoria and ashes extended over a much larger area. The surface of the lake was covered with patches of floating pumice and ashes. Incandescent stones were thrown out and fell into the lake. There were, however, no lava flows. Heavy rains descended and the barrio of Balili near Sala was covered with a shower of mud.

"In 1808 there were eruptions of slight intensity which began in February and continued until the end of April, but no damage was done to the inhabitants who, after the disaster of 1749, had returned to settle on the margin of the lake.

"The eruption of 1904 which has already been described was unimportant. It is the first one of which photographs have been published."

*In the article by R. F. Bacon, *Philippine Journal of Science, Sec. A.* (1907) 2. 115, on the "Crater Lakes of Taal Volcano," the yellow lake of Centeno's description is called the boiling crater lake. A temporary lake southeast of the yellow lake is referred to as the yellow lake. Evidently the colors of the lakes vary from time to time.

CONTRACTING NEWS

CONTRACTS AWARDED.—Municipality of Shanghai.—Oil supply 1911.—The following tenders were accepted:

Asiatic Petroleum Co., Ld.

Liquid fuel	at Tl. 0.08¼ per gal.
Petrol	" 0.50* "
Heavy Petroleum	" 0.11 "
Lubricating Oil for steam rollers	" 0.55 "

Carlowitz & Co., agents, Lubricating Oil Import Co., Ld.

Lubricating Oil, light machines	at Tl. 0.32 per gal.
Lubricating Oil, motor cars A	" 1.05 "
Lubricating Oil, motor cars B	" 1.20 "
Heavy mineral axle grease	" 0 4½ per lb.

R. M. Noblston.

Cylinder oil for quarry engines	at Tl. 0.68 per gal.
Crusher oil for quarry engines	" 0 68 "

Vacuum Oil Company.

Leather oil for harness	at Tl. 0.72 per gal.
Axle grease for stone crushers	" 0.07½ per lb.
Lubricating compound for motor cars	" 0.14† "

Standard Oil Company of New York.

Kerosene oil "Devoe's Brilliant"	at Tls. 2.10 per case
Bulk oil	at Tls. 1 50 per 10 gal.

* less $0.025 per gallon rebate and $0.75 refund on 10 gallon drums.

†less 10 per cent discount.

BIDS OPENED—MUNICIPALITY OF MANILA.—Construction Sewer System Luneta Extension. The following bids were opened:

The Manila Construction Company, ₱53 000; Delmar Smith Clinton, ₱59,000; The Atlantic Gulf and Pacific Company, ₱57,000. The work to be completed within six months.

PROPOSALS INVITED

MUNICIPALITY OF SHANGHAI—(a) 21 MILES VULCANIZED COPPER CABLE, (b) 30 MILES BARE COPPER CABLE.—Specifications available at office of the Electrical Engineer Electricity Works, Shanghai.—Tenders must be submitted by noon, March 9, 1911.

DEPARTMENT OF FINANCE, BANGKOK, SIAM.—For purchase of 360 tons of demonetized bronze coins of Siam chiefly atts and two-att pieces, 85 grains and 173 grains respectively. Also comprises proportion of half-att and four att pieces. All coins approximately 95% copper, 4% tin and 1% zinc. Proposal must be expressed in pounds sterling and guarantee that coins must be defaced, cut, chipped or melted by successful bidder. Bids must be addressed Minister of Finance, Bangkok, and marked "Tenders for purchase of old bronze coins" and submitted on or before April 18, 1911.

Sealed proposals in triplicate, subject to the usual conditions, will be received at the office of the Chief Supply Officer, Bureau of Constabulary, Old Oriente Building, Manila, until ten a. m., April 10, 1911, and then opened in the presence of attending bidders, for furnishing the Bureau of Constabulary

35,000 pairs of cotton socks.

Blank proposals may be obtained at the office of the Property Officer, Bureau of Constabulary, Old Oriente Building, Manila.

PROPOSALS FOR FROZEN FRESH BEEF AND MUTTON.—Headquarters Philippines Division Office Chief Commissary, Manila, P. I. December 31, 1910.—Sealed proposals, in triplicate, subject to usual conditions, will be received at this office until 11 o'clock a. m. April 5, 1911, at which time and place they will be opened in the presence of attending bidders, for furnishing and delivering about six million six hundred thousand (6.600.000) pounds of frozen fresh beef and two hundred thousand (200,000) pounds of frozen fresh mutton to the Subsistence Department, U. S. Army, at Manila, P. I., during year ending June 30, 1912. The contractor will be required to pay all customs duties. The United States reserves the right to decrease the amount advertised for, upon reasonable notice to the contractor, or to increase the amount with his consent. Each proposal must be accompanied with a bidder's guaranty in the amount of $20,000 or with certified check for that sum on a bank of approved standing in Manila. The bidder to whom the contract is awarded will be required to give bond. Blanks and full information furnished on application to this office or to nearest United States Consul. Envelopes containing proposals must be marked: "Proposals for frozen fresh beef and mutton for fiscal year 1912, to be opened April 5, 1911," and addressed to the undersigned.—D. L. BRAINARD. Lieut. Col., D. C. G., U. S. Army, Chief Commissary.

BUREAU OF CONSTABULARY.—Office of the Chief Supply Officer. Sealed proposals in triplicate, subject to the usual conditions will be received at the office of the Chief Supply Officer, Bureau of Constabulary, Old Oriente Building, Manila, until ten a.m., May 15, 1911, and then opened in the presence of attending bidders, for furnishing the Bureau of Constabulary

2,000 woolen blankets.

Blank proposals and information as to size and weight of blanket may be obtained at the office of the Property Officer, Bureau of Constabulary, Old Oriente Building, Manila.

PROPOSALS FOR MINERAL OIL.—Headquarters Philippines Division, Office of Chief Quartermaster, Manila, P. I., February 10, 1911. Sealed proposals, in triplicate, subject to the usual conditions, for furnishing 365,000 gallons Mineral Oil to the Quartermaster's Department, U. S. Army, during the fiscal year commencing July 1st, 1911, and ending June 30th, 1912, will be received here until 11:00 a. m. March 10th, 1911, and then publicly opened. Information and blank forms furnished upon application. F. G. Hodgson, Assistant Quartermaster General, U. S. Army, Chief Quartermaster.

PROPOSALS FOR COAL.—Headquarters Philippines Division, Office of Chief Quartermaster, Manila, P. I.. January 7, 1911. Sealed proposals, in triplicate, subject to the usual conditions, for furnishing approximately 65,000 tons of coal to the Quartermaster's Department, U. S. Army, during the Fiscal Year 1912, will be received here until 11:00 A, M. May 8, 1911, and then opened. Information and blank forms furnished upon application. F. G. HODGSON, Assistant Quartermaster General, U. S. Army, Chief Quartermaster.

PHILIPPINE MINING NEWS

PROPOSED AMENDMENTS TO PHILIPPINE MINING LAW.—General Edwards, Chief of the Bureau of Insular Affairs, in his report to the Secretary of War, makes the following recommendation:

"The organic act of July 1, 1902, provides, " 'That no holder shall be entitled to hold in his, its, or their own name or in the name of any other person, corporation, or association more than one mineral claim on the same vein or lode.'

"The Philippine Commission has repeatedly recommended amendment of this provision, and several bills for this purpose, approved by the Secretary of War, have been introduced at various times in Congress without reaching final action.

FAR EASTERN RAILWAYS

BURMA RAILWAY SUPPLIES.—Two lathes supplied by Messrs. John Lang & Sons, Ltd., a combined welding and folding machine by the J. C. Nicholson Tool Co., Ltd , and a screen shaker by the Pneumatic Engineering Appliance Co., Ltd., have been installed by the Burma Railway Co. in their shops.

WINCHOW RAILWAY ENTERPRISE.—The construction of a railway from Fung Tauen on West River, approximately fifteen miles west of Wuchow, to Sai Waan has finally been arranged. The line will be constructed by the company operating rich coal mines at Sai Waan in the Hoh Uen District.

INDIAN RAILWAY CONSTRUCTION.—The Bengal Chamber of Commerce has addressed the government on the subject of maintaining the annual capital expenditure so that it will not fall below an aggregate of £10,000 000 and if possible increase it to £12,500,000 in conformity with the conclusions of the Indian Railway Finance Committee that convened in London in 1907-08. The Chamber points to the fact that last year the amount expended fell below £10,000,000 and much greatly needed construction was delayed. Reference is also made to the prosperous condition of lines operating and the necessity of maintaining the lines so as to keep pace with the increased demands made upon them.

AMERICAN LOCOMOTIVES FOR JAPAN.—The Railway Board has placed an order with the American Locomotive Co., through the Mitsui Bussan Kaisha, for 24 Pacific engines and 6 Mallet of 0-4-0 C type loccmotives. The Pacific locomotives will have 18 5" by 24" cylinders with driving wheels of 63" diameter and total working weight of 133.000 pounds. The Mallet cylinders will be 15 5" and 24 5" by 24" with 63" drivers and a total working weight of 122,000 pounds.

FRENCH RAILWAY ACTIVITY.—Peking advices are to the effect that prominent French merchants have urged their government to promote the construction of an extension of the French line to Yunnan to connect with Szechuan for the purpose of tapping the Yangtze region, together with a line from Lungchow via Nanning to Wuchow to secure the traffic along the West River. It is also proposed that the oonstruction of Yunnan Kueichon line should be built either by French or Chinese capital.

This activity is due to a desire to develop French interests and at the same time encourage traffic for the Yunnan Railway. Then there are the projects connecting Siam with Saigon which will connect with the Peninsular Railway. What measure of success will mark these extensive programs is difficult at present to determine.

THE FUKIEN RAILWAY.—This company which operates over twelve miles of its line connecting Sing Su and Shih Bee on the mainland and serving Amoy by means of a ferry have been giving a service of three trains daily each way since January 1.

JOHORE STATE RAILWAY.—The estimates of revenue for 1911 amount to $220,000 (Str. Cur.) compared with $159,414 for 1910 and $90,-285 for 1909. The estimated expenditure for 1911 will reach $432,482 including $101,171 under the head of personal emoluments, other charges $330,068, and $45,730 for capital account. The officials anticipate an increase of 50% in traffic revenue this year and expect in a few years to put in on a paying basis.

SOUTH MANCHURIA RAILWAY LOAN.—This loan drawing 4.5% for £6,000,000 was sucessfully floated in London last month. The issue price was 98 and the bonds are redeemable in 25 years. Subscriptions were received by the Yokohama Specie Bank, the Hongkong & Shanghai Banking Corporation. It will be remembered that the company was organized with a capital of 200,000,000 yen, half of which represented the value of the railway as estimated by the Japanese Government and 20.000,000 yen was paid up and power to issue 80,000,000 in bonds conferred. This issue was made successfully, but an additional issue was considered necessary to provide for extensions and construction to keep pace with increased traffic not originally contemplated. The loan for 60,000,000 yen was authorized last year and we learn that of the proceeds 20,000,000 yen will be used to retire debentures and the 40,000,000 yen in doubling the line from Dairen to Sukiatun, in completing the Antung-Mukden reconstruction, in further developing the Tuchun mines and in completing the Dairen harbor improvement program.

THE TOKYO RAILWAY CO.—The following is the statement of the directors approved at the recent half yearly meeting:

	yen.
Net profits for the term	1,731,405
Balance brought over from previous term	23.324
Total	1,754.529
To reserve	86.570
To special reserve	88,430
Bonus to officials	35,000
Dividend to shareholders (7% per annum)	1,522,500
Balance carried forward	22,229

"During the last session a bill intended to accomplish this object was introduced in the Senate almost identical with a bill introduced during the Fifty-ninth Congress. It provides that the government of the Philippine Islands may make regulations, not in conflict with the provisions of the act of July 1, 1902, as amended, governing the number of mining claims that any person, corporation, or association may locate on the same vein or lode. It also provides, under similar regulations, for granting licenses for exploration and mining for gold and other minerals in the waters of the Philippine Islands, no exclusive licenses to be granted except as to limited or prescribed areas."

"There are a number of minerals in the Philippine Islands, some of which have been found in paying quantities. There has been much prospecting, but mining is largely a speculative matter, and, as the minerals there are found mainly in the wildest and most inaccessible parts, with no railroads or highways or means of communication with the outer world, development has been discouraged rather than encouraged by the inducements offered.

"It is recommended that these amendments be enacted into law. It is believed that they will be of material benefit to the islands in the present, while properly safeguarding future interests."

BAGUIO DISTRICT.—The work of installation on the Headwaters continues and the success of this enterprise will measure the future investment of foreign capital in the development of that region. So far as can be learned, there is no reason to doubt the extent of the deposits, making a paying low grade proposition under experienced direction and economical administration. The Major Mines are in the same class as the Headwaters with respect to future promise and it will rest with those directly in charge of operations, whether these enterprises prove successful or not. In another column, Mr. Hanlon puts his finger on the weak spot in Philippine mining activity. In developing a prospect into a mine, the amount of money spent in securing qualified expert advice, is well invested in that it eliminates false estimates and failures due to inexperienced direction and haphazard pronouncements. Mine owners in the islands have ignored this great truth. The Philippines have suffered greatly from those who have posed as authorities on mines and mining and it is in such properties as the Headquarters, the Major Mines, the Bua Company and the Benguet Consolidated in Benguet and the Colorado Mining Company in Masbate, with proper direction that the mining men of the archipelago must look for confirmation of their faith in the future of the industry.

In all the reliable reports available on mineral deposits in the islands, there is not one that does not confirm the claim that rich values are to be found, and it is regrettable that with but the few instances referred to, the failures and disappointments have been due to most deplorable administration.

Consolidation in Benguet which must be rated generally as a low grade proposition, will solve the problem of administration. This will surely come, once there is realized substantial and permanent returns in the form of dividends, from any of these properties.

THE PARACALE DISTRICT.—We understand that the proposal to develop the Paracale Extension has fallen through for thepresent. The tests recently made were satisfactory and while the report of the expert did not read like a circus poster, or a wild cat prospectus, it demonstrated that with proper equipment suited to conditions, from ten to twenty per cent could be realized on capital invested with economic administration. The values exceeded thirty cents gold as a fair average, although some tests were much higher and wide margin of safety allowed. We have not learned the exact reason for postponing this development, but a desire among a few interested to cover capitalize is believed to be the nigger that refuses to leave the woodpile.

NUEVA ECIJA DISTRICT.—Testing continues on the Rio Chico property and a lease is being negotiated by Australian capital covering 640 acres of placer on the Marinat River which has yet to be proved up. This district is easily available by railway and water transportation and if the values are found satisfactory will prove a desirable field for dredging.

MINDANAO PLACERS.—In Iligan and Cagayan de Misamis there is some activity and we understand that Australian capital is interested in the development of several claims on the Manalgue River in Iligan. On the Eponan in Cagayan de Misamis development work is reported progressing favorably.

BAHAY VALLEY OIL CO.—At the regular annual meeting of this company which is interested in the Tayabas Oil Fields the following directors were chosen:

M. F. Loewenstein, Mauro Prieto, E. E. White, E. B. Bruce, L. E. Holden and R. C. Hosty.

THE GUAMAS GROUP.—After all the splurge about the new dredge being ordered in the United States for this rich property, we have been informed that the option given the exploration company has been forfeited.

THE UMARAI RIVER PLACER MINING SYNDICATE.—The first placer mining enterprise to enter the field on the East Coast of Luzon, lying along Dingalang Bay, has taken up claims on the Umarai River owned by an association the members of which are R. W. Squires, C. D. Squires, W. S. Boston, H Hardman, L. E. Perske and Theodoro Gubayedoff. The company is capitalized for £150,000 subscribed by European and British capital with headquarters at Sydney, Australia. It is understood that a dredge will be installed by the end of the year. The tests reported cover ten claims and represent paying values.

ENGINEERING, CONSTRUCTION, FINANCIAL, AND COMMERCIAL NEWS

MUKDEN-ANTUNG CONSTRUCTION.—The railhead on the standard gauge is advancing rapidly from the Mukden and was expected to reach Penchihu, January 15. Tunnel work at Black Mine Pass has progressed to a point where the light line was transferred so as to run through it, January 1, thus saving three miles.

SHANGHAI-NANKING RAILWAY SHOPS.—The contract for the construction of sixteen passenger cars for the Tientsin-Pukow lines has been secured by this company. The order covers three first class, six second class, and ten third class.

TIENTSIN-PUKOW RAILWAY (Southern Section).—With little ostentation, the completion of temporary construction was announced January 20 and second and third class passenger traffic over the line to Linhanikuan, a distance of 100 miles, was begun. Trains are also running from the North end of the section from Tsinanfu to Taianfu. The railhead from the south is being pushed forward beyond Hsuchoufo.

SUPPLY OF INDIAN RAILWAY MATERIAL.—According to *Railway and Shipping*, the Motherwell Bridge Company, Limited, North Britain, has an order from the South Indian Railway Company for the supply of bridge mateials and bracing frames and the Workington Steel and Iron Company, Limited, for the supply of a large quantity of steel rails and steel fishplates. The Birmingham Railway Carriage and Wagon Company, Limited, have a large order from the South Indian Railway Company for the supply of spare buffer parts for rolling-stock and the Consolidated Brake and Engineering Company, Limited, Spencer House, London, E. C., for the supply of brake gear. Messrs. John Spencer and Sons, Limited, Newburn Steel Works, Newcastle-on Tyne, had a large order from the same railway for the supply of laminated bearing springs and Messrs. G. Salter and Company, Limited, for the supply of helical and volute springs for rolling stock. Messrs. Jessop and Company, Calcutta, have got the order of the North-Western State Railway for the supply of the iron and steel work which is required for the construction of the erecting shop in the new Locomotive Workshops at Lahore. Messrs. Alfred Herbert, Limited, Coventry, England, have an order from the Bengal-Nagpur Railway for the supply of a workshop sensitive radial drill and Messrs. Joshua Buckton and Company, Limited, Leeds, have a contract for the supply of a hydraulic wheel press. The Vacuum Brake Company, Limited, London, have an order from the East Indian Railway Company for the supply of five hundred sets of vacuum brake fittings and rigging, delivery to be completed by next month.

HUNAN RAILWAY CONSTRUCTION.—The section between Changsa and Chuchow is reported completed and passenger traffic will be inaugurated at an early date.

F. M. S. RAILWAY CHANGES.—The *Perak Pioneer* announces that the Division in charge of the Divisional Engineer North, F. M. S. Railway, has been extended from Tanjong Malin to Central Workshops including Batu Caves Branch Line, with effect from 1st January, 1911. This gives Mr. Frank Mills an additional mileage of about 57 miles. His two assistants, the District Railway Engineers, who are stationed at Taiping and Ipoh, Messrs. Johnson and Stephenson respectively, have also had their districts extended.

The Division of Mr. D. J. Highet, the Engineer in charge of the Southern Division, has also been considerably increased. The Government has not overlooked the fact that their work and responsibility have thereby been increased, and it has pleased the higher authorities to increase the maximum salary of their appointments by £120 per annum.

RAILWAYS CONTROLLED BY JAPAN.—Including lines in Formosa, Chosen, Manchuria the entire mileage is estimated at 7,000 miles approximately. In Chosen with the completion of the Seoul Wonsan and Honam lines the total expenditure there will reach 130,000,000 yen and it is the purpose to expend a similar amount before the plans proposed are completed. This will be represented by about 1200 miles of line. The reconstruction of the Seoul-Wiju line is expected completed in December this year and the bridge over the Yalu in March 1912.

SIAMESE PALACE ILLUMINATION.—The new royal palace at Petchaburi is to be equipped with an electric light plant for illuminating the building and grounds. The contract which was let to Messrs. Howard Erskine, Ltd., is well under way.

KYUSHU HYDRO-ELECTRIC CO.—A new project is under way to utilize the waters of the Chikingo and the Yamakunig in the development of 140,000 h. p. for generating purposes and it is proposed to compete generally with the electric power plants, in Kyushu of which there are at present fifteen. The capital of the company is 8,000,000 yen. The cost of 1 h. p. has been estimated at 237 yen and the company proposes furnishing 10 c. p. lights at 50 sen per mo. as against 1.50 yen by the old companies.

BRITISH ALL RED WIRELESS.—The following estimates are made available by Consul General James T. Du Bois of Singapore:

"The wireless stations necessary to connect the British possessions are only 20 in all. They would cost $5,000,000 to build and about $1,000,000 annually to operate.

"Stations would be required at Montreal, Glace Bay, and Vancouver, Canada; Hongkong; Singapore; Perth, Adelaide, and Sydney, Australia; Wellington, New Zealand; Gibraltar; Malta; Alexandria, Egypt; Aden; Bombay; Colombo; Mombasa, Durban, Cape Town, Bathurst, Sierra Leone, and St. Helena, Africa.

"The connections required would be: (1) Montreal, Canada, to Sydney, Australia, as follows: Montreal to Grace Bay, thence to Vancouver, Hongkong, Singapore, Perth, Adelaide, and Sydney. (2) England to Wellington, as follows: England to Gibraltar, thence to Malta, Alexandria, Aden, Bombay, Colombo, Singapore, Perth, Adelaide, Sydney, and Wellington. (3) England to China, by route 2 to Singapore, thence to Hongkong. (4) England to Africa, as follows: England to Gibraltar, thence to Aden, Mombasa, Durban, and Cape Town; or, England to Bathurst, thence to Sierra Leone, St. Helena, and Cape Town."

AVIATION WEEK IN BANGKOK.—The meet-following was postponed until the first week in February.

THE KEI HIN ELECTRIC RAILWAY.—The following is the statement of account and distribution for the half year:

	yen
Net gains	77,806
Balance brought over from previous term	899
Total	78,705
This was distributed as follows:—	
To reserve	3,891
To special reserve	1,945
Bonus to officials	2,923
Dividend to shareholders (4% per annum)	60,700
Balance carried forward	446

SANNING RAILWAY LOAN.—This company has arranged with the Bank of Kwantung for a short loan of 300,000 Tls. at the rate of 9% per annum.

TELEFUNKEN IN THE PHILIPPINES.—Messrs. Germann & Co., local agents for this company, have erected a wirelesss tation on the Luneta for the purpose of giving demonstrations with a view to entering into competition to instal an extensive system in the islands.

KIANGWAN AVIATION MEET.—A meeting was arranged for the first week in February at the International Race Course and special excursion trains from Shanghai were advertised.

HONGKONG AVIATION MEET ABANDONED.—The arrangement with J. C. Mars, the American aviator, for a flight at Taipoo was abandoned on account of the indisposition of the government to permit a special excursion over the railway out of which the aviator would secure a percentage. The press expresses great disappointment.

PHILIPPINE AVIATORS EXPERIMENTING.—After many discouragements the local Manila inventors are making substantial headway on their models. Some difficulty has been met in providing adequate power as the machines are of the heavier than air order.

HANKOW ELECTRIC LIGHT CO.—This company is reported to have concluded a loan of Tls. 1,200,000 with Japanese bankers.

BAGUIO HYDRO-ELECTRIC FRANCHISE.—The Philippine legislature has passed an act to provide for the granting of a franchise for the use of the waters of the Agno River in Benguet, for the generation of power for the maintenance of an electric light, heat, and power system and the supply of light, heat, and power in and to the city of Baguio. In lieu of taxes, etc., the successful bidder will be required to pay into the insular treasury a percentage of gross receipts.

BANGKOK LIGHTING.—The *Bangkok Times* announces that the Siam Electricity Co. is arranging to extend its lighting system and instal lights of 100 candle power on the main thoroughfares suspended on the poles of the trolley system. "This is a big improvement in street lighting," says the *Times*, "which has long been a reproach to Siam's capital."

WIRELESS USED BY TAAL RELIEF.—The enterprise of the U. S. Army in the Philippines was demonstrated by the establishment of wireless stations surrounding Lake Taal and connected with Fort McKinley, with field telephones, etc., under direction of the Signal Corps to keep the several U. S. Burial Corps detachments in touch with each other. It worked most effectively.

JAPAN'S TELEPHONE SYSTEM.—Statistics prepared by the *Chamber of Commerce Journal* of Yokohama on the 20th anniversary of the inauguration of the first telephone exchange in Japan show that over 30,000,000 yen represents the outlay of the government to date in this department with the result that 1,600 cities and towns in Japan are connected up with 126,000 subscribers. There are over 440,000 miles of wire. The annual revenue is yen 10,000,000. It is the purpose of the government to expend 18,000,000 yen during the next two years to accommodate 60,000 new applications now on file.

MANILA CARNIVAL ELECTRIC LIGHT TOWER.—There will be 48,000 lights massed on the 120 foot tower installed in the carnival grounds, Manila, besides a flash light service and illuminations covering the entire grounds and Luneta in the foreground.

AVIATION AT THE PHILIPPINE CARNIVAL.—J. C. Mars with a Curtiss biplane has arrived at Manila under contract with the Carnival Association and will make at least one flight daily during the week.

AMERICAN SUPPLIES FOR TASMANIA ELECTRIC RAILWAYS.—U. S. Consul General H. D. Baker reports that construction work on the electric tramways at Launceston, northern Tasmania, has been commenced. The 5½ miles of rails, tie rods, fish bolts, etc., were supplied by an American firm for about $45,000 and were brought to Tasmania by direct steamer. The tram track will mostly be a single line, one with loops. Double lines will, however, be put down in the busiest sections of the city. A British firm secured the contracts for the overhead equipment and the trucks, the cars are to be manufactured by a local firm, and the motorst each of 37 horsepower, will come from a company on the mainland of Australia. In is expected that the first section of the Launceston trams will be running early in 1911.

PUBLIC WORKS, DOCKS, WHARVES, BUILDINGS, ETC.

MANILA PORT WORKS.—The work of connecting the piers with the transport docks comprehensive system of arrastre is progressing.

PEARL HARBOR.—The naval estimates for 1911 include an item of $2,387,000 gold for the development of Pearl Harbor, Hawaii.

NEWCHWANG HARBOR IMPROVEMENT.—The sum of Tls. 517,000 of which Tls. 200 000 will be invested in a dredger have been appropriated for this work. Increased tonnage dues and duty on exports will be levied to reimburse the government. The details of work follow:

(1) Deepening the bar at the mouth of the Liao and otherwise improving the approach to the port, $482,974.

(2) Protecting Duck Island bend, $44.000.

(3) Improving the upper river, dredgers etc., $150,000, running expenses annually $28,000.

OPENING OF THE NEW SHANGHAI CLUB.—The new club rooms were officially opened January 6 by Sir Pelham Warren who laid the corner stone two years previously. The cost amounted approximately Tls. 600,000 and is without exception the most imposing club house in the Far East. It is of English renaissance design and the front is built of artificial stone with Soochow granite columns. The most imposing room is the Grand Hall approached by a broad stairway of Sicilian marble. This hall is 90 feet × 39 with a height to the barrelled glass ceiling of 41.5 feet. The ceiling which caps the arches is supported by ionic columns The bar on the south side is 110 feet long and 39 feet wide and panelled in oak. This room is 17 75 feet from floor to ceiling. The news room 67.5×30 feet is on the north side and waiting rooms and telephone booths are on either side of the main entrance. A billiard room 75 5×29 5 feet is located at the northwest corner with large open fireplaces. Then there is the Domino Room 36.25×39 feet, the secretary's office behind the bar and the lavatories farther to the rear. The whole of the first floor front 102.25×43.5 feet with 19 foot ceiling makes one of the most splendidly appointed dining rooms in Shanghai. Besides this main dining room there are three others on the same floor for special banquets, etc., and all are connected with the kitchen by electric elevators, telephones. etc. The library opens out of the Grand Hall on the first floor, is surrounded by a gallery, and has a reading-room 23×39 feet opening out of it. Then there is the card room 46×22 feet and 40 bedrooms each provided with a modern bath, etc. The fourth and top floor is set aside for the kitchen and stewart's apartments. In the basement are bowling alleys, barber shop, dressing rooms, cold store rooms, heating apparatus, and wine cellars.

There are 1,000 electric lights and 100 steam radiators installed. The weight of the building is estimated at 17.000 tons and the floor area 10,500 square yards. The following are among the firms who supplied materials or were otherwise interested in the construction of this splendid structure: Messrs. Howarth Erskine, Ltd., general contractors and supplying steel work; U. S. Steel Products Company, reinforcing steel for floors; Green Island Cement, Messrs. Shewan Tomes & Co., Messrs. Samuel McGregor & Co., conolite and malthoid; cold and hot water supply, Shanghai Waterworks Co.; electric light, telephones, signal service by Messrs. Scott Harding & Co; refrigerating apparatus and electric elevators, electric fittings, Messrs. Anderson, Meyer & Co; Electric fittings, the Shanghai Electric and Asbestos Co.

MANILA PUBLIC WORKS.—During the fiscal year 1910 the city expended ₱738.000 for the maintenance of roads, bridges and parks; for new roads ₱186.800; for new equipment ₱108,000; for public buildings ₱41,270, and for new waterworks and sewerage system ₱1,200,000.

TSURUGA HARBOR WORKS.—The work of improvement of this port has been suspended as a result of the destruction of the 120 yard breakwater by recent storms and the belief of engineers that a harbor at this point is impracticable.

PROJECTED HARBOR WORK IN KOREA.—The budget provides for the construction of custom houses and harbors amounting to 2,026,062 yen. Of this 583.000 yen are for the construction of a custom house and harbor in Chemulpo, 902,000 yen for Fusan, 325,000 yen for Chinnampo, and 62,000 yen for Pyongyang. The construction of the harbor at Chemulpo is a consecutive work for six years commencing next year. The estimates for the work during the six years are as follows:—

	yen.		yen.
1911	553 000	1914	650,000
1912	600,000	1915	650.000
1913	600,000	1916	450 000

The estimates for similar works at Fusan, Chinnampo, and Pongyang are as follows:—

	Fusan. yen.	Chemulpo. yen.	Pyongyang. yen.
1911	902,500	390,200	62,000
1912	325.050	340,000	66,000
1913	857.000	17,000	—
1914	973,000	—	—

MONGKOKSUI HARBOR OF REFUGE.—According to a statement made by the Colonial Secretary at a recent session of the Hongkong Legislature, the contract price for the performance of this work was $2,018,002.54. Hongkong Cur., and the date of completion is October 26, 1915.

LIENSHAN HARBOR WORKS.—With the purchase of land for streets, work on the new harbor will begin.

SHIPBUILDING, MERCHANT MARINE AND FISHERIES

PACIFIC MAIL STEAMER'S CENTURY.—The S. S. China completed here 100th round trip on the one run upon her arrival in Hongkong, January 3.

JAPANESE BUY FOREIGN STEAMERS.—The Indo-China S. N. Co. has sold the S. S. Amara through Messrs. Jardine, Matheson & Co. to Mr. C. Yamaki of Tokyo for the Formosan trade. The steamer Hingsang of the same company was purchased some time ago These vessels are each of approximately 2,400 tons.

PENANG TUG LAUNCHED.—The Eastern, a tug built by the Eastern Shipping Co., Limited, was launched from their dockyards at Sungie Nyor, Province of Wellesley, last month. This vessel is 60 feet in length with an 11 foot bean and depth of 5 5 feet. She will be fitted with a marine multitubular boiler and compound condensing engines, cylinders 8.25 inch with 12 inch stroke capable of maintaining a speed of 10 knots.

PACIFIC MAIL INTERMEDIATE SERVICE.—The S. S. Persia is to be added to the intermediate trans-pacific service making a squadron of three in this class. The rate from Hongkong to San Francisco will be £25 and the return fare £37.10 while the fare from Hongkong to London via New York will be £45, and return £78.

THE O. S. K. CANADA MARU.—This vessel which is of 6,000 tons gross, a sister ship to the Tacoma Maru and one of the most modern freight boats on the Pacific, was launched from the Mitsubishi Yards, Nagasaki, January 11.

CHINESE IMPERIAL SHIPYARDS PROPOSED FOR SHANGHAI.—The Grand Councillors are considering the selection of a site for a shipbuilding yard at Shanghai to cost Tls. 5,000,000.

MITSUI BISHI DOCKYARD.—The Yamakaze, a large torpedo boat destroyer of 1,050 tons displacement, at Nagasaki last month. She will be equipped with Parson's steam turbine engines of 22,800 h. p. and develop 33 knots.

PACIFIC MAIL MANILA STEVEDORING CONTRACT.—Messrs. Simmie and Grilk have secured the contract for handling the cargo of the company's steamers at Manila which represents an average of 10,000 tons a month.

THE HONGKONG, CANTON & MACAO S. S. CO.—The credit at profit and loss at the end of the year including $18,026 brought forward from last account was $126.344 on a capital investment of $1,200,000. Out of this a dividend of $1.25 a share was paid and $20,000 carried forward.

MINES, MINERALS, AND THE METAL TRADE, MACHINERY, ETC.

SUGAR MILL MACHINERY FOR MINDORO AND FORMOSA.—The British Steamer Beachy is expected from Seattle via Honolulu with a shipment of lumber and 1680 tons of machinery to the order of the Mindoro Development Co. from the Honolulu Iron Works. There is also a shipment of sugar mill machinery from the Honolulu Iron Works to equip two twelve roller mills for Formosa to be delivered in April. Manager Hedemann is making a trip to the East to look over the situation at the invitation of the Japanese sugar men interested in Formosa.

F. M. S. TIN OUTPUT.—The total for December was 10,395 piculs.

STANDARD OIL IN NETHERLANDS EAST INDIA.—The American Company has been incorporated under the laws of Netherlands East India for the purpose of carrying on the oil war against the Royal Dutch Petroleum Company in its own territory. This company will extend its operations to India and engage in developing oil lands as well as refining.

THE STRAITS TRADING CO., LTD.—The profits for the half year amounted to $524.057 Strs. Cur. out of which a dividend of 10% and 5% bonus was declared; $50,000 placed in reserve and $86.664 forward.

THE PENCHIHU COAL MINE AND MAOKON IRON DEPOSIT.—It is understood that a joint Japanese and Chinese Company with a capital of 1,000,000 yen has been organized to develop these mines after a careful investigation is made as to their promise respecting the production of iron.

CEMENT IN SIAM.—During the last fiscal year there were 2,846 tons of cement imported from Tonkin and 8,511 tons from Denmark.

GERMAN STEEL WORKS FOR KIANCHAU.—German capitalists are considering the establishment of an extensive smelter and steel manufacturing plant near Kianchau to be controlled by the Shantung Mining Co.

THE LINOTYPE & MACHINERY CO. LTD.—Messrs. Jardine Matheson & Co. have secured the Shanghai agency for this company and display rooms have been secured on Szechuen Road where the machines will be exhibited. The Ewo Engineering Department of the company will take charge of this important agency under the direction of Manager W. J. Milne.

THE MITSUI BUSSAN KAISHA, LTD.—The second half-yearly report of the Mitsui Bussan Kaisha, Ltd., for the period ending October 31st, 1910, submitted to and passed by the general meeting of the shareholders on January 18th, 1911, has just reached the local office of the company. The net profits for the half year ending October 31st, 1910, were 2,509,325 75 Yen which, together with a balance brought forward from the last term, made 2,899 654 40 Yen which the general meeting appropriated as follows: Legal reserve 130,000 yen, Special reserve, 1,600,000 yen, Directors' fees, 130,000, Dividends, 700,000 yen. Balance carried forward to next term, 339,654.40.

TONGKAH HARBOR TIN CO.—This company declared a second interim dividend of 5% payable January 28. The following is an excerpt from the recent report of the directors for 1910:

Profit and Loss Account.—The accounts presented herewith show that a gross working profit was made of £26,551 18s. 10d., Add the Deposit forfeited by the Option Syndicate £1,000, Together with the Balance carried forward from September 30th, 1909, £4002 17s. 4d. A total of £31,554 16s. 2d.

Against this there are the following items:—Stamp Duty £4:6 13s. 4d. Balance new buckets, etc., now in use on No. 1, 2, and 3 Dredgers written off £5051, 12 2.

Depreciation—Furniture £73 10s. 0s. Workshop Plant £183 14s. 5d. Buildings £197 7s. 6d. 10% on Nos. 1, 2, and 3 Dredgers £3,954 1s. 10d. Total £4,408 13 9d. Grand total 9.876 19 2. Leaving a balance at credit of Profit and Loss A/c of £21,677 16 11.

Notwithstanding the satisfactory profit shown above, no dividend was declared during the 12 months, but taking the Company's present position and prospects into consideration, the directors anticipate making an early announcement of quarterly dividends, which they hope will be regularly maintained.

This company placed an order for two new dredgers with Messrs Wm. Simons & Co, Ltd., of Renfrew, along special designs which will soon be operating. One of the dredgers arrived last month and is described as follows: Length between perpendiculars of 125 ft., over all, 191 ft. breadth 40 ft. and depth 8 ft., dredging to a depth of 45 ft, and having a dredging capacity of 840 cub. yards per hour.

THE PUSING BABRU TIN MINING CO., Ltd. —This company has declared a dividend of sixpence a share.

THE RAUB.—The total returns for the four weeks ended December 31, 1910, were 476 ounces of smelted gold and 1,225 amalgam.

THE ULU JOHAN MINING SYNDICATE, LTD. —This is a new company organized with a capital of $30,000 to develop a block of tin lands near Sorakai.

FINANCIAL, COMMERCIAL AND MISCELLANEOUS.

MANILA MUNICIPAL COLLECTIONS.—The total collections from all sources for the first half of the fiscal year 1911 amounted to ₱1,266,610 as against ₱1,230,378 81 the corresponding period 1910.

MELCHERS & CO. AT TSINGTAO.—This company has opened its new offices at Tsingtao where they are engaged in general import and export and shipping business.

ZAMBOANGA FAIR.—A most successful exposition is in progress at the capital of the Moro province, the attendance being large from all parts of the Philippines.

KOREAN BEAN CROP.—The total yield of beans for 1910 is estimated at 10,000,000 bushels and the export up to the end of November reach a value of 4,700,000 yen.

CHINESE MILITARY DEPARTMENT.—A report from Peking is to the effect that on account of lack of funds only 25 divisions will be organized instead of 36 as proposed.

BANCO ESPAÑOL FILIPINO.—At the annual meeting the following officers were elected: President, J. S. Hord; Vice President, D. G. Marzano; Directors, Thomas L. Hartigan, Juan J Tuason, A. R. Roxas, Edilberto Calixto, Felix Roxas, Mariano Limjap, Fernando Zobel, Enrique Barrera, Maximino Paterno, Paul Hube, Bernardino Hernandez, Emilio Moreta, Cu Un Jieng, S. M. Jones.

THE AMERICAN-CHINESE BANK.—According to latest advices this institution will have a capital of Tls. 10,000,000 subscribed equally by Chinese and Americans with head office in Shanghai and branches throughout China and America.

THE HONGKONG AND SHANGHAI BANKING CORPORATION.—The following is an excerpt from the directors' report for the half year ended December 31:

The net profits for that period, including $2,029,390 83, balance brought forward from last account after paying all charges, deducting interest paid and due, and making provision for bad and doubtful accounts, amount to $5,249,606 46.

The Directors recommend the transfer of $250,000 from the Profit and Loss Account to credit of the Silver Reserve Fund, which Fund will then stand at $16,250,000.

After making this Transfer and deducting Remuneration to Directors there remains for appropriation $4,984,606 46, out of which the Directors recommend the payment of a Dividend of Two Pounds Sterling per Share, viz.: £240,000 and a Bonus of Five Shillings Sterling per Share, viz: £30,000 amounting in all to £270,000 which at 1/10 the rate of the day, will absorb $2,945,454 55.

The Balance $2,039 151 to be carried to New Profit and Loss Account.

Sterling reserve fund.—The holding of £1.-200,000 2½ per cent Consols has been written down to 79. This was effected by the purchase at about par of £15,000 other Sterling Securities, making our holding under this heading £340,-000 written down to £287,400. The cost of this adjustment was met out of the earnings of the halfyear.

Directors.—The Honourable Mr. Henry Keswick has been elected Chairman for the year 1911, and Mr G. H. Medhurst Deputy Chairman.

Mr. J. W. Bandow and Mr. E Shellim having resigned their seats, Mr. G. Friesland and Mr. W Logan have been invited to fill the vacancies; these appointments require confirmation at the Meeting.

Mr. H. A. Siebs, Mr. R. Shewan and Mr. G. Balloch retire in rotation, but being eligible for re-election, offer themselves accordingly.

Auditors.—The Accounts have been audited by Mr. W. Hutton Potts and Mr J. W. C. Bonnar, who offer themselves for re-election.

PHILIPPINE POSTAL SAVINGS BANK.—On February first 45 new branches were opened in different parts of the islands.

THE WEST POINT BUILDING CO., LTD.—This company paid a dividend of $4 for 1910 as against $3.80 the previous year.

AMERICAN CAPITAL TO TAKE OVER A. S. WATSON & CO, MANILA BRANCH.—A corporation with a capital of ₱500,000 has been organized to purchase this old reliable house and continue the business. The officers of the corporation are:

R. N. Clark, president; Assistant Manager Taylor of the International Bank, vice president; Jerome Prager, secretary-treasurer; and Dr Tee Han Kee, F. W. Breaker, C. W. O'Brien, George I. Franks and John T. Pickett, directors.

THE PARSONS HARDWARE CO.—The well-know firm of J. Parsons, general hardware and machinery dealers, have incorporated with Mr. W. Parsons, president. The announcement will be made in the near future.

THE FILIPPINO HOME MUTUAL BUILDING AND LOAN ASSOCIATION.—This association was recently organized with an authorized capital of ₱3,000,000.00 in shares of ₱200 each.

PHILIPPINE HAT MAKING

The PHILIPPINE JOURNAL OF SCIENCE, Volume VI. Section C, No. 2. will include a paper by Dr. C. B. Robinson on the subject of Philippine hats.

The work covers the whole field of the subject, the origin and history of hat making so far as the Philippines are concerned, the materials used, methods of preparation, the actual hats and the difference between them, their prices, statistics of the export trade in them, brief comparison with the products of other countries in the eastern tropics, and the commercial situation and outlook. It embodies also short notes on mat making and other allied industries. The headings are as follows: introduction, seat of industry, history, species of plants used, means of distinguishing the principal kinds of Philippine hats, bamboo hats, buri hats, buri-leaf hats, buntal hats, and buri-midrib or Calasiao hats, pandan hats including sabotan, balangot hats, hemp hats, nito hats, ticog or tajoctayoc hats, materials of minor importance, straw hats, salacots, mat making, cigar cases and cigarette-cases, bags and baskets, general considerations and acknowledgments.

This will be an extensive, well illustrated article, the result of much research work, extending over a period of many months. For those interested in hat manufacturing the work would be found authoritative and valuable.

LONDON METAL MARKET

The following are to-nigth's (December 30) prices of metals:—

COPPER.	£	s.	d.		£	s.	d.
*Tough cake and ingot	59	10	0	..	60	0	0
*Best selected	59	10	0	..	60	0	0
*Electrolytic	60	15	0	..	61	5	0
*Sheets and sheathing	72	0	0	..	—		
*Flat bottoms	75	0	0	..	—		
STANDARD †Cash	56	0	0	..	56	2	6
STANDARD †Three Months	56	15	0	..	56	17	6
*Copper tubes, seamless per lb.	0	0	8⅞	..	—		
*Lake	61	10	0	..	62	0	0

* Less 3½ per cent. † Net.

ALLOYS.	£	s.	d.		£	s.	d.
BRASS: Wire	0	0	6¾	..	—		
,, Tubes (solid drawn)	0	0	6¾	..	—		
,, Sheets	0	0	6⅞	..	—		
TIN.							
English ingots, f. o. b.	174	0	0	..	175	0	0
,, bars	175	0	0	..	176	0	0
,, refined	176	0	0	..	177	0	0
Straits... Cash	174	10	0	..	174	15	0
Straits... Three months	173	15	0	..	174	0	0
Australian spot	—			..	—		
Banka (in Holland) Cash	172	5	0	..	—		
Banka (in Holland) Three months	172	10	0	..	—		
LEAD.							
Spanish or soft foreign	£13	0	0	..	13	1	3
English pig, common	13	5	0	..	13	7	6
,, L. B.	13	15	0	..	—		
,, sheet and bar lead	14	17	6	..	—		
,, pipe	15	7	6	..	—		
,, red	15	17	6	..	—		
,, white	19	15	0	..	—		
,, patent shot	16	5	0	..	—		
SPELTER.							
Silesian ordinary brands	23	17	6	..	24	0	0
,, special brands	24	5	0	..	24	10	0
English Swansea	—			..	—		
Sheet zinc	29	5	0	..	—		
ANTIMONY.							
Antimony	27	0	0	..	29	0	0
,, Crude	12	0	0	..	13	10	0
,, Ore (basis 50%)	28	15	0	..	—		
QUICKSILVER.							
Flasks, 75 lbs. warrants	8	0	0	..	—		
ALUMINIUM.	Per ton.				Per ton.		
98-99 per cent.	66	10	0	..	67	10	0
NICKEL.	Per ton.				Per ton.		
98-99 per cent. guaranteed	167	10	0	..	171	0	

PLATINUM.

Per oz. Troy, 160s.; nominal and subject to negotiation.

The Mining Journal.

FAR EASTERN STOCKS AND QUOTATIONS

Courtesy of Messrs. Kadoorie & Co., Hongkong, February 3, 1911.

STOCK.	WHEN ESTABLISHED	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	AT WORKING ACCOUNT	DATE	LAST DIVIDEND.	Approximate Yield per cent per annum at Present Quotation	CLOSING QUOTATIONS
BANKS.											
Hongkong & Shanghai Banking Corporation	1865	$15,000,000	120,000	$125	$125	g £1,500,000 s $16,000,000 i $250,000	$2,029,390	31-6-10	£2. for first half year ending 30-6-10, @ ex 1/9⅜ = $22.456	4⅜%	$920 £89-15/-
National Bank of China, Ld.	1891	£699,475	10) 99,925	£7	£6	c £4,009 $400,000	$34,167	31-12-09	$2 (London 3/6) for 1903	---	$80 buyers
MARINE INSURANCES.											
Canton Insurance Office, Ld.	1881	$2,500,000	10,000	$250	$50	$1,600,000 j $268,696 u $305,181	Nil.	31-12-08	$15 for 1909	8½%	$180 sellers
North China Insurance Co., Ld.	1903	£150,000	10,000	£15	£5	g £125,000 s Tls. 225,000 u Tls. 368,644 f Tls. 137,308	Tls. 205,719	30-6-10	Final dividend of 7½% for 1909 making 15% in all	5%	Tls. 160 sellers
Union Ins. Society of Canton, Ld.	1867	$3,100,000	12,400	$250	$100	s $3,000,000 g £90,000 f $287,984 j $1,449,735 u $713,985	2,552,545	31-12-09	Final of $20 per share, making in all $50 per share for 1908, and an int. div. of $30 per share for 1909	6%	$825
Yangtsze Ins. Association, Ld.	1889	$1,200,000	12,000	$100	$60	$1,000,000 f $371,802 £169,861	$797,602	31-12-09	$12 for year ending 31-12-08 and interim of $3 on account of 1909	6%	$200
FIRE INSURANCES.											
China Fire Ins. Co., Ld.	1870	$2,000,000	20,000	$100	$20	$1,000,000 z $550,348 f $61,168	$438,406	31-12-09	$6 and bonus $2 for 1908	6½%	$120 buyers
Hongkong Fire Ins. Co., Ld.	1868	$2,000,000	8,000	$250	$50	$1,460,000 j 81,153	$426,218	31-12-09	$27 for 1908	7½%	$365
SHIPPING.											
China & Manila Steamship Co., Ld.	1882	$750,000	1) 30,000	$25	$25	i $57,734	Dr $3,777	31-12-09	$4% for 1906	....	$7½ buyers
Douglas Steamship Co., Ld.	1883	$1,000,000	20,000	$50	$50	$230,000 i $100,589	Nil.	30-6-10	$2½ for year ending 30-6-1908	....	$17 buyers
Hongkong, Canton & Macao Steamboat Co., Ld.	1865	$1,200,000	80,000	$15	$15	e $250,000 d. i. $630,000 f $130,545 $ 19,106	$18,026	30-6-10	Dividend of $1½ for half year ending 30.6.1910	8½%	$31½ sellers
Indo-China Steam Navigation Co., Ld. (Preferred) Do. Do. (Deferred)	1882 m	£600,000	2) 60,000 2) 60,000	£5	£5	i £138,100	£15,162	31-12-08	3% = 3/- on Preferred shares only for 1910.	2½%	$56
"Shell" Transport & Trading Co. Ld.	1898	£ 2,000,000	2,000,000	£1	£1	£120,000 i £1,000,000	£205,868	31-12-09	Final div. of 2/6 per share (coupon 14) making in all 4/6 per share for 1909, and an int. div. of 1s. per share on % for 1910	5%	90/- £11 buyers
"Star" Ferry Co., Ld.	1898 1900	$200,000	10,000 10,000	$10 $10	$10 $5	$6,500 i $55,830	$1,159	30-4-10	A dividend of 7% and bonus of 5% making 12% for year ending 30.4.1910	5% 6%	$23 $12
REFINERIES.											
China Sugar Refining Co., Ld.	1878	$2,000,000	20,000	$100	$100	e $520,000 r $83,620	Dr. $8,090	31-12-09	$5 for half year ending 30-6-1910.	6%	$112 sellers
Luzon Sugar Refining Co., Ld.	1882	$700,000	7,000	$100	$100	none	Dr. $101,851	31-12-09	$3 for 1897	---	$18 sellers
MINING.											
Chinese Engineering & Mining Co., Ld.	1901	£1,000,000	1,000,000	£1	£1	d £215,000 h £12,289	....	..	Final div. of 1/6 for the year 1910 making 15% (coupon 15)	9%	Tls. 13½ sellers
Headwaters Mining Co.	1908	₱600,000	28) 600,000	₱10	₱10				First year		₱10
Raub Australian Gold Mining Co., Ld.	1892	£200,000	200,000	£1	£1	£4,873	Dr. $6,583	13-4-10	1/2 per share, 13th div.	5%	$3 sellers
Oriental Consolidated Mining Co. Ld.	....	g $5,000,000	500,000	g $10	$10	none	....	..	Final of gold $0.65 for 1909 in all g. $1.15	..	32/6
DOCKS, WHARVES AND GODOWNS											
Fenwick (Geo.), & Co., Ld.	1889	$450,000	z 18,000	$25	$25	$25,275	Dr $8,460	31-12-09	$1½ for year ending 31-12-06	---	$5
Hongkong & Kowloon Wharf & Godown Co., Ld.	1886	$3,000,000	60,000	$50	$50	$550,000 i $31,993 i $40,000	$4,848	31-12-09	$2½ for 1909	4½%	$53½ sellers
Hongkong & Whampoa Dock Co., Ld.	1866	$2,500,000	50,000	$50	$50	i $88,214 v $221,000	$148,940	30-6-10	3% for half year ended 30-6-1909	..	$57
Shanghai Dock & Engin'g Co., Ld.	1906	Tls. 5,570,000	13) 55,700	Tls. 100	Tls. 100	Tls. 1,000,000	....	..	Final of Tls. 3½ making Tls. 6 in all for year 30-4-1910	9%	Tls. 67
Shanghai & Hongkew Wharf Co., Ld.	1902	Tls. 3,600,000	36,000	Tls. 100	Tls. 100	b Tls. 697,257 r Tls. 50,000 e Tls. 125,000	....	..	Interim of Tls. 3 for 1910	7	Tls. 100
LANDS, HOTELS AND BUILDINGS.											
Anglo-French Land Investment Co., Ld.	1906	Tls. 2,500,000	3) 25,000	Tls. 100	Tls. 100	Tls. 35,000	Tls. 4,314	29-2-09	Tls. 6 for year ending 29-2-10	6⅓	Tls. 95 sellers
Central Stores, Ld.	---	$751,845	16) 50,123	$15	$15	n. $1,000	$1,000	31-12-08	8% for 1909	....	$11 sellers
Hongkong Hotel Co., Ld.	1866	$600,000 $400,000	12,000 8,000	$50 $50	$50 $25	$648,975 r $20,000	$21,477	30-6-10	$3 on old shares, $1.50 on new shares, for half year ending 30-6-10	5⅞%	$103 buyers $64 buyers
Hongkong Land Investment & Agency Co., Ld.	1889	$5,000,000	50,000	$100	$100	e $250,000	$27,971	31-12-10	Final Dividend of $3.50 per share for 1910	7%	$97 sellers
Humphreys' Estate & Finance Co., Ld.	1887	$1,500,000	150,000	$10	$10	i $226,945 20) $25,856	$5,471	31-12-09	45 cents for 1909	5⅞%	$7 buyers
Kowloon Land & Bldg. Co., Ld.	1889	$300,000	6,000	$50	$30	none	$269	31-12-09	$2½ for 1909	8%	$35 sales
Shanghai Land Investment Co., Ld.	1888	Tls. 3,900,000	78,000	Tls. 50	Tls. 50	Tls. 1,523,045 e Tls. 300,000	Tls. 63,969	31-12-09	Interim of Tls. 3 for 1910	6⅛	Tls. 98
West Point Bldg. Co., Ld.	1889	$625,000	12,500	$50	$50	none	$1,958	31-12-10	Final Dividend of $2.20 per share making $4 in all for year 1910	8⅜	$43 buyers
COTTON MILLS.											
Ewo Cotton Spinning & Weaving Co., Ld.	1895	Tls. 1,000,000	5) 20,000	Tls. 50	Tls. 50	Tls. 250,000	Tls. 10,991	31-10-09	Tls. 11 for year ended 31-10-09	13%	Tls. 85
Hongkong Cotton Spinning, Weaving & Dyeing Co., Ld.	1901	$1,250,000	125,000	$10	$10	e 20,000	$26,297	30-7-09	50 cents for year ending 31-7-08	---	$5 buyers

FAR EASTERN STOCKS AND QUOTATIONS—(Continued.)

STOCK.	WHEN ESTABLISHED	CAPITAL.	NO. OF SHARES.	VALUE	PAID UP.	RESERVE	AT WORKING ACCOUNT.	DATE.	LAST DIVIDEND.	Approximate Yield per cent per annum at Present Quotation.	CLOSING QUOTATIONS
International Cotton Manufacturing Co., Ld.	1895	Tls. 750,000	6) 10,000	Tls. 75	Tls. 75	Tls. 175,000	Tls. 8,372	30-9-09	Tls. 7½ for year end. 30-9-09 (10%)	10%	Tls. 53
Laou-kung-mow Cotton Spinning & Weaving Co., Ld.	1895	Tls. 800,000	8,000	Tls. 100	Tls. 100	none	Tls. 4,829	31-12-08	Tls. 6 for 1909	10%	Tls. 59
Soy Chee Cotton Spinning Co., Ld	1895	Tls. 1,000,000	2,000	Tls. 500	Tls. 500	f Tls. 31,173	Tls. 31,173		Tls. 35 for 1909	17%	Tls. 240
MISCELLANEOUS											
Bell's Asbestos Eastern Agency, Ld.	1895	£5,377.10s.	11) 8,604	12/6	12/6	£1,500	£797	31-12-09	15% for 1909		$8 sellers
China-Borneo Co., Ld.	1903	$720,000	8) 60,000	$12	$12	$40,000	Nil.	31-12-08	5% for 1909	6½	$9
China Light & Power Co., Ld.	1901	$300,000	50,000	$5	$5	none	$50,242	31-7-10	60 cents for year ending 28-2-06		95 cts. buyers
Do. do. Special Shares	1907		17) 50,000	$1	$1						
China Provident Loan & Mortgage Co., Ld.	1898	a $1,250,000	7) 125,000	$10	$10	$81,000	$450	31-12-09	80 cents for 1910	10%	$7½ ex div. sellers
Dairy Farm Co., Ld.	1896	$300,000	40,000	$7½	$6	l $10,000 / $10,000	$1,850	31-7-09	$1.20 for year ending 31-7-09	6¾%	$17½ buyers
Green Island Cement Co., Ld.	1897	$4,000,000	400,000	$10	$10	$14,000	$4,290	31-12-09	Interim of 15 cts. per share for 1910	15	$3½ sales
H. Price & Co., Ld.	1907	$120,000	19) 15,000	$10	$10	none	$1,923.87	31-12-09	14% viz $1.40 for 1909	12%	$12
Hongkong Electric Co., Ld.	1889	$600,000	60,000	$10	$10	none	$11,798	28-2-10	A dividend of $1.20 per share and a bonus of 10 cts. per share for year end. 28-2-10.	6½	$21 buyers
Hongkong Ice Co., Ld.	1881	$125,000	5,000	$25	$25	k $150,000	$12,662	31-12-09	Interim of $2 per share for 1910	....	$150 buyers
Hongkong Rope Manufacturing Co., Ld.	1883	$600,000	$60,000	$10	$10	$40,000	$9,176	31-12-09	Interim of $1 per share for 1910	10½%	$18¾
Maatschappij tot Mijn-, Bosch- en Landbouwexploitatie in Langkat	1902	Gs. 2,500,000	250,000	Glds. 10	Glds. 10	21 Tls. 547,500 / Tls. 547,500 / f Tls. 63,914	Tls. 316,682	31-12-08	3rd Interim Div. of Tls. 15 making in all Tls. 37½ for 1910	5	Tls. 122
Peak Tramways Co., Ld. / Do. (New)	1907	$750,000	25,000 / 50,000	$10 / $10	$10 / $10	$20,000	$3,014	30-4-10	80 cents on fully paid shares & 8 cents on $1 paid shares for year ending 30-4-10	5½ / 5	$13 sellers / $1½ sellers
Philippine Co., Ld.	1904	$750,000	75,000	$10	$10	none	Ps. 2,875	31-12-09	None	....	$8
Robinson Piano Co., Ltd.	1900	$200,000	22) 4,000	$50	$50	$5,000	$61,138	31-8-08	6% for ½ year ending 30.9.07	....	$50
Shanghai-Sumatra Tobacco Co., Ld.	1902	Tls. 600,000	9) 30,000	Tls. 20	Tls. 20	Tls. 24,820 / w Tls. 100,000	Tls. 5,250	31-10-08	No dividend this year	2	Tls. 120 sellers
South China Morning Post, Ld.	1903	$150,000	6,000	$25	$25	none	Dr. $31,096	31-8-09	None	—	$25
Steam Laundry Co., Ld.	1902	$100,000	20,000	$5	$5	none	$127.86	31-5-10	50 cents for year ending 30-5-10	8	$6
Union Waterboat Co., Ltd.	1905	$500,000	15) 50,000	$10	$10	w $11,956	$687	31-12-08	5% for year ending 31-12-10	6½	$7½ sales
United Asbestos Oriental Agency, Ld.	1896	$100,000	10,000	$10	$4	$46,000	$471	31-5-10	15% per ordinary share for year ended 31-5-10	5	$11½ sellers
Watkins, Ltd.	1899	$100,000	10,000	$10	$10	none	$19,41	31-12-09	3½ for 1909	—	$3 sellers
Watson (A. S.) & Co., Ld.	1886	$900,000	90,000	$10	$10	$300,000 / s) $25,000	$1,776	31-12-09	3% for 1909	5%	$5¾ buyers
Weismann Limited	1904	$30,000	3,000	$10	$10	$12,250	$67	31-7-10	10 per cent for year endg. 31.7.10.	8%	$12 buyers
William Powell, Ld.	1901	$105,000	15,000	$7	$7	none	$782	30-6-09	30 cents making 80 cents for year ending June 30th 1906	....	$2½
Societe des Pulpes et Papeteries du Tonkin		660,000	13,200	50 Haiphong	35 Currency	...	.	....	First year	....	$36 (Hk.Cy.) sel.

LOANS AND DEBENTURES.	AGENTS FOR THE LOAN.	AMOUNT OF LOAN.	PAR VALUE.	OUTSTANDING BONDS.	WHEN PAYABLE.	CLOSING QUOTATIONS.
China Government, 7 per cent. Silver Loan 1886 E.	Hongkong & Shanghai Banking Corporation.	Tls. 767,200	Tls. 250	1914	Mar. 31st and Sept. 30th each year until Mar. 31st, 1917	par. (Plus interest)
Hongkong Hotel Company, Ltd., 6 per cent. Mortgage Debentures of 1899 ‡	Hongkong & Shanghai Banking Corporation.	$750,000	$500	§ all	Half yearly, June 30th and December 31st	par
Shanghai & Hongkew Wharf Company, Ltd., 6 per cent. Debentures of 1902	Hongkong & Shanghai Banking Corporation.	Tls. 543,900	Tls. 100	....	Half yearly, June 30th and December 31st	Tls. 103½
Astor House Hotel Company, Ltd., 8 per cent. Debentures of 1903	Hongkong & Shanghai Banking Corporation.	Tls. 500,000	Tls. 100	....	Half yearly, January 1st and July 1st	102½
Chinese Engineering & Mining Co., Ltd., 6 per cent. Debentures of 1903 †	....	£500,000	¶	£431,960	Half yearly, June 30th and December 31st	par.
International Cotton Manufacturing Co., Ltd. 7% Debentures of 1901	Russo Chinese Bank	Tls. 500,000	Tls. 100	‖	Half yearly, March 31st and Sept. 30th	Tls. 97½.

a Authorised capital $2,000,000.
b Building Reserve Account.
c Capital Reserve Fund.
d Depreciation Fund.
e Equalization of Dividend Fund.
f Exchange and Investment Fluctuation Account.
g Gold Reserve Fund
h Exchange and Reserve Account.
i Insurance Fund.
j Reinsurance Fund.
k Contingencies Account.
l Legal Reserve Fund.
m Authorized Capital
n Sinking Fund.
o Raw Sugar Reserve Account.
p Premium on New Issue.
q Boiler Repairs and Renewals Account
r Repairs and Renewals Account.
s Silver Reserve Fund.

t Depreciation and Repair Account
u Underwriting Suspense Account.
v Special account
w Special Works Fund.
x Extra Reserve Fund.
y 72,560 owned by the Company.
z 7,200 shares unissued.
1 4,000 shares unissued.
2 First issue of 60,000, of which 10,411 unallotted.
3 5,000 shares unissued.
4 4,480 shares unissued.
5 5,000 shares unallotted.
6 1,616 shares unallotted.
7 75,000 shares unissued.
8 14,000 shares unissued.
9 17,000 shares unissued.
10 40,453 shares actually issued.
11 7,688 shares actually issued.
12 4,200 shares unissued.

13 500 shares unissued.
14 399 shares unissued.
15 22,277 shares unissued.
16 10,000 shares unissued.
17 Special shares are entitled to half of the profits.
18 Capital contributed by Chinese Government-Kuping Tls. 50,000.00.
19 12,000 issued only.
20 Typhoon and Floods Insurance Fund.
21 Special Cash Reserve.
22 1000 shares unissued.
23 10,000 shares unissued.
24 4595 part paid shares.
25 7,500 shares unissued.
26 10,000 shares unissued.
27 2,350 shares unissued.
28 25,000 shares unissued,
29 10,000 shares unissued.

30) 3,700 fully paid vendor shares and an option of 5,000 shares at par for 5 years granted to option holders.
*Based on last year's dividend.
** Based on present dividend.
§ 216 held by the Company.
‖ Only Tls. 134,000 taken up.
¶ In certificates of £20 and £100.
‡ Redeemable in 10 years, or at option of Comp., the Company giving 6 months notice.
† Redeemable at par at rate of £10,000 per annum from 31st December 1903 to 31st December 95.
*** Redeemable at par on 30th June, 1915.
Dr. Deficit.
†† Singapore dollars.
‡‡ 4,880 shares unissued.
× 16,756 shares unissued.
§§ 25,000 shares unissued.
4140 shares unissued.

ADDITIONAL SHANGHAI SHARE QUOTATIONS

December 30, 1910

STOCK	CLOSING QUOTATIONS	HIGHEST AND LOWEST PRICES DURING THE WEEK	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	LAST DIVIDEND	WHEN PAID
Vulcan Iron Works, Limited....	Tls. 10		Tls. 500,000	1,000	Tls. 500	Tls. 500	—	Tls. 50 for year ended 31.8.06......	Nov. 1, 1906
Yangtsze Wharf & Godown Co. Limited.......................	Tls. 195		Tls. 250,000	2,500	Tls. 100	Tls. 100	Tls. 50,000	Tls. 15 for 1909.......................	April 1, 1910
Wei-hai-wei Land & Building Co, Limited....................	Tls. 8 nominal		Tls. 91,850	3,674	Tls. 25	Tls. 25	—	Interim of $2.00 for 1909............	Aug. 8, 1909
Anglo-German Brewing Co., Limited............................	$80 sellers		$100,000	4,000	$100	$100	none	5% for 1909...........................	Mar. 12, 1910
Butler Tile Works, Limited.....	Tls. 23		Tls. 60,000	1,200	Tls. 50	Tls. 50	—	Tls. 3 for year ending 31.3.09......	June 8, 1909
Major Bros, Limited............	Tls. 40		Tls. 300,000	6,000	Tls. 50	Tls. 50	—	—	—
Oriental Ice Company, Limited	Tls. 25		Tls. 130,000	2,600	Tls. 50	Tls. 50	—	First year..........................	—
Scharffs Oil and Bone Mills, Ltd.	Tls. 40		Tls. 200,000	4,000	Tls. 50	Tls. 50	—	First year..........................	—
Shanghai Ice Company, Limited.	Tls. 13		Tls. 200,000	8,000	Tls. 25		—	6 for 1909............................	Mar. 14, 1910
Dunning & Company, Limited..	$33 sales		$100,000	2,000	$50	$50	—	$5 year ending 28.2.08..................	Apr. 15, 1908
J. Llewellyn & Co, Limited.....	$60 nominal		$72,000	1,200	$60	$60	—	7.20 for 1909..........................	May 1, 1910
Lane, Crawford & Company.....	$120		$250,000	2,500	$100	$100	—	10% for year 1909..................	Apr. 28, 1910
S. Moutrie & Company, Limited.	$20		$250,000	5,000	$50	$50	—	$2 for year ended March 31, 1909.	June 18, 1909
Weeks & Company, Limited...	$23		$400,000	20,000	$20	$20	$40,000	Final of 6% making 10% for 1909..	June 1, 1910
Dominion Rubber Co., Limited.	Tls. 30		Tls. 225,000	22,500	Tls. 10	Tls. 4	—	First year..........................	—
Senawang Rubber Estates Company, Limited..................	Tls. 50		Tls. 250,000	2,500	Tls. 100 Tls. 100	Tls. 100 Tls. 75	—	20% for year ending May 31 1910...	May 9, 1910
Tebong Rubber and Tapioca Estates, Limited..................	Tls. 20		£76,000	76,000	£1	£1	—	50 cents for 1909.....................	Sept 2, 1910
Shanghai Mercury, Limited....	Tls. 55		Tls. 105,500	2,100	Tls. 50	Tls. 50	—	Final of 6% making 16% year 1909.	June 22, 1910
Shanghai Mutual Telephone Co., Limited............................	Tls. 64		Tls. 675,000	13,500	Tls. 50	Tls. 50	—	Tls. 3 for 1907..........................	June 28, 1909
China Export, Import & Lumber Company, Limited............	Tls. 75 sales		Tls. 350,000	500	Tls. 100	Tls. 50	—	5 p. c. for 1909........................	May 1, 1910
China Printing Co., Limited.....	Tls. 50		Tls. 750,000	1,500	Tls. 50	Tls. 50	—	7% 1908................................	Apr. 18, 1909
Hirano Mineral Water Co., Ltd.	Y. 10		Y. 125,000	5,000	Y. 25	Y. 25	—	10%=yen 2½ for year ending 30th Sept. 08 Y. 1.20 for year ended Feb. 29..................	Apr. 26, 1909
Shanghai Electric & Asbestos Company, Limited............	$21 sellers		$125,000	5,000	$25	$25	—	8% for year ended Feb. 28, 09....	June 21, 1909
Shanghai Electric Construction Company, Limited............	£6/5	£11	£320,000	32,000	£10	£10	—	First year..............................	—

DEBENTURES

LOANS		PRICE—PLUS ACCRUED INTEREST	AMOUNT OF LOAN	OUTSTANDING	NOMINAL VALUE	RATE OF INTEREST	WHEN PAYABLE
Shanghai Municipal Debentures..........................	1892	Tls. 97	Tls. 45,400	Tls. 45,400	Tls. 100	5 %	June & Dec.
do	1893	,, 100	,, 46,200	" 32,000	" 100	5½ ,,	Do
do	1894	,, 106	,, 60,000	" 60,000	" 100	6 ,,	Do
do	1895	,, 97	,, 107,600	" 32,600	" 100	5 ,,	Do
do	1896	,, 97	,, 117,300	" 131,800	" 100	5 ,,	Do
do	1897	,, 97	,, 268,400	" 268,400	" 100	5 ,,	Do
do	1898	,, 106	,, 60,000	" 60,000	" 100	6 ,,	Do
do	1900	,, 100	,, 31,700	" 31,700	" 100	5½ ,,	Do
do	1901	,, 106	,, 77,000	" 200,000	" 100	6 ,,	Do
do	1902	,, 106	,, 145,000	" 150,000	" 100	6 ,,	Do
do	1903	,, 106	,, 430 500	" 490,500	" 100	6 ,,	Do
do	1904	,, 106	,, 164,500	" 214,500	" 100	6 ,,	Do
do	1905	,, 106	,, 285,900	" 320,000	" 100	6 ,,	Do
do	1907	,, 106	,, 500,000	" 250,000	" 100	6 ,,	Do
do	1908	,, 250 scarce	,, 650,000	" 351,400	" 250	6 ,,	Do
do	1909	,, 97½	,, 300,000	" 250,000	" 100	6 ,,	Do
Chinese Imperial Government Loan....................	1886 E	,, 102½	,, 354,400	"	" 100	7 ,,	Mar. & Sept
Shanghai Land Investment Co., Debentures..............	1892	,, 95	,, 250,000	" 250,000	" 100	6 ,,	May & Nov.
do	1894	,, 104	,, 250,000	" 250,000	" 100	6 ,,	Mar. & Sept.
do	1896	,, 104	,, 250,000	" 250,000	" 130	5 ,,	June & Dec.
do	1900	,, 95	,, 250,000	" 250,000	" 100	6 ,,	April & Oct.
do	1901	,, 104	,, 250 000	" 100,000	" 100	6 ,,	June & Dec.
do	1901	,, 104	,, 100,000	" 400,000	" 100	5 ,,	May & Nov.
do	1902	,, 104	,, 400,000	" 250,000	" 100	6 ,,	June & Dec.
do	1905	,, 104	,, 250,000	" 815,900	" 100	6 ,,	Do
Shanghai Waterworks Co., Debentures....................	1909	,, 104	,, 865,900	" .	" 100	6 ,,	April & Oct.
Shanghai Gas Co., Debentures..............................	1909	,, 106	,, 775,000	" 800,000	" 100	5 ,,	Do
Shanghai and Hongkew Wharf Co., Debentures...........	1902	,, 105 scarce	,, 1,000,000	" 799,800	" 100	6 ,,	June & Dec.
Astor House Co., Debentures..............................	1905	,, 100	,, 750,000	" 500,000	" 100	7 ,,	Do
British Municipal Council, Hankow.......................	1901	Sh. ,, 100	H'kow Tls 100,000	H'kow Tls 100 000	" 100	7 ,,	June & Dec.
Shanghai Club Debentures..................................	1907	,, 100	Tls. 170,000	Tls. 170,000	" 100	6 ,,	Do
Country Club Debentures....................................		,, 102½	,, 139,000	" 139,000	" 100	6 ,,	Do
do	1907	,, 102	,, 92,000	" 92,000	" 100	6 ,,	Do
Lane Crawford & Co., Debentures..........................	1907	,, 105	,, 110,000	" 110,000	" 100	7 ,,	Mar. & Sept.
Anglo-French Land Debentures..............................	1908	,, 102	,, 250,000	" 250,000	" 100	6 ,,	June & Dec.
Central Stores Ltd Debentures.............................	1908	,, 102½	,, 250,000	" 250,000	" 100	8 ,,	Do
Shanghai Mutual Tel. Co. Debentures.....................	1909	,, 102½	,, 200,000	" 200,000	" 100	6 ,,	Do

SINGAPORE SHARE QUOTATIONS

(COURTESY MESSRS. FRASER & CO., BROKERS, SINGAPORE, JANUARY 26, 1911)

Date of Formation	Capital	Capital paid up	No. of Shares Issued	Issue Value	Paid up	Reserve	Last Dividend	Name	Buyers	Sellers.
								MINING		
1903	$300,000	300,000	30,000	10	10	....	10% interim..................	Belat Tin Mining Co., Ltd..................	4.85	5.00
1907	$300,000	225,000	22,500	10	10	....	....	Bruang Ltd..................................	6.00	6.25
1901	$600,000	600,000	60,000	10	10	25,000	6% for year ending 30-4-09..........	Bruseh Hydraulic Tin Mining Co., Ltd......	....	5.00
1907	$400,000	375,000	37,500	10	10	....	....	Kanaboi, Ltd................................	1.50	1.75
1901	£60,000	60,000	60,000	1	1	....	6/- interim 1910..................	Kinta Tin Mines, Ltd.......................	16.75	17.50
1905	$150,000	99,000	9,900	10	10	6,485.68	35% for year ending 31-12-07..........	Kuantan Tin Mining Co., Ltd................	2.00	3.00
1906	£120,000	120,000	120,000	1	1	....	1/- interim 1909..................	Lahat Mines Ltd..........................	8.75	9.25
1906	$450,000	450,000	45,000	10	10	....	....	Malacca Tin Dredging Co., Ltd.............	....	1.50
1906	£30 000	30,000	30,000	1	1	....	....	Malaya and Siam Corporation Ltd..........	....	7/6
1906	£250,000	179,500	500,000e	5/-	5/-	....	....	Pahang Consolidated Co., Ltd..............	4/6	5/6
1907	£100,000	80,000	80,000	1	1	....	....	Pengkalen. Ltd............................	4.00	4.50
1904	£100,000	80,000	80,000	1	1	....	6/- interim..................	Pusing Bahru Tin Mines, Ltd................	7.75	8.25
1904	£120,000	100,000	100,000	1	1	6,000	6/- interim..................	Pusing Lama Tin Mines, Ltd.................	2.25	2.75
1907	$450,000	300,000	30,000	10	10	....	....	Rahman Hydraulic Tin, Ltd..................	10.50	11.00
1905	£40,000	£40,000	40,000	1	1	....	....	Rahman Tin Co.,Ltd.........................	10.50	11.00
1905	£27,000	27,000	27,000	1	1	....	1/- for 1907..................	Rambutan, Ltd..............................	....	9.00
1892	£200,000	200,000	200,000	1	1	....	1/2 paid April, 1910..................	Raub Aust. Gold Ming. Co., Ltd,............	2.35	2.50
1905	£40,000	40,000	40,000	1	1	4,873	....	Redhills Tin Mining Co., Ltd...............	2.50	3.50
1900	$110,000	110,000	22,000	5	5	....	3% for year ending 22-1-09..........	Royal Johore Tin Mining Co., Ltd...........	....	1.25
1907	$550,000	500,000	50,000	10	10	....	....	Salak South, Ltd..........................	....	1.00
1907	£80,000	80,000	80,000	1	1	....	....	Sempam Tin Mines, Ltd....................	1.00	1.50
1906	$850,000	850,000	85,000	10	10	25,000	5% interim 1910..................	Serendah Hydraulic Tin Ming. Co., Ltd.....	5.00	5.50
1899	$230,000	230,000	23,000	10	10	....	3% for ½ year ending 31-12-08..........	Sipiau Tin Co., Ltd.......................	1.75	2.25
1909	$200,000	$150,000	15,000	10	10	....	....	Sungei Gau Tin Mining Co., Ltd............	....	3.00
1907	£90,000	70,000	70,000	1	1	....	6/- during 1910..................	Tekka, Limited.............................	12.50	22.50
1906	£150,000	150,000	150,000	1	1	....	1/- interim 1909..................	Tongkah Harbour Tin Dredging Co., Ltd.	12.00	12.50
1902	£160 000	160,000	160,000	1	1	....	7/- during 1910..................	Tronoh Mines, Ltd.........................	15.00	15.50

SINGAPORE SHARE QUOTATIONS.—(CONTINUED.)

Date of Formation	Capital	Capital paid up	No. of Shares Issued	Issue Value	Paid up	Reserve	Last Dividend	Name	Buyers	Sellers.
								STERLING RUBBER		
1909	£85,000	78,225	782,250	2/-	2/-	......		Allagar Rubber Estates, Ltd	4/2	4/6
1905	£150,000	150,000	1,500,000	2/-	2/-	......	75% interim	Anglo-Malay Rub. Co., Ltd.	20/3	21/9
1909	£50,000	47,000	470,000	2/-	2/-	......		Batang Malaka Rubber Estates, Ltd	2/-	2/6
1904	£30,000	26,750	26,750	1	1	......	35% interim	Batu Caves Rub. Co., Ltd.	15.10.0	16.0.0
1906	£80,000	67,800	67,800*l**	1	1	......	2½% for 1909	Batu Tiga (Selangor) Rubber Co., Ltd.	4.1.3	4.7.6
1909	£100,000	74,454 }	57,816	1	1	......	6½% for 18 months ending 30-6-10	Bukit Kajang Rubber Estates, Ltd	2.3.3	2.6.0
			22,184*n**	1	15/-	......	" " " " "	" " " *part paid*	1.2.6	1.5.0p.
1907	£30,000	25,500 {	24,000	1	1	......	30% for year ending 30-6-10	Bukit Lintang Rubber Estates, Ltd	4.0.0	4.5.0
			6,000	1	5/-	......		" " " *part paid*	2.2.6	2.7.6p.
1903	£70,000	66,700	66,700	1	1	2,000	25% interim	Bukit Rajah Rubber Co., Ltd.	14.17.6	15.10.0
1906	£35,000	35,000	35,000	1	1	......		Castlefield (K.) R Estate, Ltd.	5.7.6	5.17.0
1909	£225,000	176,086	1,760,860	2/-	2/-	......		Chersonese (F.M.S.) Estates, Ltd	3/1	3/8
1904	£16,000	16,000 }	100,000	2/-	2/-	......	50% interim	Cicely Rubber Estates Co., Ltd	2.3.1	2.5.0
			60,000	2/-	2/-	......	54½% interim	" " " " 5% *Pref*	2.3.1	2.5.0
1905	£75,000	62,007	620,070	2/-	2/-	1,000	50% interim	Consolidated Malay Rub. Estates, Ltd	1.1.	1.3.6
1906	£110,000	110,000	110,000	1	1	......	50% interim for 1910	Damansara (Selangor) Rubber Co., Ltd.	6.7.6	6.15.0
1903	£600,000	447,200	447,200*a*	1	1	......		Duff Development Co., Ltd	11/-	12/-
1909	£45,000	42,500	425,000	2/-	2/-	......	15% interim	Edinburgh Rub. Estates, (Selangor) Ld.	10/-	11/-
1907	£80,000	70,000	70,000	1	1	......	25% interim	Golconda Rubber Co., Ltd.	5.0.0	5.5.0
1909	£82,000	£82,000	820,000	2/-	2/-	......		Heawood Tin and Rubber Estate, Ltd	5/4	6/-
1906	£310,000	307,770	307,770	1	1	8,784	30% interim	Highlands & Lowds. Para Rub. Co., Ltd.	4.13.9	5.0.0
1904	£50,000	30,000	30,000	1	1	2,500	100% for year ending 30-6-10	Inch Kenneth Rubber Estates, Ltd	11.15.0	12.5.0
1909	£200,000	143,750 }	775,000*p*	2/-	1/-	......	15% for eleven monhts end. 30-6-10	Kam. (P.) R. & T. Co., Ltd. "A" Shares	3/10	4/6 p.
			105,000	1	1	......	" " " " "	" " " " "B" "	....	nom.
1905	£70,000	70,000	70,000	1	1	......	20% interim	Kapar Para Rubber Estates, Co., Ltd	8.0.0	8.10.0
1909	£35,000	£21,125	95,000	2/-	2/-	......		Kota Tinggi Johore Rubber Co., Ltd	....	2/-
			155,000	2/-	1/-	......		" " " "	0/3	0/6 p.
1906	£180,000	180,000	180,000	1	1	.....	75% interim	Kuala Lumpur Rubber Co., Ltd	7.5.0	7.17.6
1907	£100,000	100,000	1,000,000	2/-	2/	......	30% interim	Labu (F. M. S.) Rub. Co., Ltd	13/6	14/6-
1907	£320,000	£252,067/10/-	} 198,930*v*	1	1	3,000	10% interim	Lanadron Rubber Estates, Ltd	4.2.6	4.10.0
			} 70,850	1	15/-	......	10% interim	" " " *part paid*	3.5.0	3.12.6p.
1908	£125,000	75,000 }	60,000*g**	1	1	......	10% interim	Ledbury Rubber Estates Ltd.	3.0.0	3.7.6
			40,000	1	7/6	......	10% interim	" " " *part paid*	1.12.6	1.17.6p.
1895	£100,000	98,324 8/- }	883,244*w*	2/-	2/-	4,000	150% interim	Linggi Plantations Ltd.,	2.3.6	2.6.0
			10,000	1	1	......	7% for 1909	" " " 7% *Pref*	....	nom.
1907	£160,000	140,000	1,400,000*k*	2/-	2/-	......	10% interim	London Asiatic R. & Produce Co., Ltd.	12/3	13/3
1909	£220,000	147,500 }	50,000	1	1	.....		Lumut Rubber Estates, Ltd	....	nom.
			150,000	1	3/-	......		" " " " *part paid*	12/6	14/- p.
1906	£400,000	300,000 }	185,000	1	1	......	10% interim for 1909	Malacca Rubber Plants., Ltd	7.15.0	8.5.0
			115,000	1	1	.....	" " "	" " " " 7½% *Pref.*	7.15.0	8.5.0
1909	£210,000	181,250	1,812,500	2/-	2/-	......		Merlimau Rubber Estates, Ltd	5/-	5/6
1910	£250,000	250,000	250,000	1	1	......		Mount Austin (J.) Rubber Estates, Ltd.	1.13.9	1.17.6
1903	£30,000	22,500	225,000	2/-	2/-	......	75% interim	Pataling Rubber Estates Synd. Ltd	2.13.9	2.16.0
1906	£85,000	85,000	850,000	2/-	2/-	......	12½% interim	Perak Rubber Plantations, Ltd	6/10½	7/9
1909	£60,000	41,150 }	15,000*s**	1	1	......		Rembia Rubber Estates Ltd.	....	nom.
			35,000	1	15/-	......		" " " 6% *Cum. Pref.*	3/6	5/- p.
1904	£25,000	19,092 }	17,732*u*	1	1	......	50% for year ending 30-9-10	Sagga Rubber Company, Limited	9.15.0	10.5.0
			2,268	1	12/-					
1905	£100,000	100,000 }	71,378	1	1	.....		Sapong Rubber and Tobacco Estates, Ltd.	1.5.0	1.7.6
			28,622*l*‡							
1907	£100,000	100,000	100,000	1	1	......	15% interim	Seafield Rubber Co., Ltd	6.0.0	6.10.0
1898	£30,000	30,000	300,000	2/-	2/-	3,000	225% interim	Selangor Rubber Co., Ltd	2.12.6	2.15.0
1909	£50,000	36,000	40,000	1	18/-	......		Sendayan (F. M. S.) Rubber Co., Ltd	1.6.3	1.10.0p.
1906	£65,000	65,000	65,000	1	1	......	10% interim	Shelford Rubber Estate, Ltd	3.5.0	3.15.0
1909	£150,000	78,500 }	14,000*i*‡	1	1	......		Sialang Rubber Estates, Ltd	15/-	20/- p.
			86,000	1	15/-	......				
1909	£120,000	100,000	100,000	1	1	......	12½% for year ending 31-6-10.	Singapore Para Rubber Estates, Ltd	4/6	5/6
1906	£200,000	192,500	1,925,000	2/-	2/-	......	17½% for year ending 31-3-10	Straits Settlements (B.) Rub. Co., Ltd	6/9	7/3
1907	£60,000	50,000	50,000*p*‡	1	1	.....		Sungei Choh Rub. Estate, Co. Ltd	3.12.6	4.0.0
1906	£110,000	100,000	1,000,000	2/-	2/-	......	25% interim	Sungei Kapar Rubber Co., Ltd	12/-	13/-
1907	£70,000	60,500	60,500	1	1	......		Sungei Salak Rubber Co., Ltd	3.18.9	4.5.0
1904	£60,000	59,500	59,500	1	1	......	12½% interim	Sungei Way (Selangor) Rub. Co., Ltd	5.7.6	5.17.6
1908	£150,000	100,560	100,560	1	1	......		Tebrau (Johore) Rubber Co	2.13.9	3.0.0
1907	£200,000	200,000	200,000	1	1	......	5% interim	United Serdang (S.) R. Plantations, Ltd.	5.5.0	5.10.0
1908	£85,000	78,612	786,120	2/-	2/-	.....	20% interim	United Sumatra Rubber Estates, Ltd	7/4½	8/-
1904	£60,000	50,600	506,000	2/-	2/-	.....	75% interim	Vallambrosa Rubber Co., Ltd.	1.13.6	1.16.0
								DOLLAR		
1909	$120,000	105,000	105,000*w**	1	1	......		Alor Gajah Rubber Estate, Ltd	1.90	2.00
1909	$750,000	700,000	140,000	5	5	......		Ayer Panas Rubber Estates. Ltd	5.60	6.00
1905	$200,000	151,500	151,200	1	1	5,250	40% interim	Balgownie Rub. Estate, Ltd	10.25	10.50
1910	$500,000	500,000	50,000	10	10	......		Bukit Timah Rubber Estates, Ltd	13.00	14.00
1910	$750,000	700,000	70,000	10	10	......		Changkat Serdang Estates, Ltd	7.25	7.50
1909	$300,000	300,000	300,000	1	1	.....		Glenealy Plantations, Ltd	1.60	1.70
1910	$200,000	164,285	32,857*m*‡	5	5	......		Haytor Rubber States, Ltd	5.50	7.50
1910	$600,000	210,000	30,000	10	7	......		Henrietta Estates, Ltd.	....	2 dis.
1909	$250,000	200,000	20,000	10	10	......		Indragiri (S.) R. and Gutta P. Co., Ltd	12.00	13.00
1910	$350,000	300,000	300,000*s*‡	1	1	.....		Jimah Rubber Estates, Ltd	0.55	0.65
1910	$350,000	291,000 }	11,000	5	5	......		Kelemak Rubber Estate, Ltd	3.00	4.00
			59,000	5	4	......		" " " *part paid*	3.00	2.00 dis.
1907	$300,000	170,000	20,000	10	8.50	....		Kombok Rubber Co., Ltd	15.00	p. nom.
1910	$1,000,000	1,000,000	500,000	2	2	......		Malakoff Rubber Co., Ltd	2.25	2.40
1910	$1,250,000	1,250,000	250,000	5	5	......		New Singapore Rubber Co., Ltd	6.00	6.25
1910	$700,000	[illegible]	600,090*q*‡	1	1	......		Nyalas Rubber Estates	0.40	0.50
1909	$400,000	[illegible]	80,000	5	5	......	5% interim	Pajam Limited	10.50	11.00
1909	$200,000	[illegible]	200,000	1	1	......		Pantai, Limited	1.20	1.30
1909	$500,000	[illegible]	45,000	10	10	......	17½% for year ending 31-8-10	Pegoh, Limited	30.00	30.50
1910	$450,000	295,000 }	45,000*f*‡	5	5	.....		Port Dickson Rubber Co., Ltd	10.00	12.00
			35,000	5	2	.....		" " " *part paid*	....	1.00 p.
1910	$5,000,000	3,675,000 }	360,000	10	2	.....		Pulau Bulang Rub. & Produce Co., Ltd.	1.75	1.85
			7,500	10	10	.....		" " " " "	....	....
1910	$200,000	150,000	50,000	1	1	.....		Pulo Daat Plantations, Ltd.	0.75	1.00
1904	$100,000	100,000	50,000	2	2	20,000	100% interim	Sandycroft Rubber Co., Ltd	23.50	24.50
1910	$1,500,000	1,500,000	1,500,000	1	1	......		Sembawang Rubber Plantations, Ltd	0.50	0.60
1903	$450,000	417,300	208,650	2	2	......	25% interim	Singapore & Johore Rub. Co., Ltd	11.50	11.75
1909	$250,000	100,000	10,000	10	10	.....		St. Helena Rubber Coy., Ltd	....	26.00
1910	$600,000	450,000	225,000*n*‡	2	2	....		Sungei Bagan Rubber Co., Ltd	1.25	1.50
1909	$200,000	165,000	33,000	5	5	......		Teluk Anson Rubber Estate, Ltd	4.50	4.75
1910	$425,000	371,700	371,700*r*‡	1	1	.....		Ulu Pandan (Singapore) Rub. Estates Ltd.	0.45	0.55
1909	$1,000,000	737,500	737,500*y**	1	1	.....		United Singapore Rubber Estates, Ltd.	1.25	1.35
								GENERAL		
1903	£400,000	400,000	400,000	1	1	......		Singapore Electric Tramways, Co., Ltd	3/3	4/3
1907	$1,500,000	1,065,150 }	25,000*d**	10	10	......	10% for year ending 31/12/08	Eastern Smelting Co. Ltd	....	10.00 n.
			116,450	10	7	......	10% for year ending 31-12-08	" " " *part paid*	6.15	6.50
1898	$360,000	360,000	36,000	10	10	170,000	10% interim	Fraser & Neave, Ltd	28.00	29.00
1905	$2,400,000	2,400,000 }	18,000	100	....	75,000	2½% for year ending 31-10-08	Howarth Erskine, Ltd	....	54.00
			6,000	100	....	......	7% for year ending 31-10-08	" " 7% *Pref*	....	91.00
1896	$1,000,000	1,000,000 }	6,000	100	100	40,600	12% for year ending 31-12-09	Katz Brothers, Ltd. *Deferred*	....	125.00
			4,000	100	100		8% " " " " 09	" " 8% *Cum. Pref*	....	nom.
1901	$34,000	34,000	3,400	10	10	......	20% for year ending 31-10-09	Maynard & Co., Ltd	23.00	24.00
1899	$875,000	875,000 }	6,000	100	100	175,000	5% for year ending 31/12/09	Riley, Hargreaves & Co., Ltd	80.00	85.00
			2,750	100	100	......	7% for year ending 31/12/09	" " " " 7% *Pref*	102.00	....
1897	£3,500,000	3,500,000 {	2,500,000	1	1	1,120,000	22½% for 1909	Shell Transport and Trading Co., Ltd	4.6.0	4.10.0
			100,000	10	10			" " " " *Pref.*	11.5.0	12.0.0
1903	$600,000	250,000	25,000*n*	10	10	......	12½% for year ending 30-6-10	Singapore Cold Storage Co., Ltd	24.00	25.00
1891	$30,000	30,000	600	50	50	23,000	10% for year ending 31-7-09	Singapore Dispensary Ltd.	50.00	52.50
1884	$200,000	200,000	2,000	100	100	75,000	15% interim	Straits Ice Co., Ltd	....	165.00
1890	$1,000,000	623,000	{ 4,980	100	100	760,000-1/7	5% interim	Straits Steam Ship Co., Ltd	215.00	225.00
			{ 2,500	100	50			" " " " " *part paid*	80.00	90.00p.
1887	$3,000,000	3,000,000	300,000	10	10	805,400½ / 1,450,000	10% & 5% bon. for half yr. end. 31/3/10	Straits Trading Co., Ltd	52.50	53.50

DEBENTURES

Name	Buyers	Sellers.
Howarth Erskine, Ltd. 6% $600,000	....	par.
Riley, Hargreaves & Co., Ltd. 6% 284,000	1½%	2½% p.
Singapore Electric Tramways, Co., Ltd. 5% £350,000	....	....
Singapore Municipal 5% 1,878,000	....	nom.
" " 4½% of 1907 1,600,000	6%	7% p.
" " 4½% of 1909 1,000,000	7%	8% p.
" " 4% 602,900	....	7% dis.

a { 152,800 unissued / 43,949 6% debenture
e { 54,500 £1 Prefs issued / 45,500 £1 " unissued / 100,000 5/- Ord. "
f 6,250 unissued
k £40,000 6% Debentures 200,000 unissued

p 175,000 unisd "A" shares
q Sundry Reserves.
r "
u 5,000 issued £1 prem.
v 50,220 unissued
w 16,756 "
*b** 221 7½% Debentures
*d** 8,550 unissued

*g** 25,000 unissued
*l** £10,000 Convertible 6% Debentures issued 12,200 shares unissued
*n** 20,000 unissued
*y** 262,500 "
*s** 10,000 "
i‡ 50,000 "

l‡ 6% Deb. Stock Convble.
m‡ 7,143 unissued.
n‡ 75,000 unissued.
o‡ 67,750 "
p‡ 10,000 "
q‡ 100,000 "
r‡ 53,300 "
s‡ 50,000 "

YOKOHAMA SHARE QUOTATIONS

COURTESY A. C. HUTTON POTTS, SHARE AND GENERAL BROKER, YOKOHAMA, JANUARY 26, 1911.

STOCKS.	CAPITAL.	NO. OF SHARES.	ISSUE VALUE.	AMOUNT PAID UP.	DATE.	LAST DIVIDEND.	FOR TERM.	CLOSING QUOTATION.
Brett & Co., Ltd.	-Y- 28,000	2,800	-Y- 10	-Y- 10	31-12-09	12½%	for 1 year	15 Sales
Club Hotel, Ltd.	185,000	1,850	100	100	31-3-10	6%	for 1 year	70 Sales
Grand Hotel, Ltd.	500,000	5,000	100	100	31-6-10.	5%	for ½ year	90 Sales.
Helm Bros., Ltd.	186,000	3,720	50	50	31-12-10	17½%	for 1 year	95 Sales.
Langfeldt & Co., Ltd.	100,000	2,000	50	50	30-6-09	6%	for ½ year	60 Sellers.
C. Nickel & Co., Ltd. ...A	500,000	20,000	25	25	31-10-10	14%	for 1 year	65 Sellers.
Thwaites, Limited.	100,000	2,000	50	50	First Year	—	—	55 Sales.
Yokohama Engine and Iron Works ...B	500,000	10,000	50	50	31-5-09	—	for 1 year	35 Sales.
Oriental Hotel, Ltd., Ordinary	} 250,000	3,000	50	50	31-8-07	12%	for 1 year	50 Sales
Oriental Hotel, Ltd., Preference		2,000	50	50		8%	for 1 year	52:50 Sales
The Union Estate and Investment Co., Ltd. ...C	1,000,000	10,000	100	100	30-9-09	7%	for 1 year	100 Nominal.
The Clifford Wilkinson Tansan Mineral Water Co., Ltd. ...D	500,000	5,000	100	100	31-12-09	7%	for 1 year	100 Buyers.

A 285,000 unissued. B 390,000 issued.
C 475,000 unissued. D 375,800 issued.

DEBENTURE LOANS.	AMOUNT OF LOAN.	FACE VALUE OF DEBENTURES.	RATE OF INTEREST.	INTEREST PAYABLE.	CLOSING QUOTATION.
Yokohama United Club	230,000.00	100.00	6%	30 June and 31 Dec.	102 Nominal.
Oriental Hotel, Limited	350,000.00	100.00	8%	1 April and 1 Oct.	103 Sales.
Union Estate and Investment Co., Limited	250,000.00	100.00	6%	30 June and 31 Dec.	100 Sales.

JAPANESE STOCKS.	FACE VALUE.	AMOUNT PAID UP.	LAST DIVIDEND.	DIVIDEND PAYABLE.	17TH JANUARY, 1911.	24TH JANUARY, 1911.
Bonds & Debentures.						
Exchequer Bonds 3rd issue	-Y-100	-Y-100	5%	March and Sept.	-Y-101.20	101.30
Railway Bonds (Ko-Gobu)	100	100	5%	June and Dec.	,, 99.70	99.75
4% Imperial Loan Bonds (1st issue)	100	100	4%	June and Dec.	,, 93.45	93.50
4% Imperial Loan Bonds (2nd issue)	100	100	4%	March and Sept.	,, 94.20	94 30
Special 5% Bonds (issued 1906)	100	100	5%	June and Dec.	,, 99.70	99.70
Yokohama Water Works Bonds	100	100	6%	June and Dec.	,, 101.50	101.50
Yokohama City Public Loan Bonds	100	100	6%	March and Sept.	,, 103.80	103.80
Railways & Electric Trams.						
Tokyo Railway Company, Limited	50	50	7%	June and Dec.	,, 72.95	72 95
Yokohama Electric Tramway Company, Limited	50	50	5%	July and Jan.	,, 54.00	53.50
Keihin Electric Tramway Company, Limited	50	50	6%	June and Dec.	,, 43.05	42.60
Cotton Spinnings.						
Kanegafuchi Cotton Spinning Company, Limited	50	50	12%	July and Jan.	,, 105.95	106.00
Fuji Gassed-yarn Company, Limited	50	50	6%	June and Dec.	,, 94.40	91.70
Tokyo Cotton Spinning Company, Limited	50	50	7%	July and Jan.	,, 43.60	43.15
Imperial Hemp Weaving Company, Limited	50	50	10%	July and Jan.	,, 69.50	70.00
Nisshin Boseki Kabushiki Kaisha	50	17½	Nil	June and Dec.	,, 12.20	12.15
Sugar & Beer Cos.						
Dai-nippon Sugar Refinery Company, Limited	50	50	Nil	May and Nov.	,, 45 00	46.00
Ensuiko Sugar Refinery Company, Limited	50	20	20%	June and Dec.	,, 48 60	49.70
Dai-nippon Beer Company, Limited	50	50	12%	July and Jan.	,, 80 30	80.80
Kirin Brewery Company, Limited	50	50	7%	July and Jan.	,, 53.00	53.00
Docks & Steamships.						
Yokohama Dock Company, Limited	50	33	12%	June and Dec.	,, 59.00	59.50
Nippon Yusen Kaisha	50	50	10%	May and Nov.	,, 96 94	97.40
Hokkaido Tanko S. S. Company, Limited	50	50	Nil	July and Jan.	,, 28.60	27.85
Miscellaneous.						
Tokyo Electric Light Company, Limited	50	50	12%	June and Dec.	,, 82.75	82.90
Tokyo Gas Company, Limited	50	50	13%	July and Jan.	,, 82.00 ex New	81.35
Yokohama Union Electric Light Company, Limited	50	50	13%	June and Dec	,, 106.00	106.50
Fuji Paper Mills	50	50	6%	June and Dec.	,, 32.00	32.00
Hoden Petroleum Company, Limited	50	50	12%	April and Oct.	,, 63.55	63.35
Tokyo Rope Manufacturing Company, Limited	50	50	16%	June and Dec.	,, 106.00	106.00
Tokyo Stock Exchange Company	50	50	15.04%	June and Dec.	,, 174.30	175.80

BANGKOK SHARE QUOTATIONS

(COURTESY MESSRS. EDWARDS & CO., BANGKOK, SIAM.) JANUARY 26, 1911.

NAME.	BUYERS.	SELLERS.	LAST SALES.	ESTABLISHED.	CAPITAL.	NO. OF SHARES.	ISSUE VALUE	AMOUNT PAID UP	RESERVE FUND	LAST DIVIDEND
Siam Electricity Co., Ltd.	Tcs. 300	Tcs. 325	Tcs. 325	1901	£ 300 000	30,000	£ 10—	£ 300,000	Tcs. 491.338	12% Tcs. 4 bon.
Paknam Railway Co., Ltd	,, 200	,, —	,, 220	1893	Tcs. 400,000	5,000	Tcs. 80	Tcs. 400,000	,, 37,566	14%
Siam Tramway Co., Ltd	,, —	,, —	,, 108	1905	,, 1,450,000	6250 Shares 7250 Deb 3000 P. Shares	,, 100	,, 2,230,000	,, 1,875	—
Meklong Railway Co., Ltd	,, 90	,, 100	,, 90	1907	,, 2,230,000	22,300	,, 100	,, 223,000	,, 28 000	5%
Bangkok Manufact. Co., Ltd.	,, —	,, —	,, 132	1898	,, 400 000	4 000	,, 100	,, 400 000	,, 60,000	7% per for 6 months
Bangkok Dock Co., Ltd	,, —	,, 135	,, 135	1865	,, 1,000,000	10,000	,, 100	,, 950 000	,, 220,000	5%
Siam Steam Packet Co.	,, 80	,, 909	,, 90	1898	,, 190 000	3 800	,, 50	,, 190,000	,, 34,000	4% for 6 mos.
Siam Commercial Bank	,, 1,000	,, 1 500	,, 1,000	1906	,, 3,000 000	3 000	,, 1,000	,, 3,000 000	,, 338,850	none
Menam Motor Boat Co.	,, 75	,, 90	,, 90	1905	,, 200 000	2,000	,, 100	,, 200,000	—	—
Transport Co., Motor.	,, —	,, 75	,, 100	1906	,, 200 000	2,000	,, 100	,, 200,000	—	—
Jenderata Rubber Co *	,, —	,, 325— Ticals	,, 325 (for six calls)	1906	£ 40,000	4,000	£ 10	£ 7.-paid	—	—
Bagan Rubber Co	,, —	,, 100	,, 100	1907	Tcs. 300 000	3 000	Tcs 100	Tcs. 40 per share	—	—
Siam Steam Navigation Co., Ltd	,, 300	,, 325	,, —	1909	,, 2 000 000	10,000	,, 200	—	,, 10,000	6% half year
Siam Stone Works, Ltd.	,, —	,, —	100	1909	,, 350,000	3 500	,, 100	,, 350,000	—	—
Kombok Rubber Co	,, 25	,, 85	32	1906	$ 300,000	30,000	$ 100	$7. per Share	—	—

PHILIPPINE SHARE REPORT

Courtesy B. A. Green, General Share, Bond and Investment Broker —*Manila, P. I., February 10, 1911.*

Name	Closing Quot'n	When Incorporated	Authorized Capital	Issue Value of Shares	Number of Shares	Number of Shares Subscribed	Paid up	Reserve Fund	Working Account	Date	Last Dividend
American Drug Store		1908	₱ 100.000	₱1,000	100	51	₱1,000	₱5,000	₱ 50,000	June 30, 1910.	
Antamok Valley Mining Co	₱0.40	1909	500.000	1	500,000	320,000	1				First year
Banco Español Filipino	₱255.	1851	3,000.000	200	15,000	15,000	200	408,715		July 1, 1910.	10% for 1910
Bayhay Valley Oil Co	100.	1909	100,000	100	1,000		100				First year
Benguet Commercial Co	85.	1908	200.000	100	2,000	736	100				8% for 1906
Benguet Consolidated Mining Co	0.50	1903	2,000,000	2	1,000,000	495,000	2				
Bua Mining Co. Common	90.	1905	750.000	100	7,000	3,366	100				
Bua Mining Co. Preferred	140.			100	500	500	100				
Cadwallader-Gibson Lumber Co		1908	1,000.000	100	10,000	8,650	100				
Camote-Clayton Mining Co		1909	400,000	10	40.000	26,000	10				
Compania Maritima	65.	1894	510,000	100	5,100	5,100	100				First year
East Batan Coal Mining Co	33.	1909	3,000,000	50	60.000	40,000	50				20% for 1902
El Varadero de Manila	80.	1885	450,000	100	4,500	4,500	100	288,955	134,715	Aug. 31, 1910	First year
Electrical Supply Co		1909	100,000	100	1,000	280	72				3½% interim 1910
Export & Import Lumber Co		1908	200.000	200	1,000	1,000	200				First year
Escolta Press Inc	100.	1907	50,000	100	500	320	100				
Fabrica de Hielo de Manila	58.	1894	350,000	50	7,000	7,000	50				12% for 1909
Germinal Cigar Factory	525.	1900	1,500,000	500	3,000	3,000	500				14% for 1910
H. E. Heacock & Co		1909	100,000	100	1,000	800	100				12% for 1909
Headwaters Mining Co	10.	1908	600.000	10	60,000	59.800	10				First Year
Insular Lumber Co	140.	1907	2,000,000	200	10,000	9,000	200				
Lepanto Mining Co		1906	1,000,000	100	10,000	8,000	100				
Juan Seiboth Co		1908	150,000	20	7,500	500	20				
La Concha Button Factory	90.	1905	75.000	100	750	530	100				
Los Banos Improvement Co	150.	1908	100,000	200	500	500	200				15% for 1909
Lambert, Springer Co		1908	200.000	1,000	200	80	1,000				16% for 1908
Luzon Stevedoring Co	25.	1909	250,000	25	10 000	4 200	·25				
Luzon Sugar Refining Co	18.	1882	700,000	100	7,000	7,000	100				
Manila Electric Ry. & Light Co	130.	1903	12,000,000	200	60 000		200				3% for 1907
Manila Hotel Co	100.	1909	400,000	100	4,000	3,500	100				4% for 1909
Mindanao Herald Publishing Co		1907	15.000	100	150	75	100				Under Construction
Muyot Mining Co.	3.30	1909	500,000	10	50,000		10				½% for 1908
Paracale Gold Dredging Co	15.	1907	£10.000	£1	10,000	10,000	£1				First Year
Paracale Ext. Gold Dredging Co	10.	1909	₱450.000	₱10	45,000		₱10				£1 for 1908-9
Philippine Publishing Co	120.	1907	600.000	200	3,000	2,187	200				First Year
Philippine Co., Ltd.	5.	1904	750,000	10	75,000	75,000	10				10% for 1910
Philippine Gold Dredging Co	8.	1907	200,000	10	20.000	20,000	10				
Philippine Exploration Co		1908	2,000,000	10	200,000	120,000	10				
Port Banga Lumber Co		1908	100,000	100	1,000	934	100		40,000	Oct 1, 1910.	
Rosenstock Publishing Co		1908	75.000	10	7,500	6 000	10				
San Nicolas Iron Works	100.	1901	300.000	500	600	600	500				
San Mauricio Gold Mining Co		1908	4,000,000	200	20,000	20,000	200				15% for 1903
Sanitary Steam Laundry	20.	1908	100,000	20	5,000	3,900	20				
Tarlac Railway Co	40.	1906	150,000	100	1,500	1,500	100				5% for 1910
Tumbaga Mining Co	0.35	1910	2,000,000	2	1,000,000	772,0 00	2				
Union Hemp Machine Co		1909	50,000	10	5,000	2.600	10				Reorganized 1910
Walter E. Olsen Co	100.	1909	500,000	100	5,000	2,033	100				First Year
Zamboanga Cold Storage Co	125.	1903	40,000	100	400	200	100				20% for 1909

PHILIPPINE BONDS

	Dated	Authorized	Issued	Outstanding	Par Value	Rate of Int.	When payable	Last Quotation
Philippine Friar Land Bonds	Feb. 1st. 1904	$7,000,000	$7,000 000	$7,000,000	$ 100	4%	Feb. 1, 1914	101½
Public Works and Permanent Improvement Bonds	March 1, 1905	$5,000,000	$2,500,000	$2,500,000	$ 100	4%	March 1 1915	101½
Do.	Feb. 1, 1906		$1 000,000	$1,000,000	$ 100	4%	Feb. 1, 1916	101½
Manila Sewer and Water Works Improvement Bonds	June 1, 1905	$4,000,000	$1,000,000	$1,000,000	$ 100	4%	June 1, 1915	101½
Do.	Jan. 2, 1907		$2,000,000	$2,000,000	$ 100	4%	Jan. 2, 1917	101½
*Philippine Railway First Mortgage Four per cent Thirty Year Sinking Fund Gold Bonds	July 1, 1907	$15,000,000	$5,736,000	$5,736,000	$1000	4%	July 1, 1937	95
B. P. O. Elks. First Mortgage 7% Five-Fifteen Year Sinking Fund Gold Bonds	July 1, 1908	$75,000	$15,000	$45,000	$ 50	7	July 1, 1923	50½

*Payment of interest guaranteed until maturity or redemption by the Philippine Government

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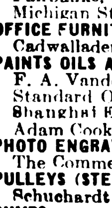

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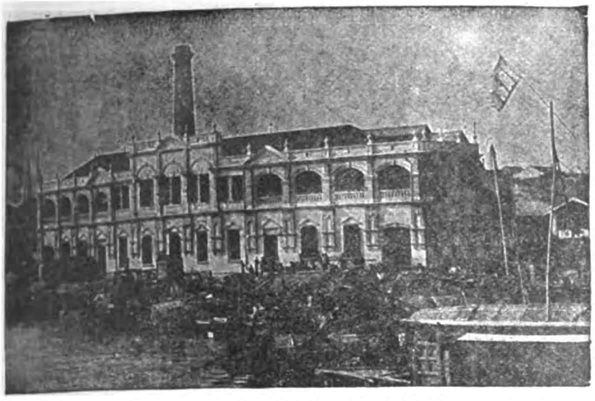

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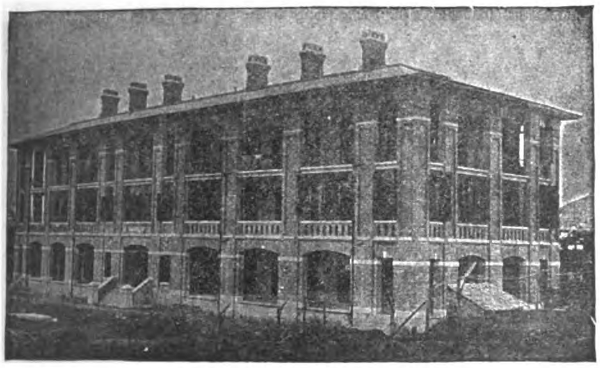

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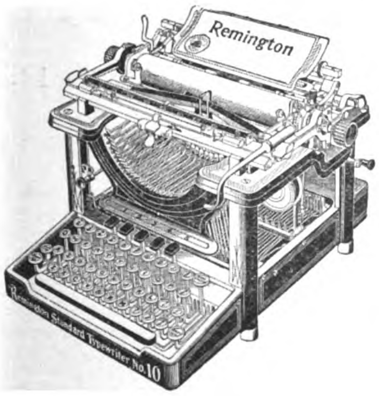

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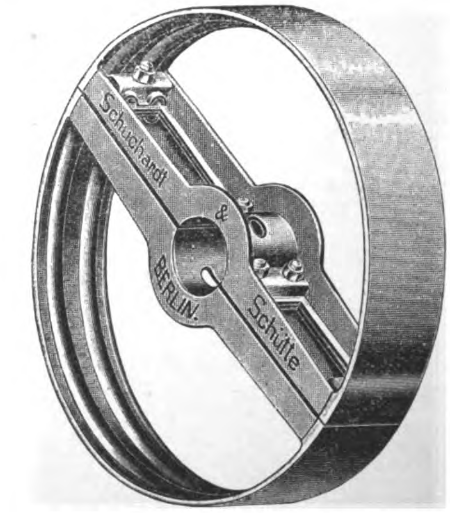

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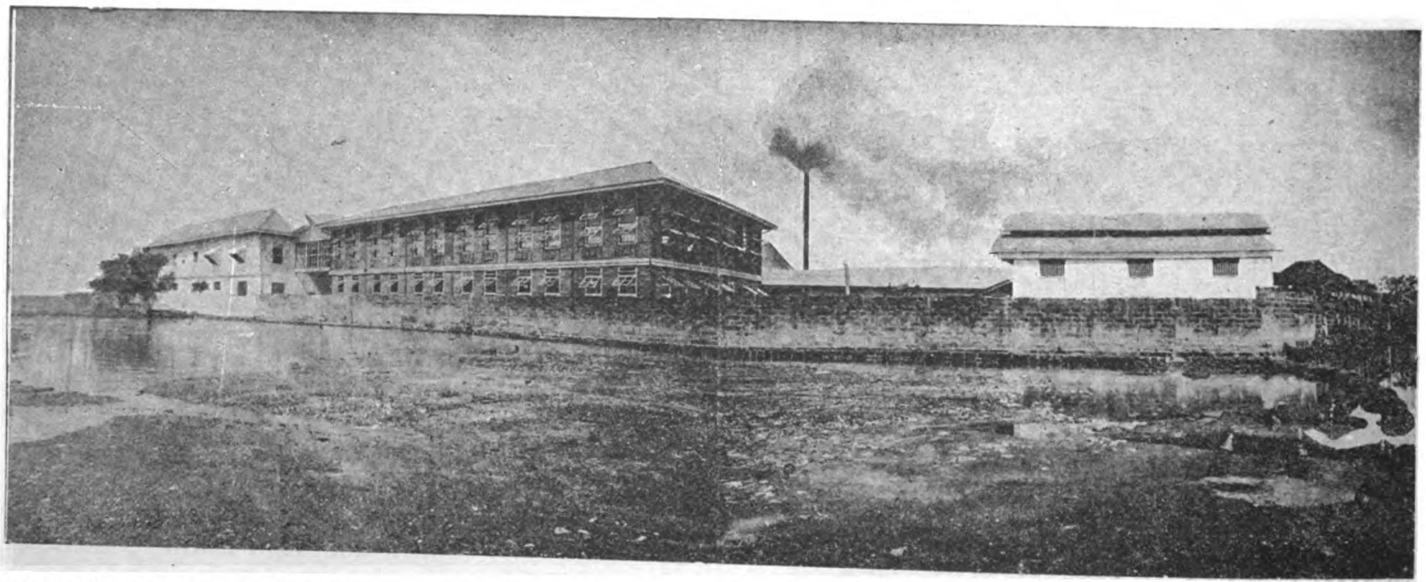

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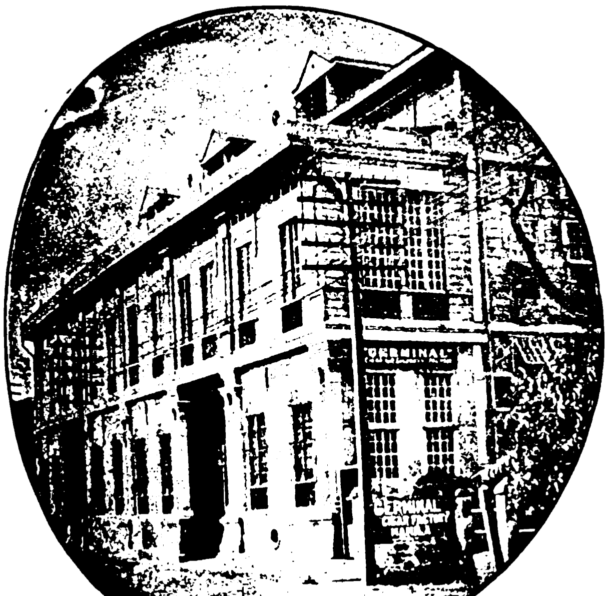

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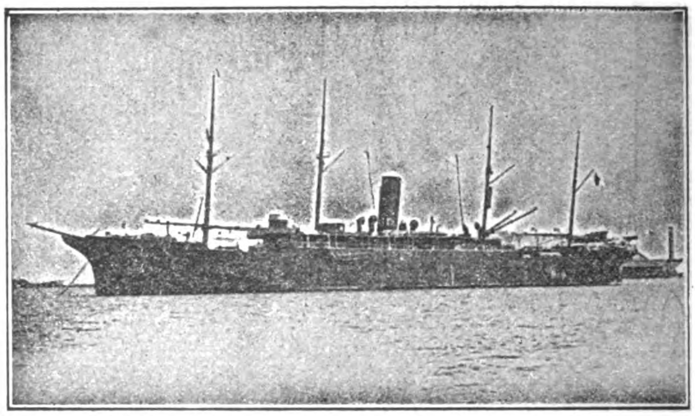

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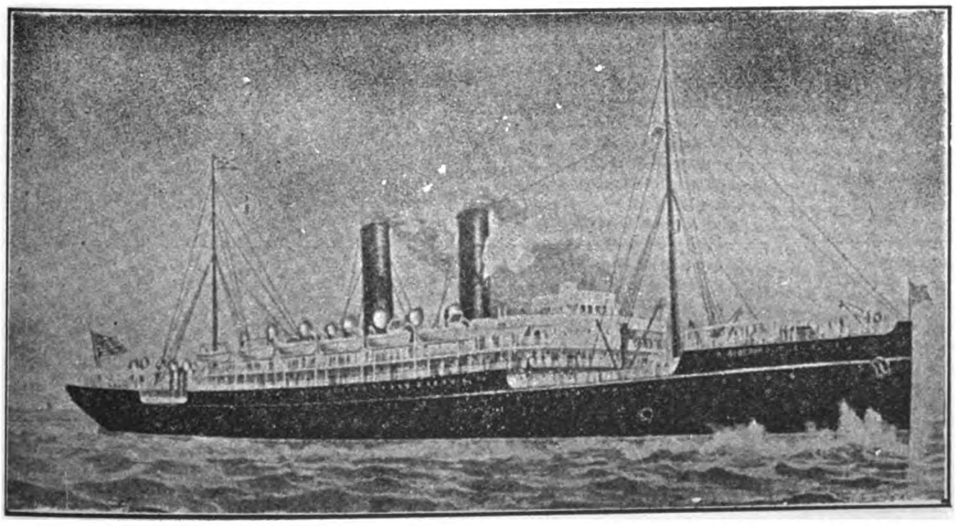

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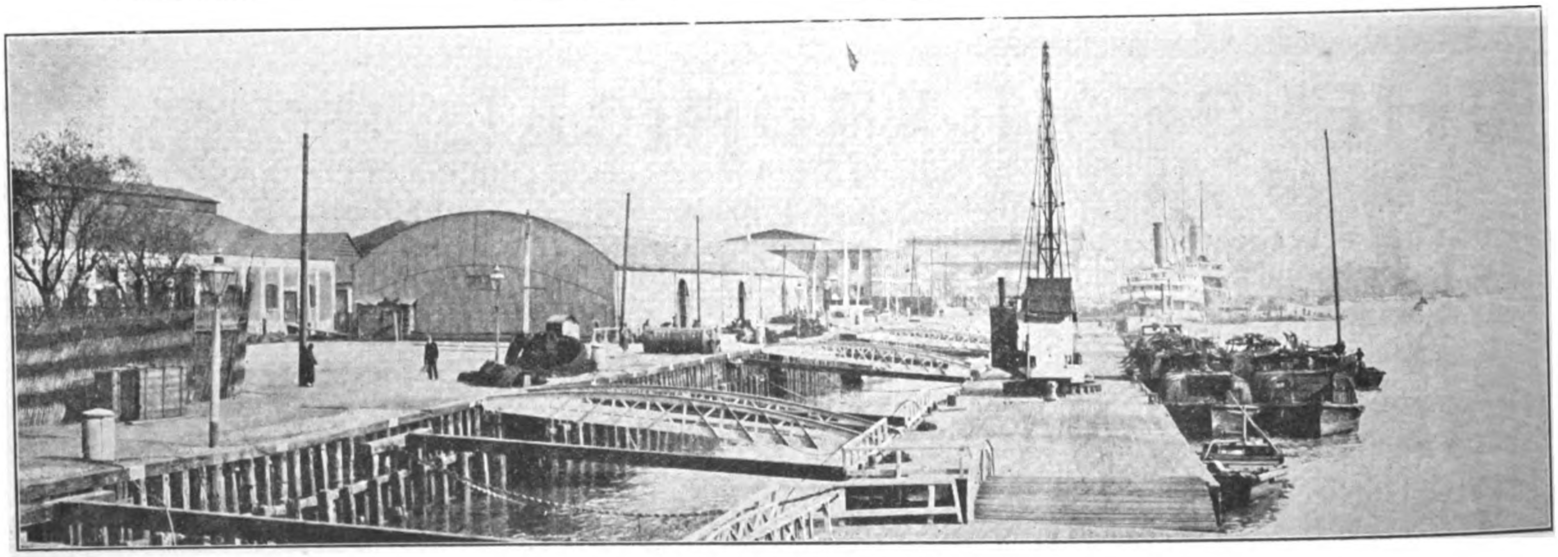

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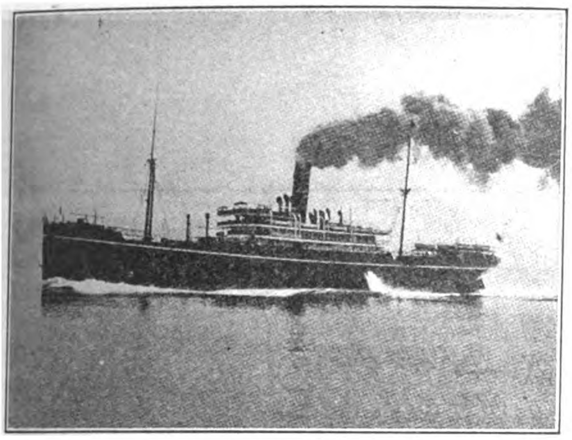

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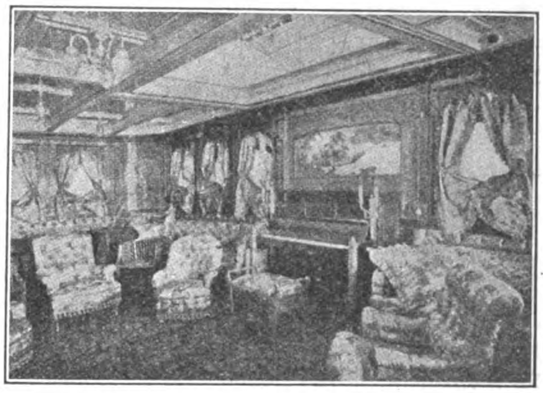

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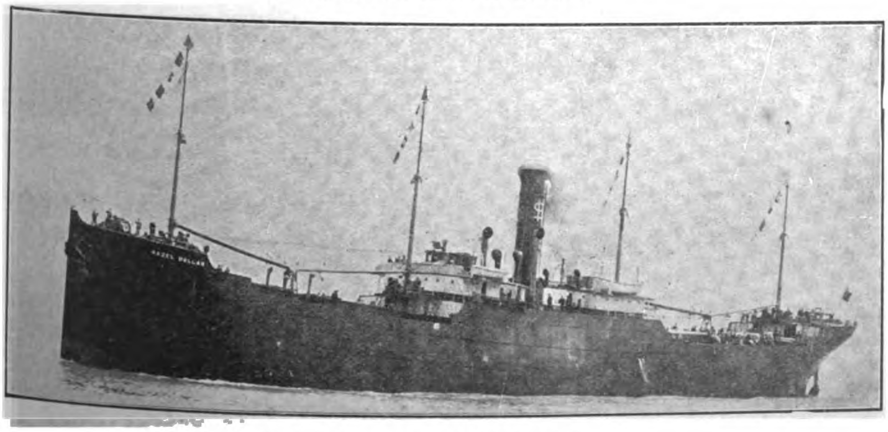

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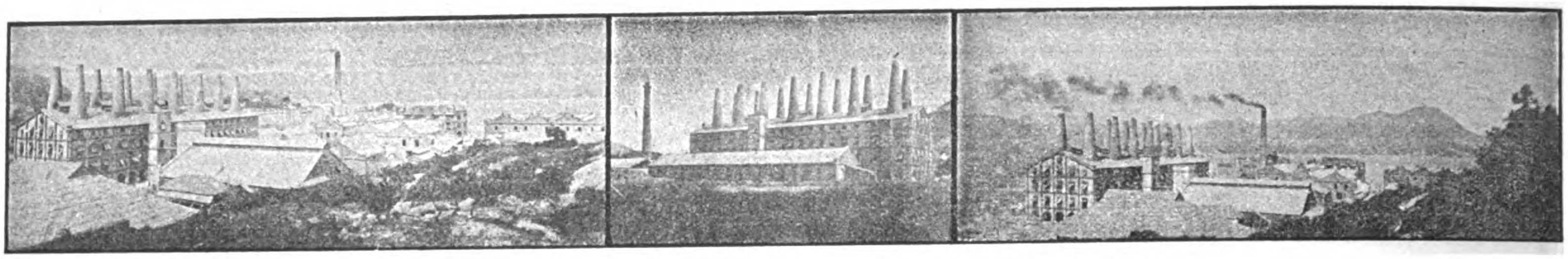

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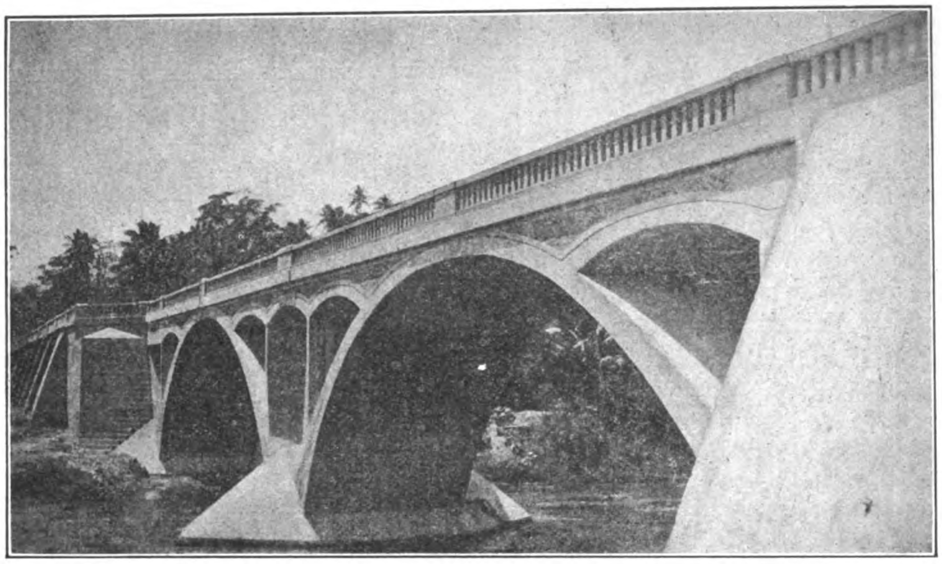

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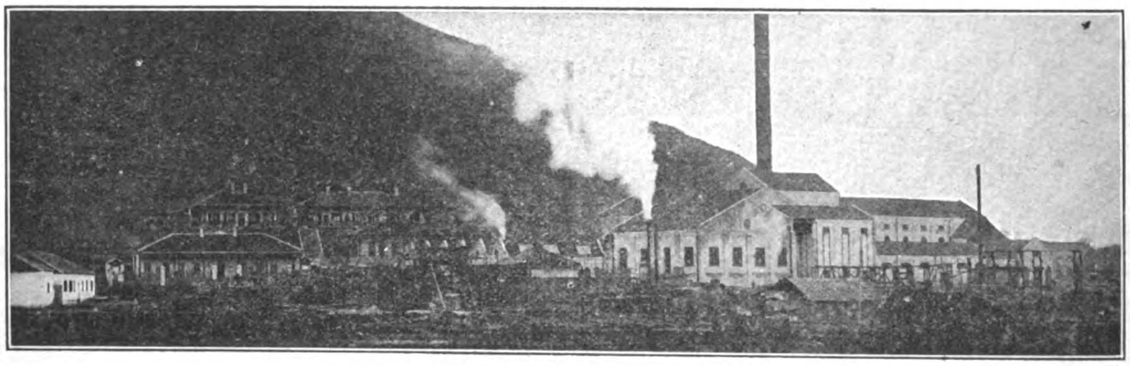

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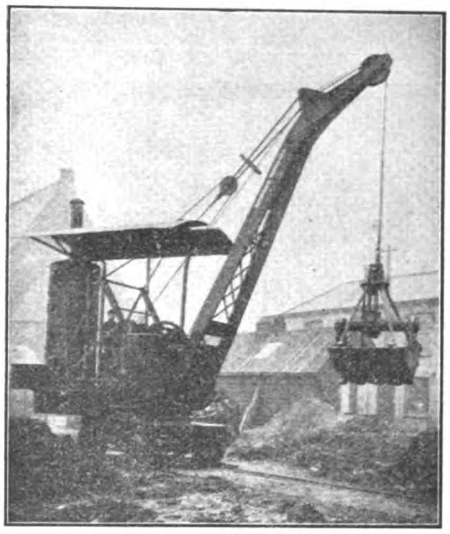

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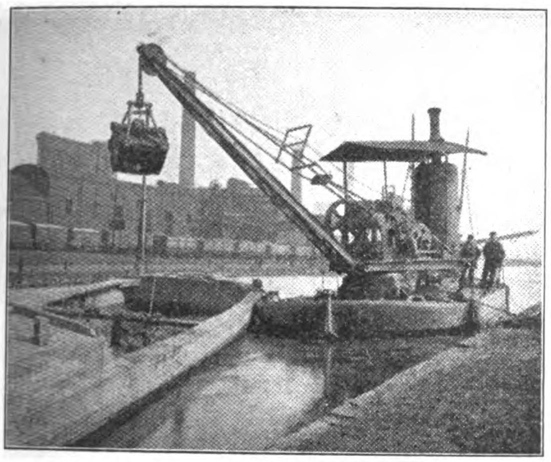

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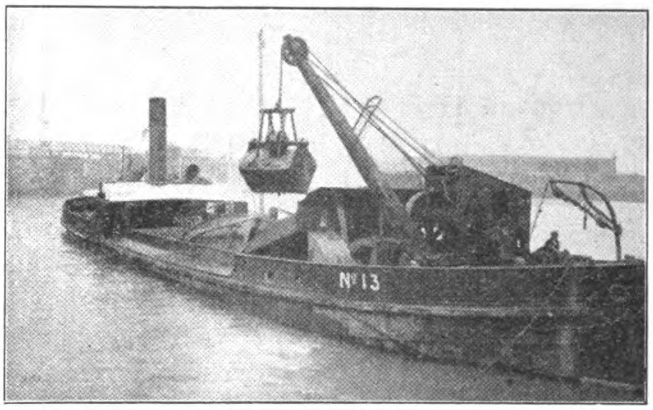

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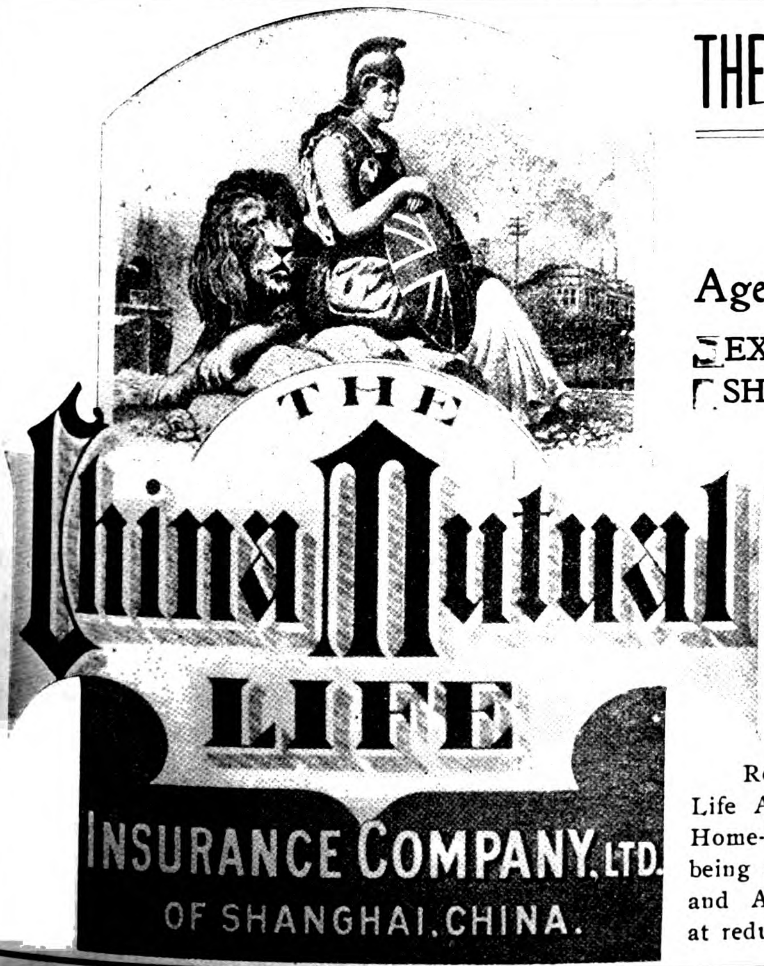

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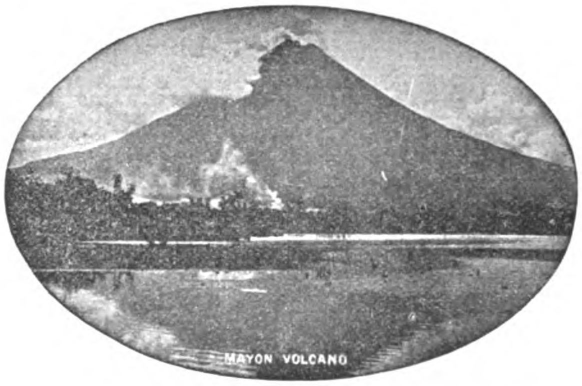

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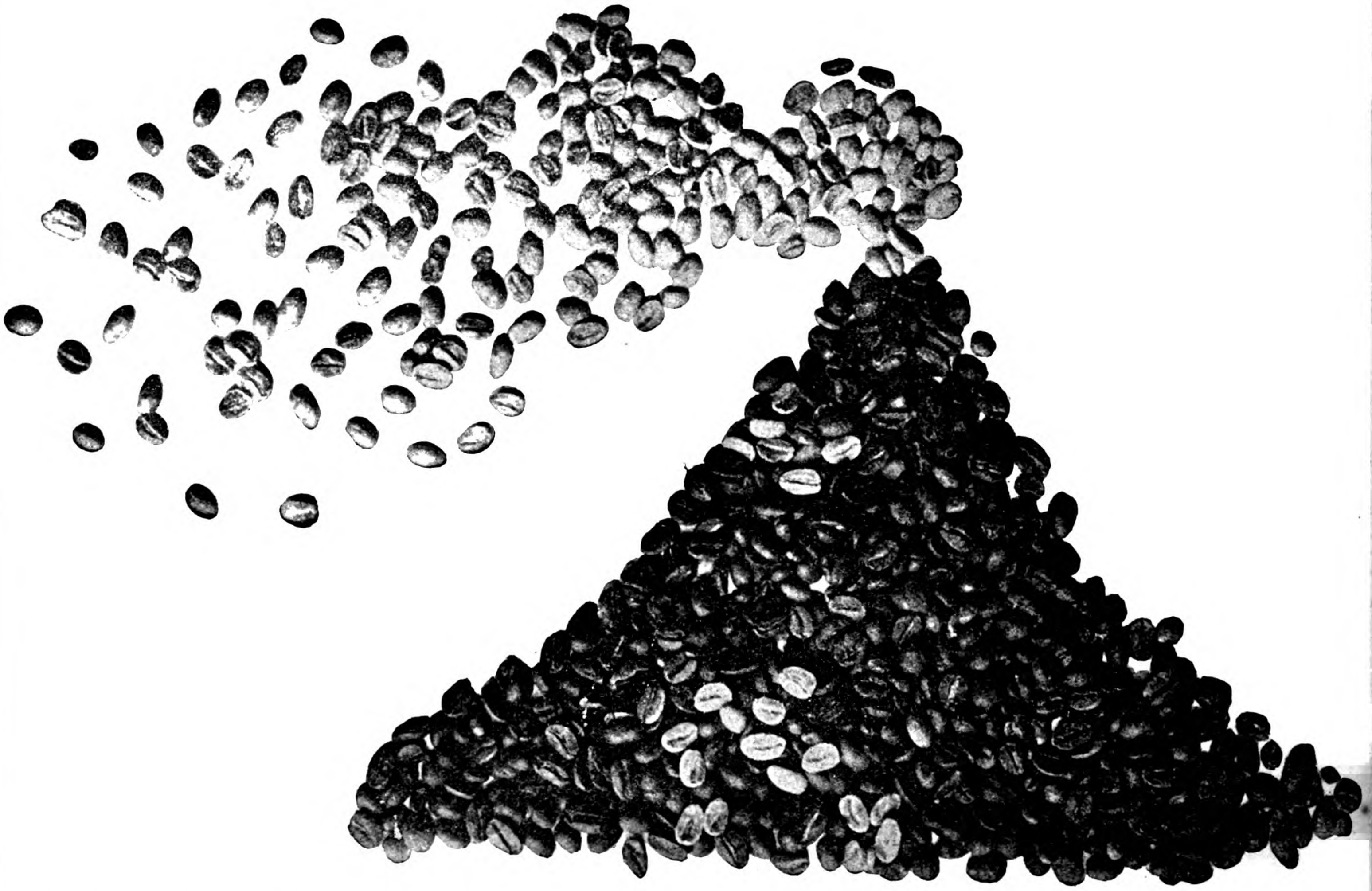

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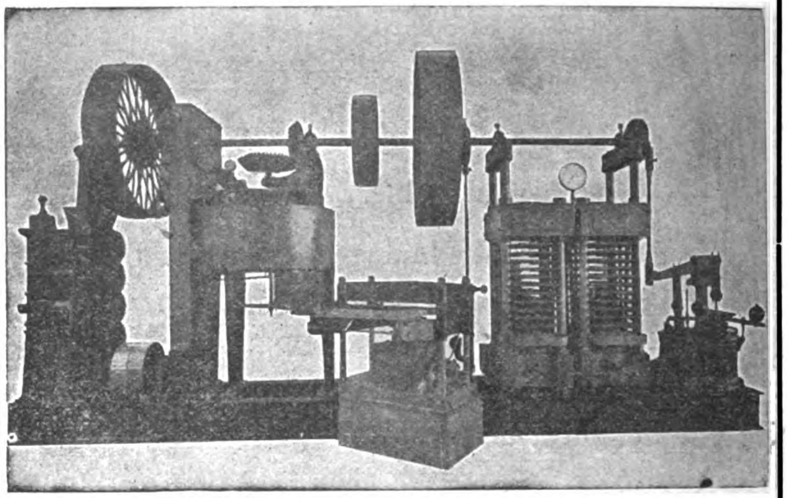

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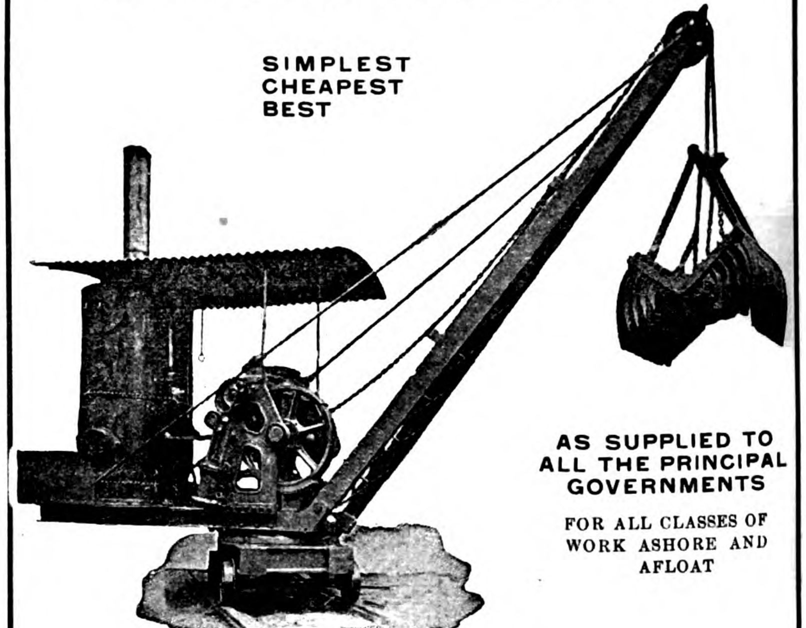

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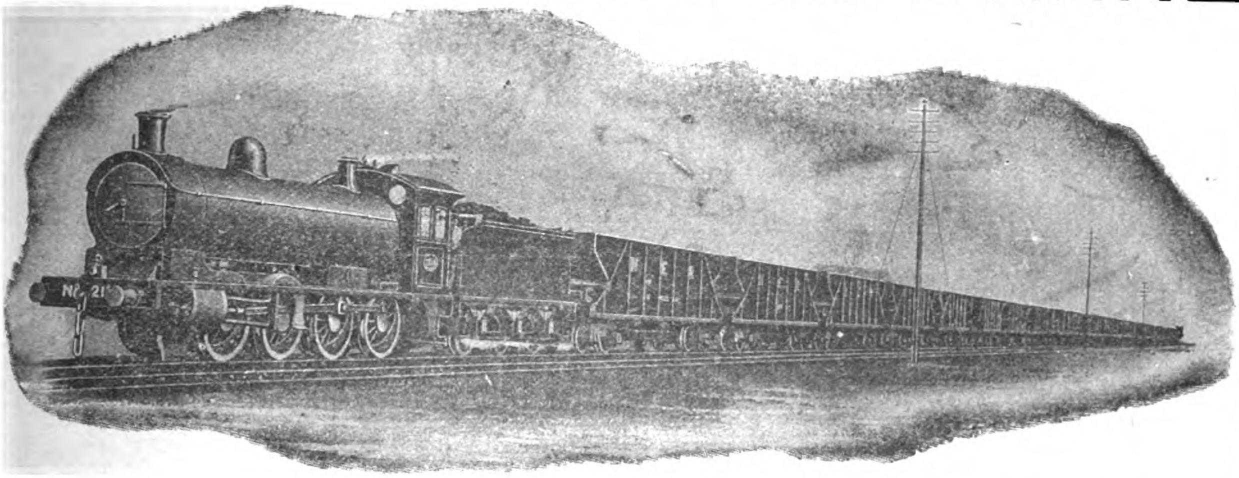

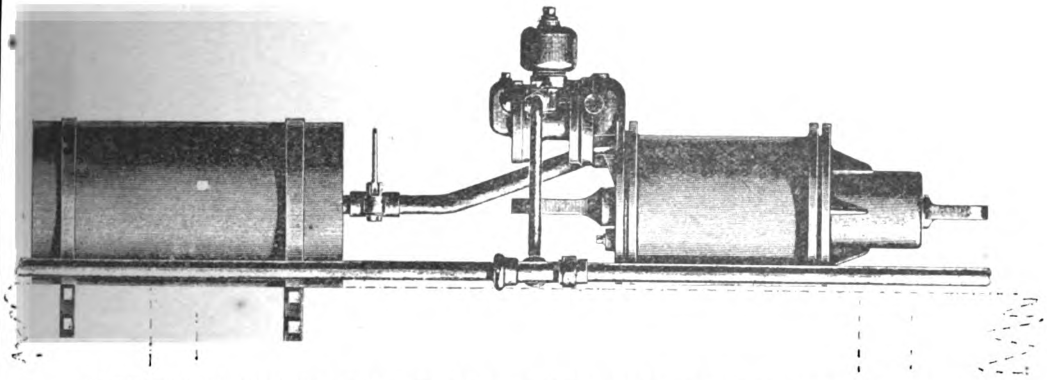

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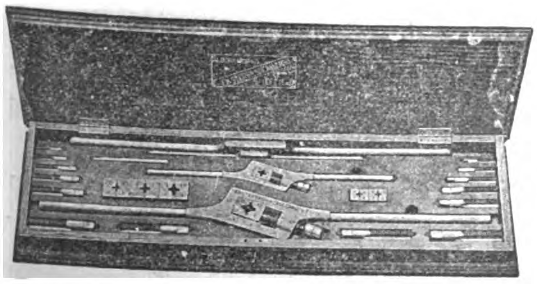

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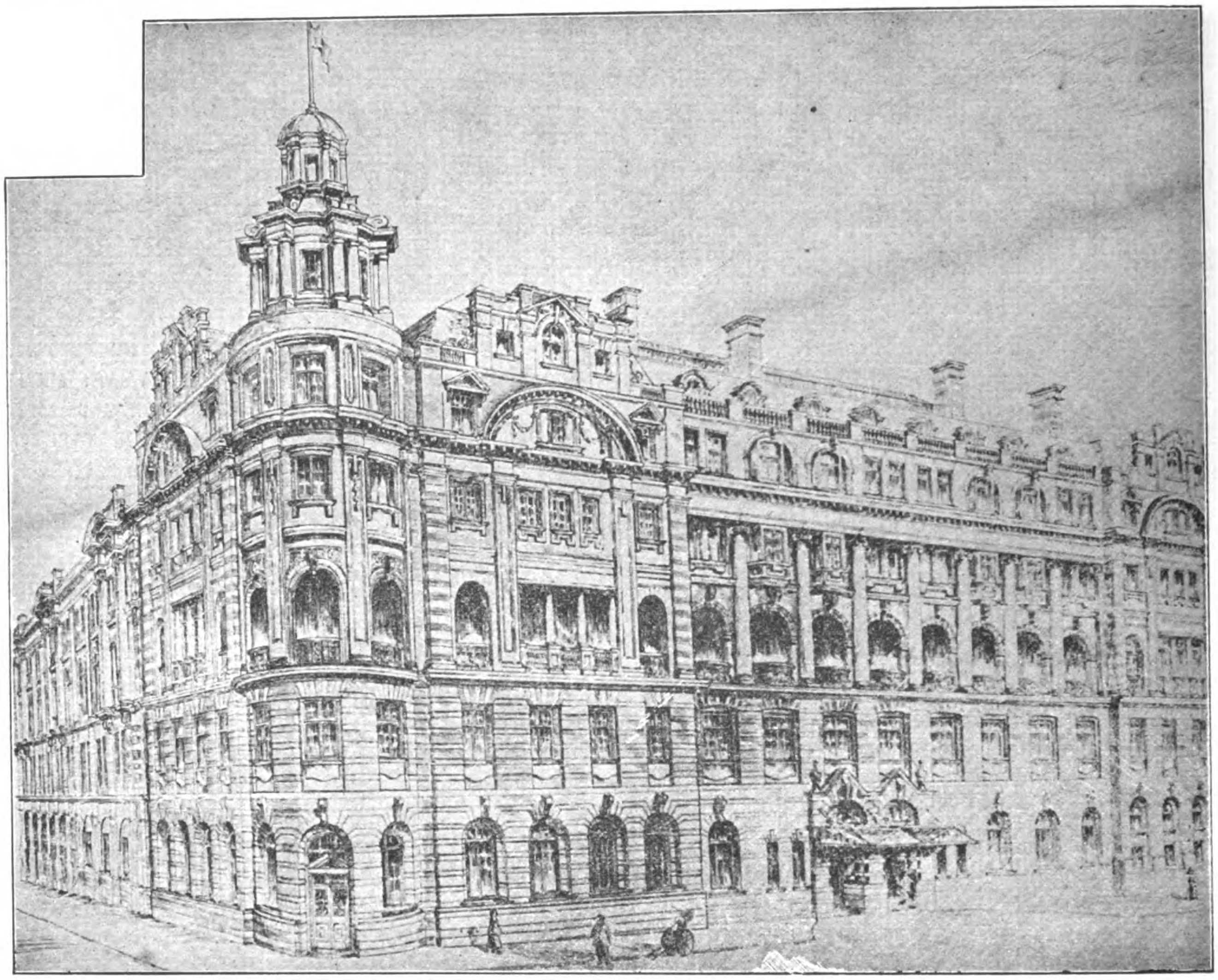

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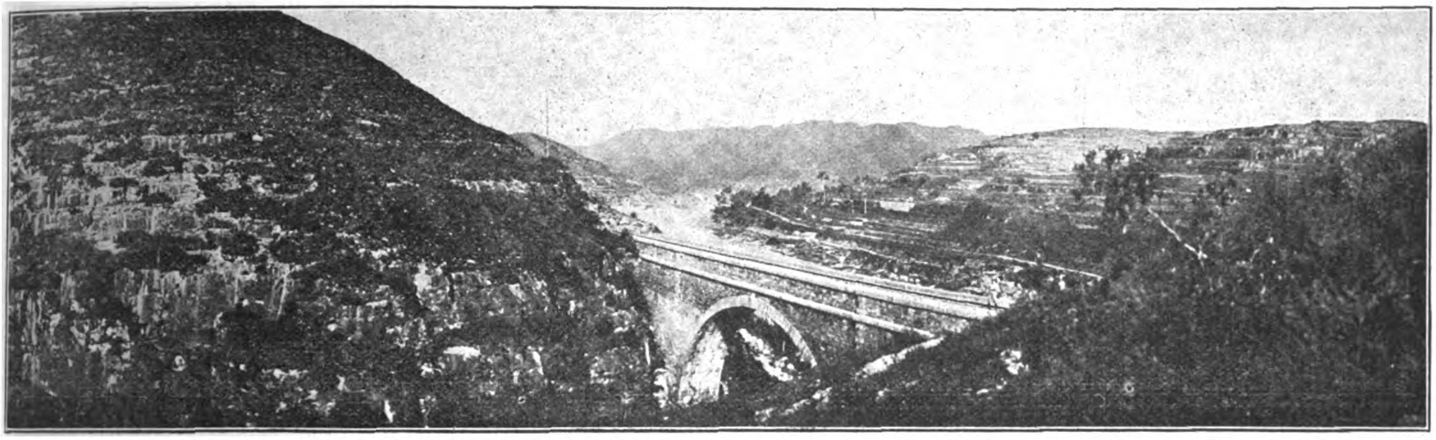
SHANGHAI, CHINA

IMPERIAL CHINESE RAILWAYS

The Cheng-Tai Railway

(IMPERIAL GOVERNMENT SHANSI LINE—CHENGTINGFU TO TAIYUANFU)

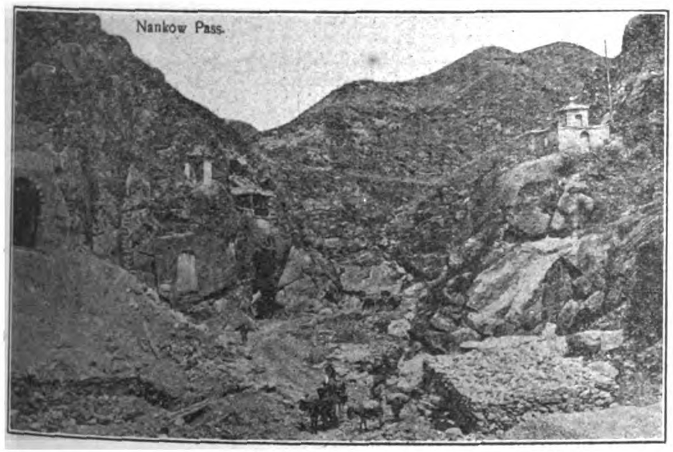


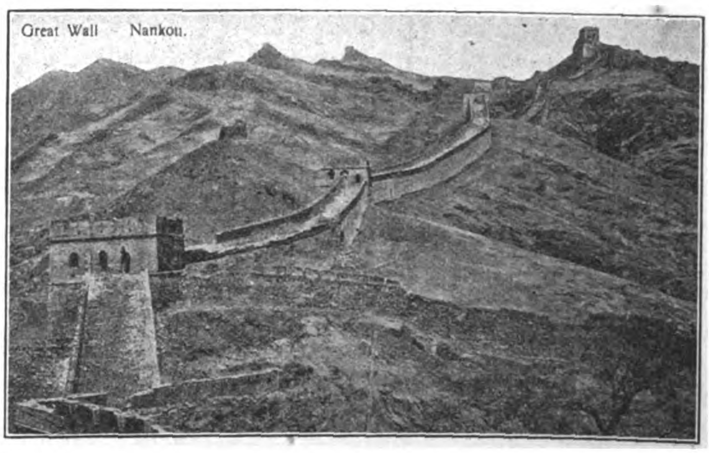
VIEWS ALONG ROUTE OF CHENG-TAI RAILWAY.

The trains of this line connect with the through service of the Peking-Hankow Railway, affording Travellers the opportunity of seeing the most picturesque part of China. The line passes through a mountainous section of country, rich in Mineral Resources to the Provincial Capital of Shansi at Taiyuanfu. This interesting city is a great educational center, and famous for the fine quality of its artistic embroideries.

The Peking-Kalgan Line

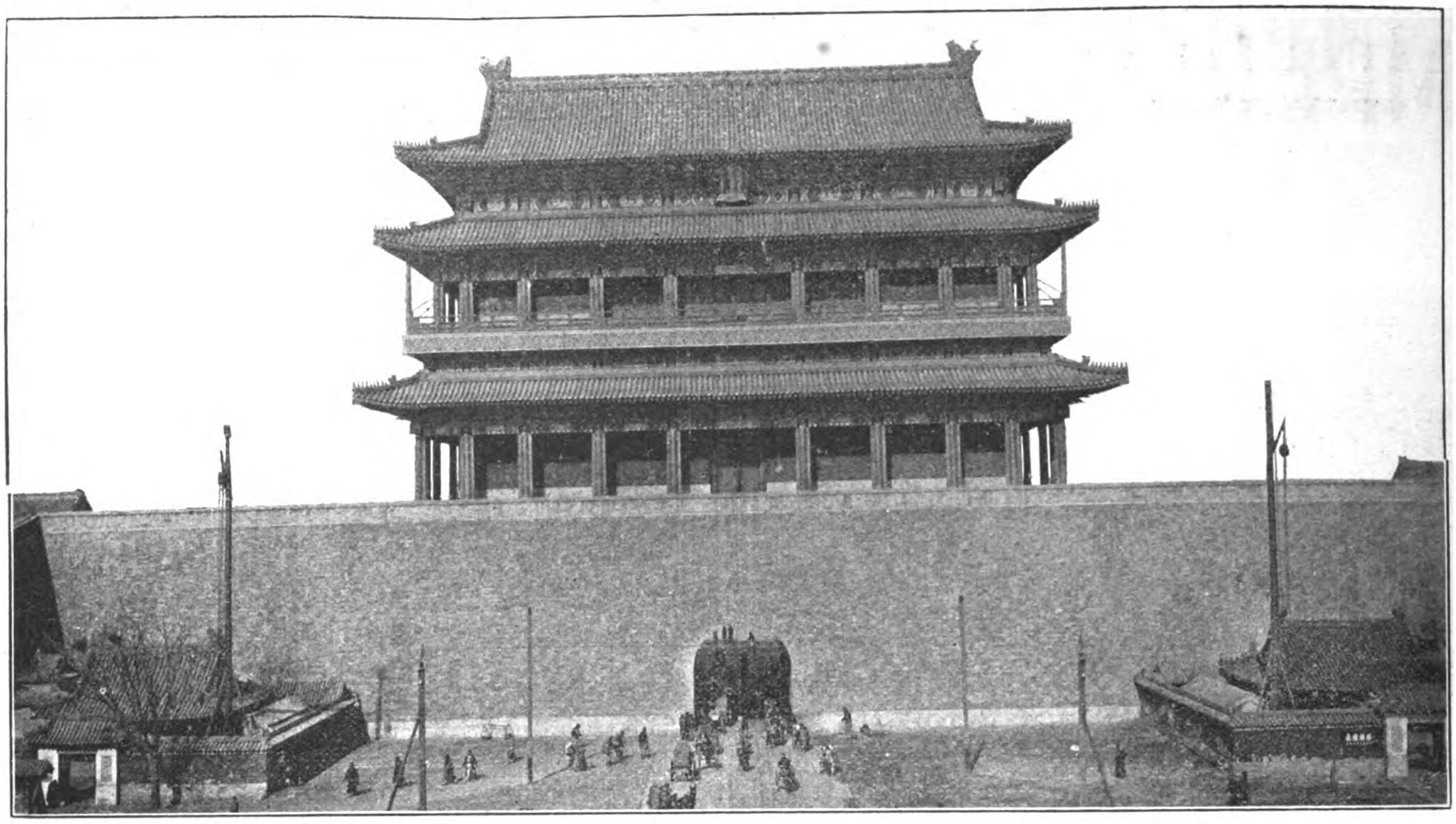
"THE ROAD TO THE GREAT WALL"





This line follows the ancient caravan route and military highway from Mongolia into China by the way of the historic Nankow Pass. This pass is the Key to Peking, and Kalgan is the gate of the Empire. From here the great camel caravans set out on their long journeys across Mongolia to Siberia and Central Asia. This old frontier mart, retaining its time-honored characteristics, one of the most interesting sights of the Old World, is made accessible by the new railway. The line also carries the passenger in two hours from Peking to Nankow, when the Great Wall of China and the Ming Tombs may be seen. A foreign hotel is operated by the railway authorities at Nankow, where chairs and guides may be secured for the Tombs.

TAOTAI JEME TIEN-YU, Director General



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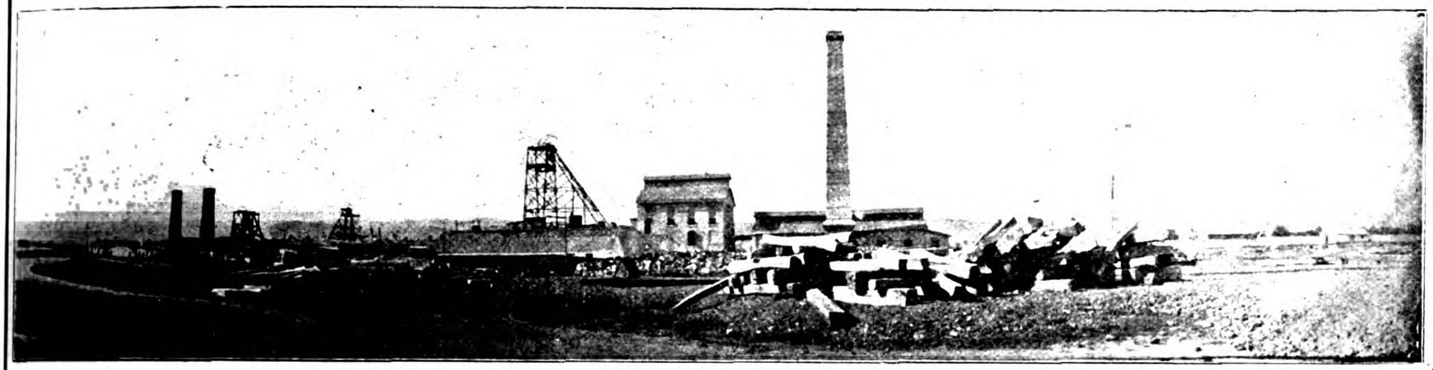
IMPERIAL CHINESE RAILWAYS

THE TAO-CHING RAILWAY

TAOKOU TO CHINGHUA

(Imperial Chinese Government Honan Line)



GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

"China's Road of Anthracite"

THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

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(KAIFENG-FU TO HONAN-FU)

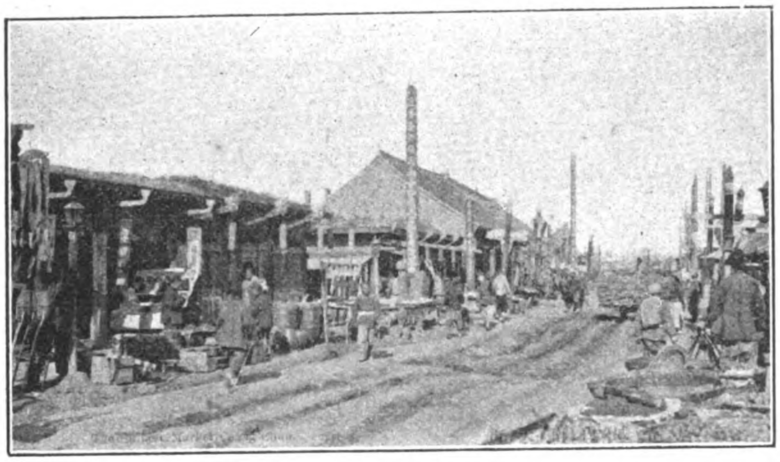
"THE FIRST SECTION OF THE PROJECTED CENTRAL TRUNK LINE"

CHUNG-HUAN TEMPLE, KAIFENG-FU.

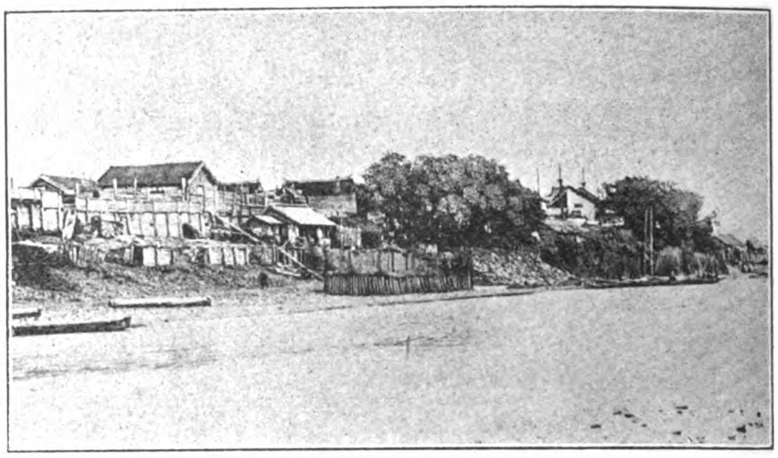
This line connects with the through service of the Peking-Hankow Railway at Chengtingfu, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

IMPERIAL CHINESE RAILWAYS

KIRIN-CHANGCHUN LINE



CHINESE MARKET AT CHANG-CHUN



VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

TIME TABLE

The Kirin-Changchung Railway

DOWN TRAIN

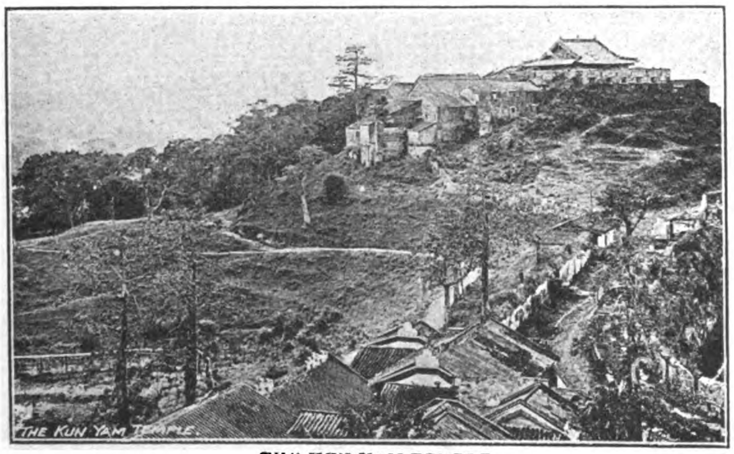
Station	*No. 1* a. m.	*No. 2* a. m.
Changchung	7:00	12:00
Coran	8:17	1:17

UP TRAIN

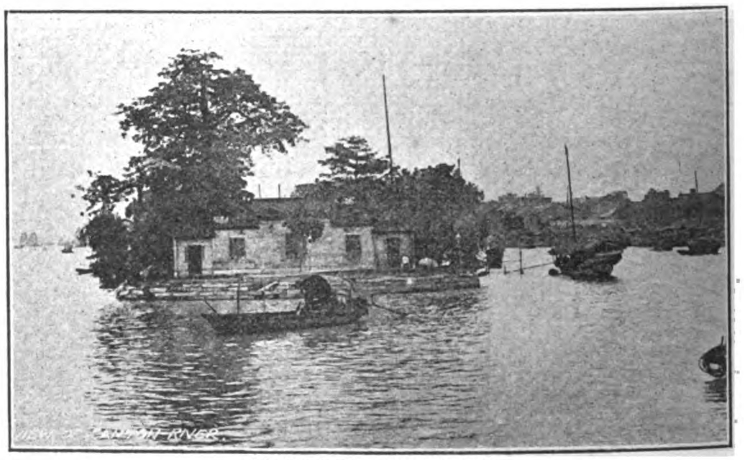
Station	*No. 2* a. m.	*No. 4* p m.
Coran	10:00	5:00
Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS

CANTON-KOWLOON LINE



THE KUN YAM TEMPLE



VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 10th JANUARY 1911 UNTIL FURTHER NOTICE.

Canton (Tai Sha Tou) to Sien Tsun.

Miles	STATION		Daily Passenger Trains. No. 1 A. M.	No. 3 P. M.
	Canton (TAI SHA TOU)	dep	7.30	2.00
3.63	Shiek Pai	arr	7 39	2.09
		dep	7.42	2 12
7.90	Che Pi	arr	7 53	2-23
		dep	7.57	2.27
12.58	Wu Chung	arr	8 08	2.38
		dep	8.11	2 41
17.09	Nam Kong	arr	8.22	2 52
		dep	8 26	2.56
21.67	Sun Tong	arr	8.38	3.08
		dep	8.41	3.11
23.61	Tong Mei	arr	8.46	3 16
		dep	8 50	3 20
25.54	Nga Yeo	arr	8 55	3 25
		dep	8 58	3.28
29.00	Sien Tsun	arr	9.07	3.37

Sien Tsun to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2 A. M.	No. 4 P. M.
	Sien Tsun	dep	9.25	4 00
3 46	Nga Yeo	arr	9 34	4 09
		dep	9.37	4.12
5 39	Tong Mei	arr	9.42	4.17
		dep	9.46	4.21
7.33	Sun Tong	arr	9 51	4.26
		dep	9 54	4.29
11.91	Nam Kong	arr	10.06	4 41
		dep	10 10	4 45
16.42	Wu Chung	arr	10 21	4.56
		dep	10.24	4 59
21.10	Che Pi	arr	10 35	5.10
		dep	10.39	5.14
25 37	Shiek Pai	arr	10 50	5 25
		dep	10 53	5.28
29.00	Canton (TAI SHA TOU)	arr	11.02	5 37

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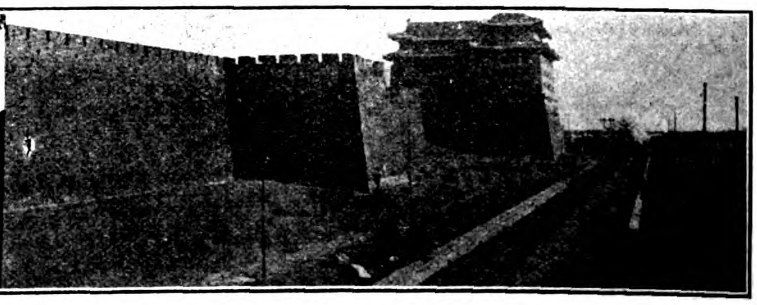
STREET SCENE AT SHANHAIKUAN



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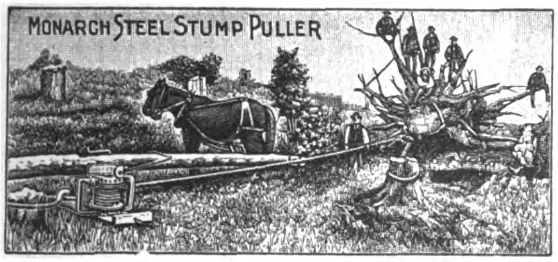

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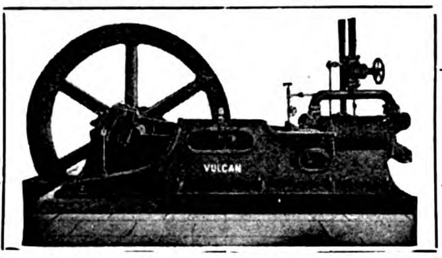
VUL  **CAN**

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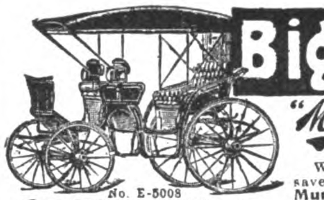

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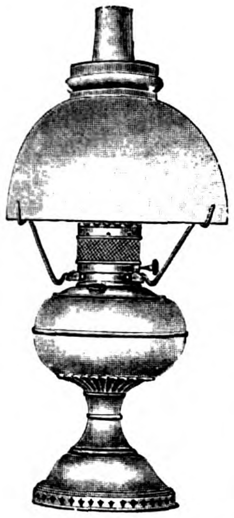

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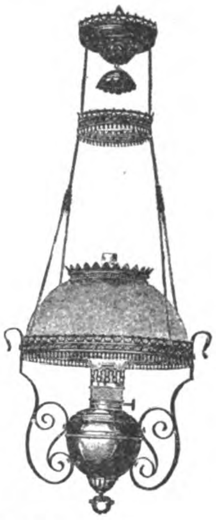

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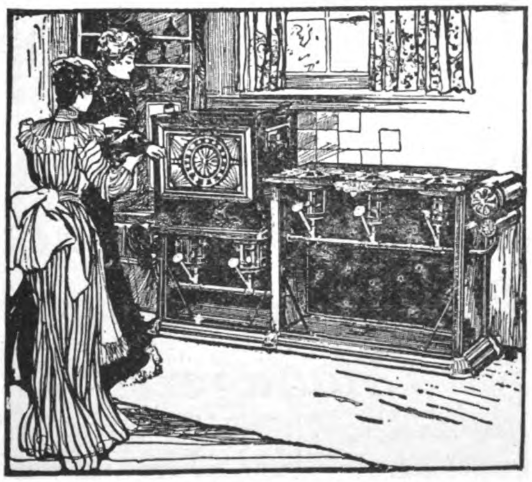

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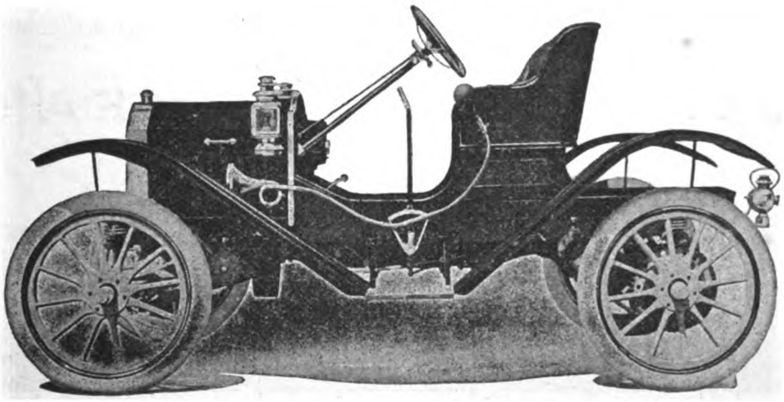

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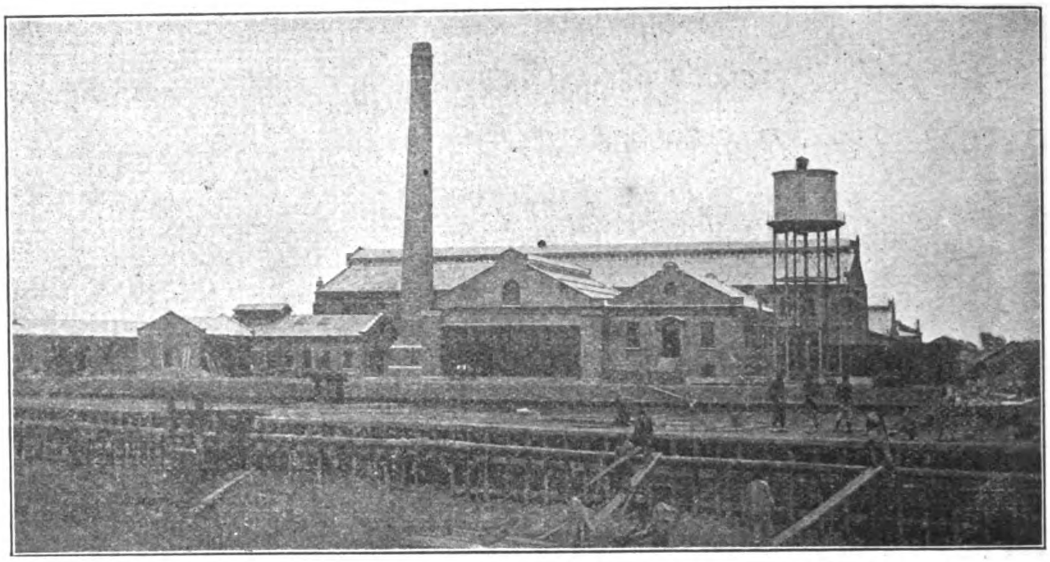

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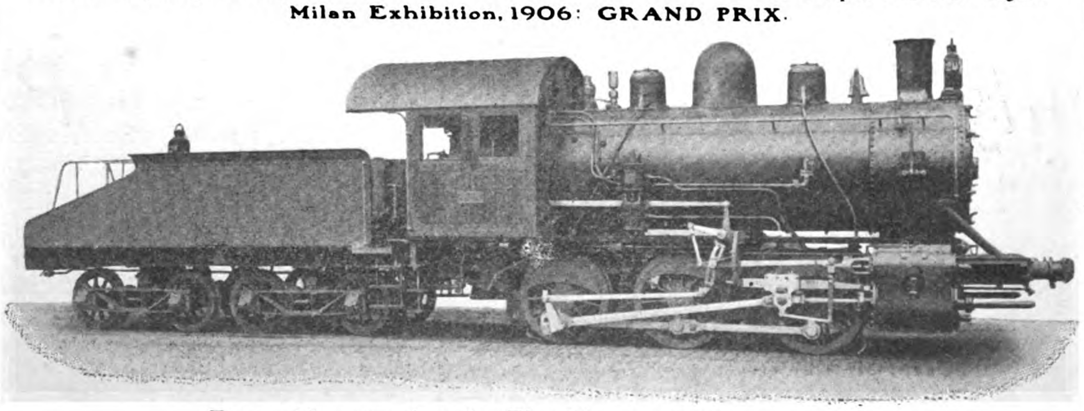

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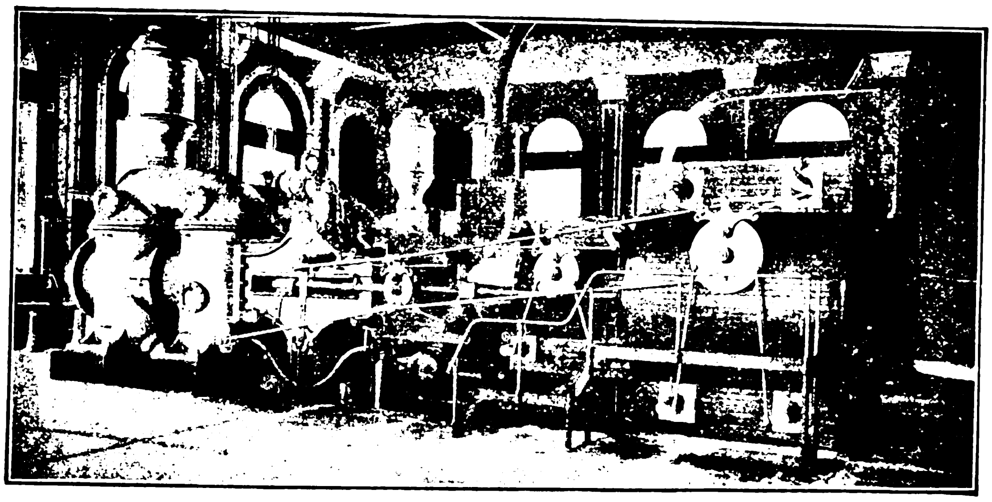

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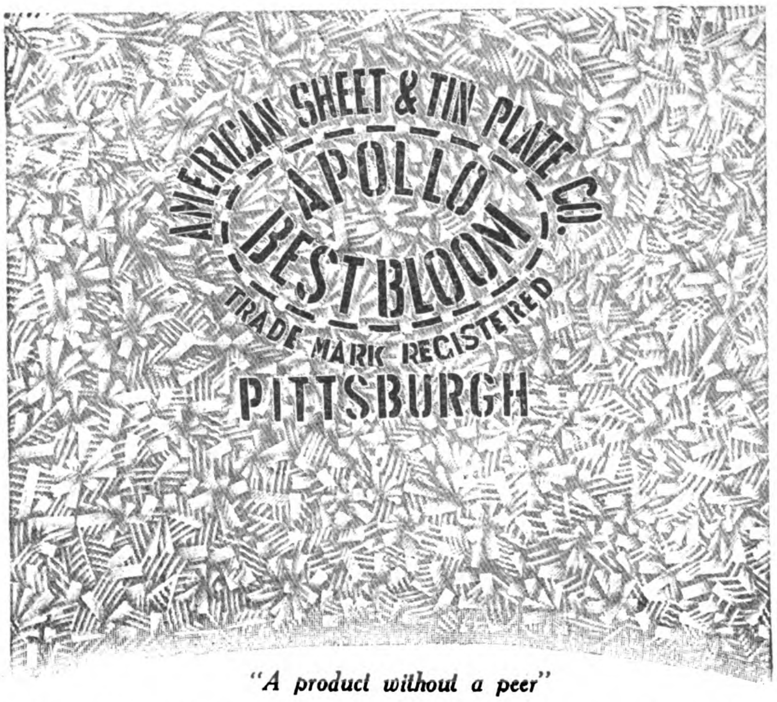

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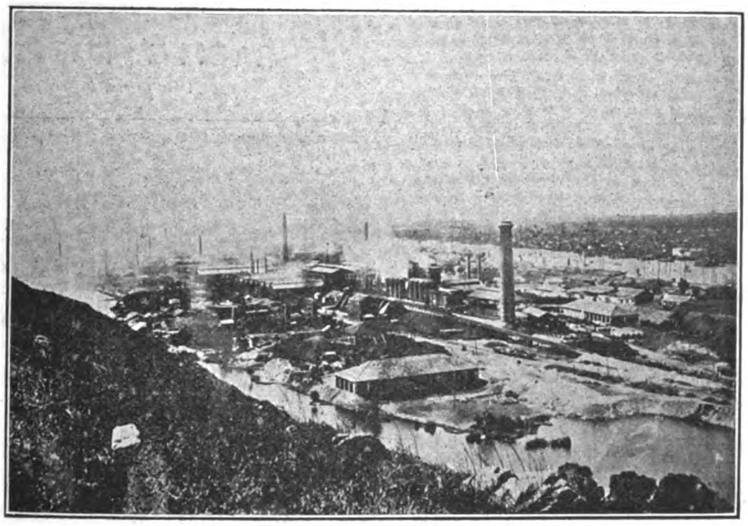

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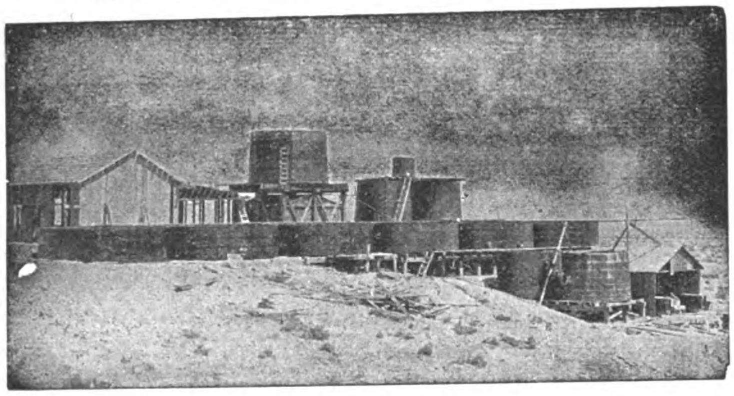

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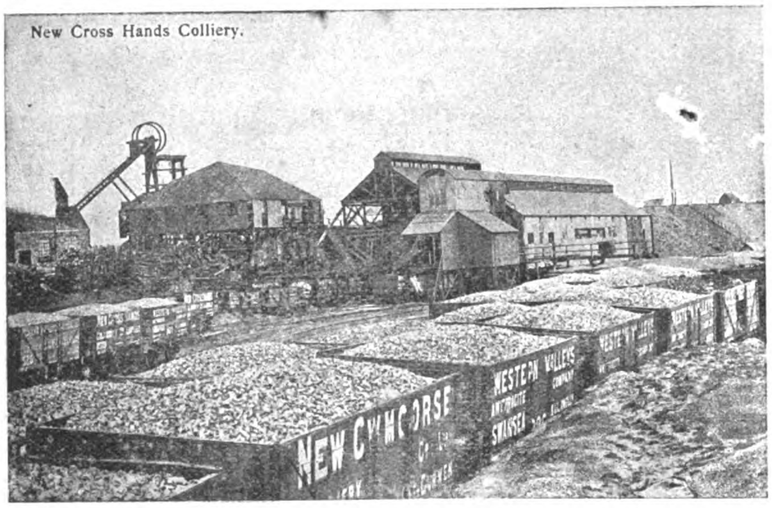

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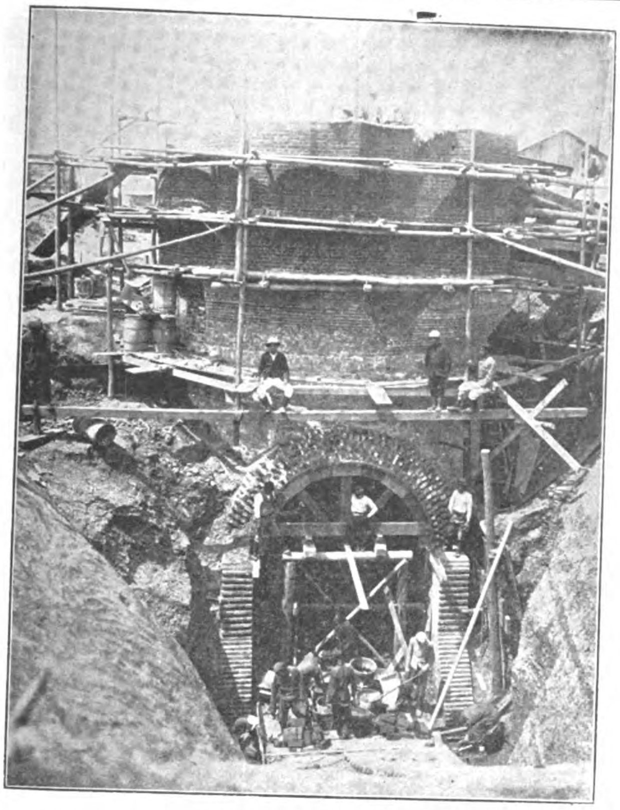

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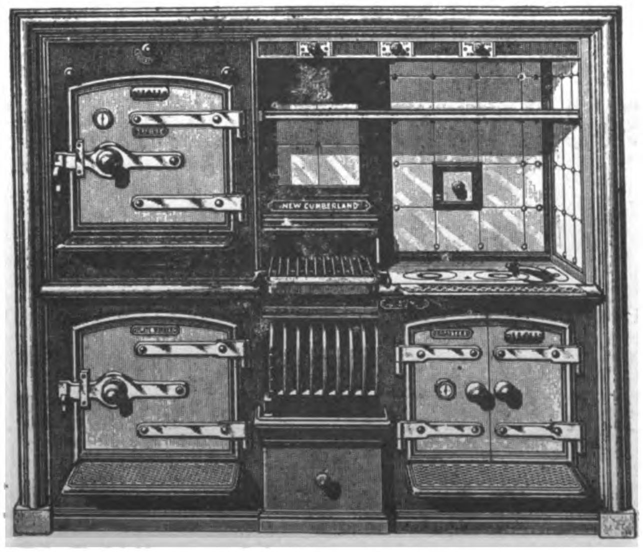

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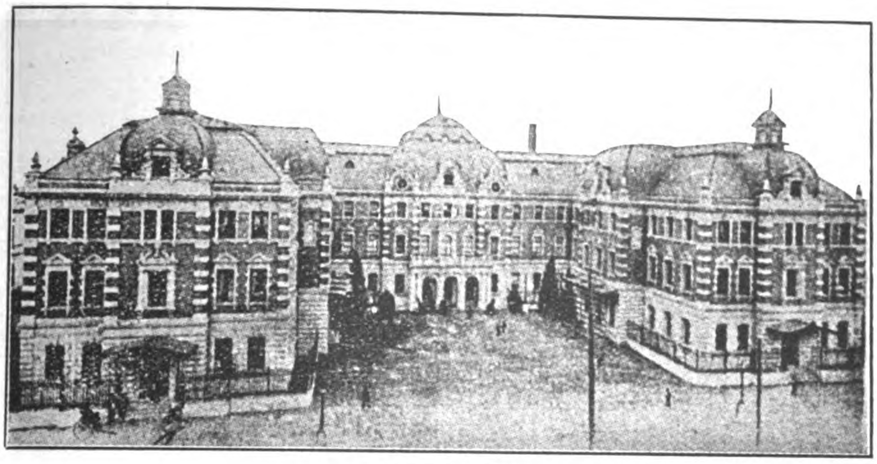

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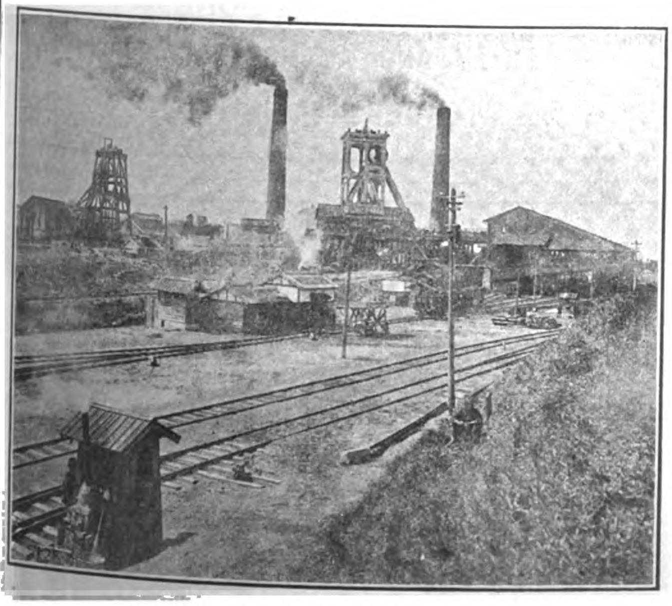

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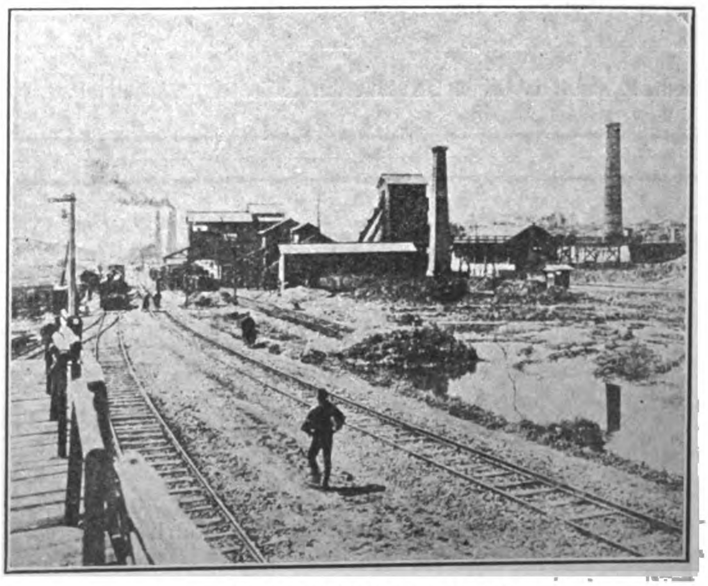

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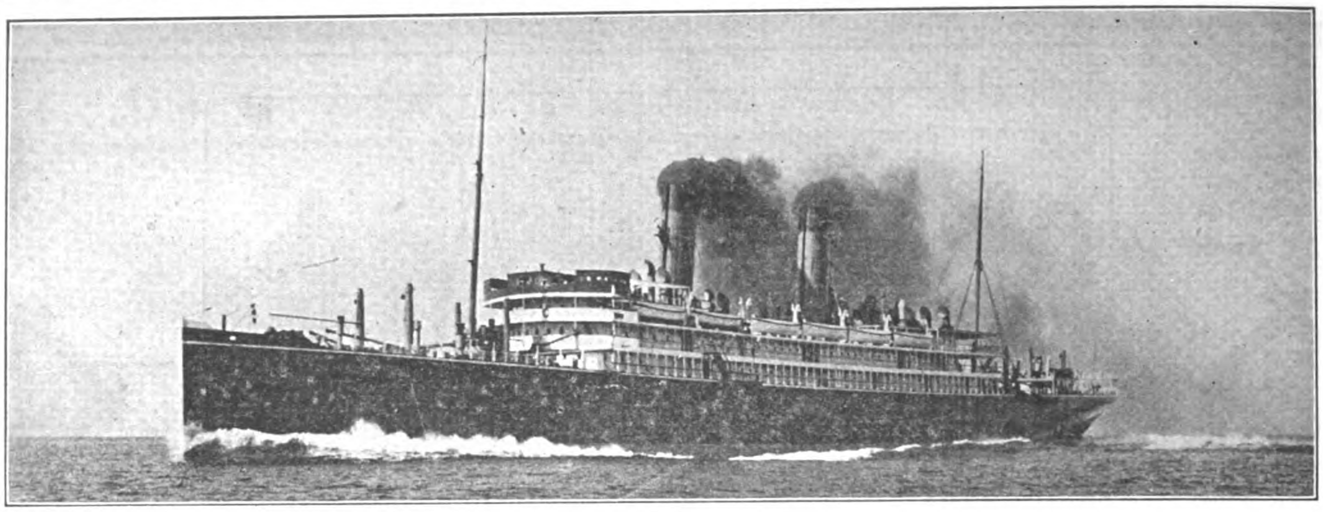

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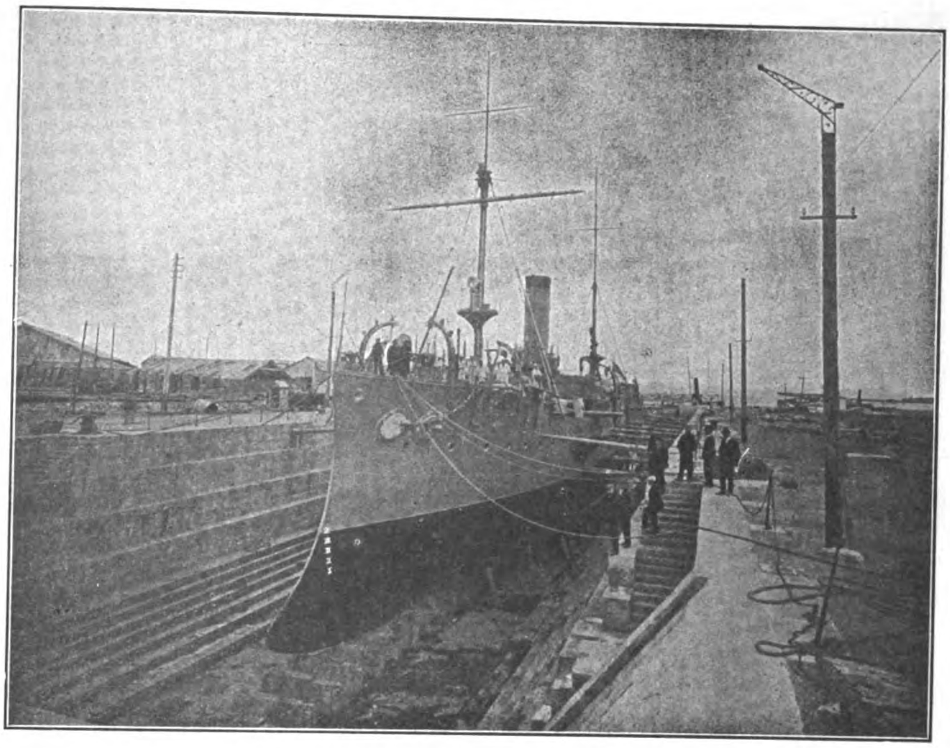

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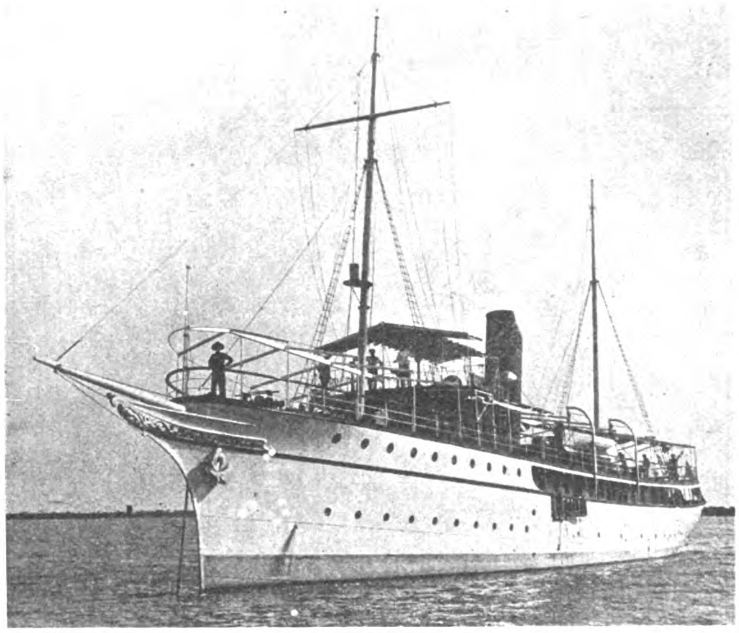

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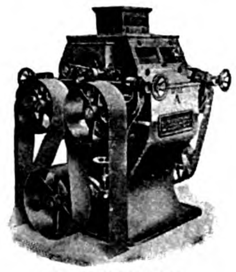

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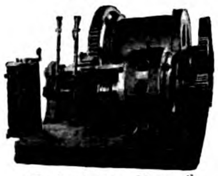

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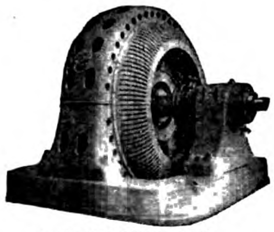

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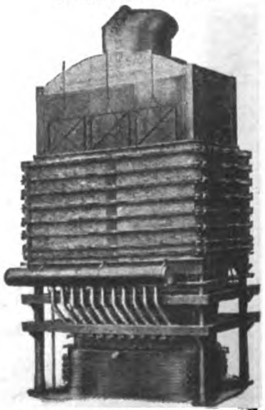

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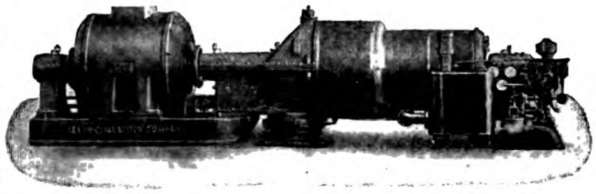

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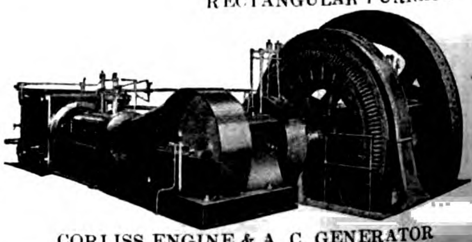

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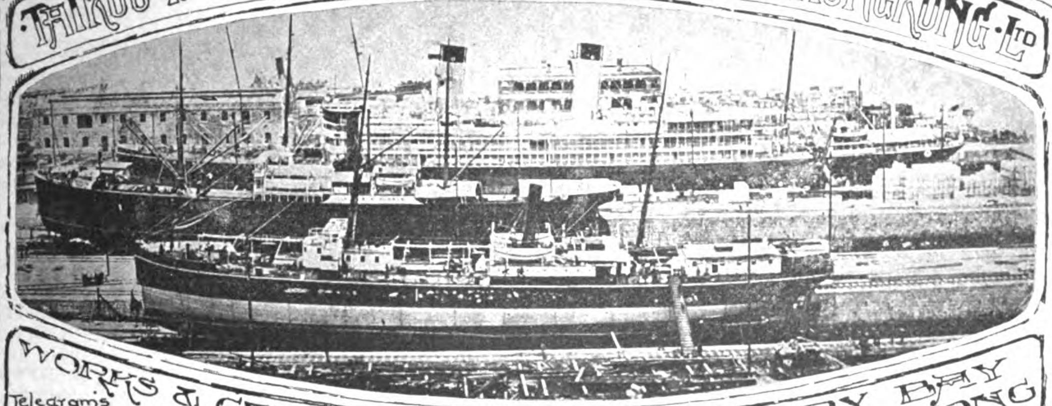

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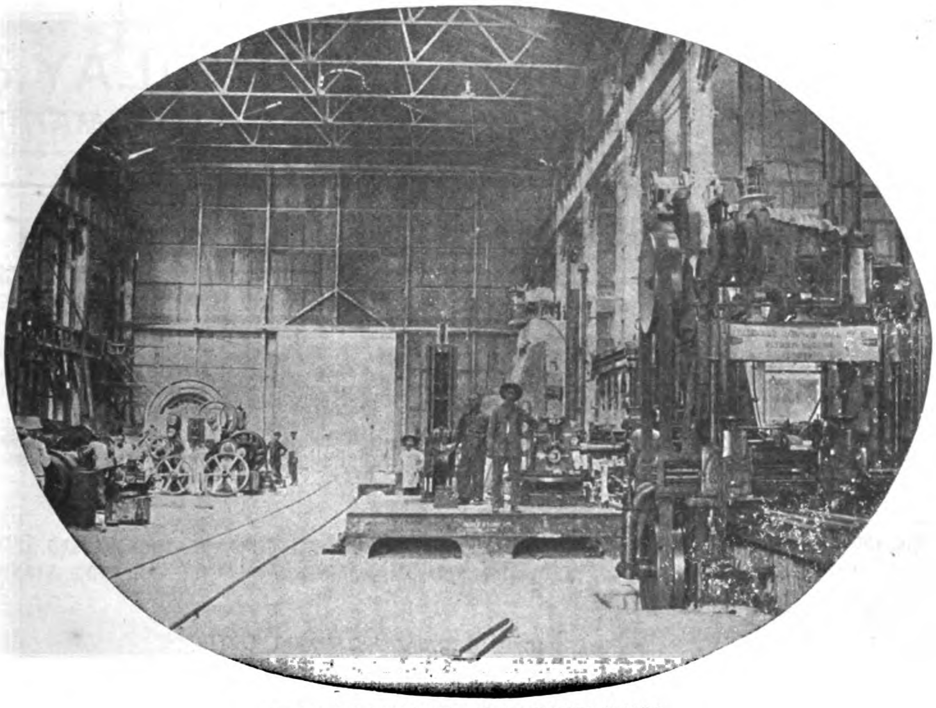

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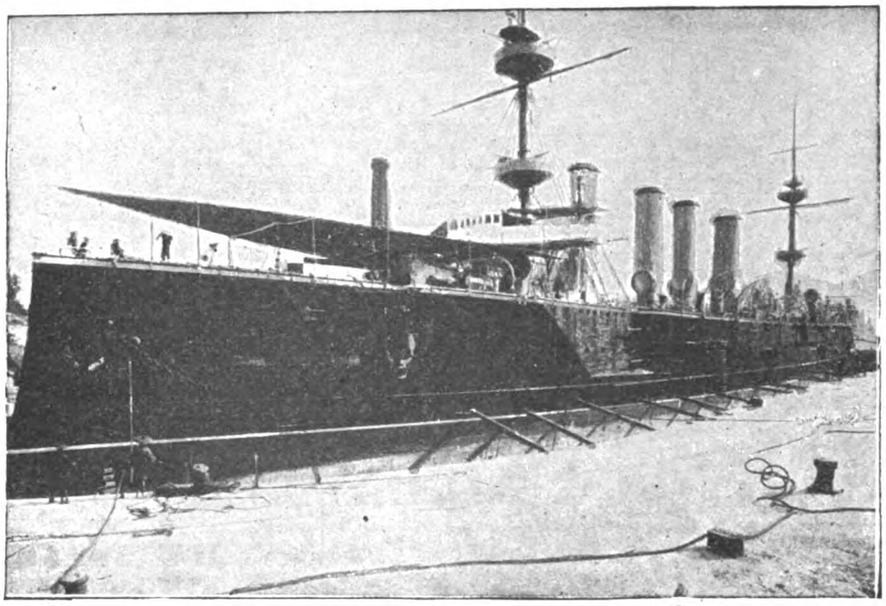

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The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	*Length on Keel Blocks*	*Entrance Breadth*	*Depth Over Sill at Ordinary Spring Tides*	*Rise of Tide*	
				Springs	*Neaps*
KOWLOON	*Feet*	*Feet*	*Feet*	*Feet*	*Feet*
No. 1 Dock, Kowloon.........	700	86 ft top / 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon.	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon...	240	60′	14′	7′ 6″	—
Patent Slip, No 2, Kowloon...	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock..........	466	85′ 6″	20′	7′ 6′	—
ABERDEEN					
Hope Dock	430	84′	23′	7′ 6″	—
Lamont Dock................	333	64′	16′	7′ 6″	—

Please Address Enquiries to the Chief Manager, R. M. DYER, B. Sc., M. I. N. A., Kowloon Dock, Hongkong

Telephone No. 13 K. Head Office, Kowloon.

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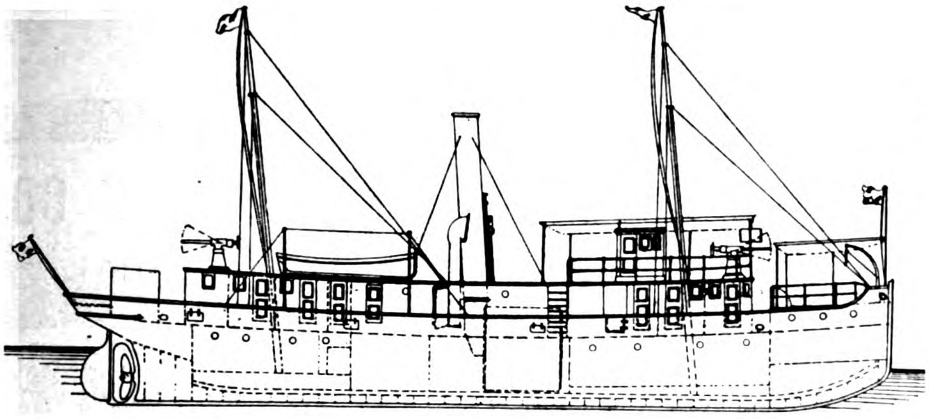

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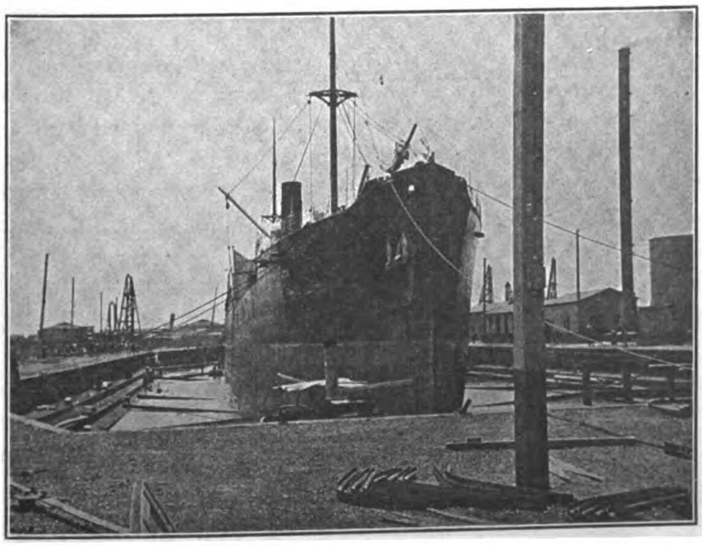

VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK
LENGTH ON BLOCKS 455'0"
" OVERALL - 469'0"
WIDTH, ENTRANCE 74'0"
" SILL - - 64'0"
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21'0"
DEPTH ON 3'0" BLOCKS (H. W. O. S. TIDES) 19'0"
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
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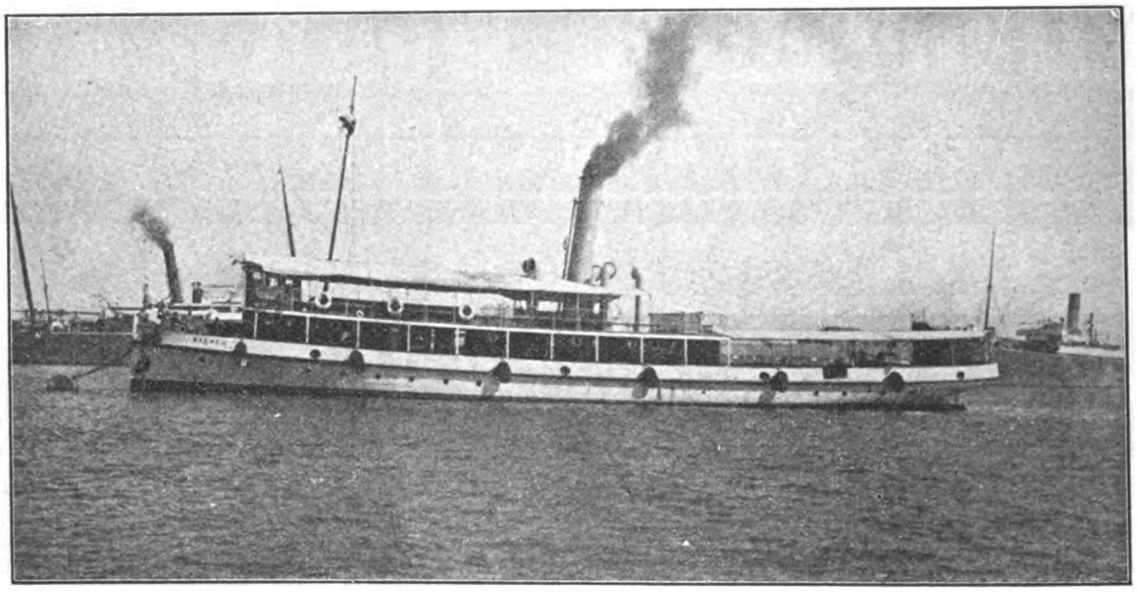

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The Docks are five in number, ranging in length from 360 feet to 560 feet, and breadth of entrance from 57 feet to 82 feet, with the depth of water on the sill from 16 feet to 24 feet.

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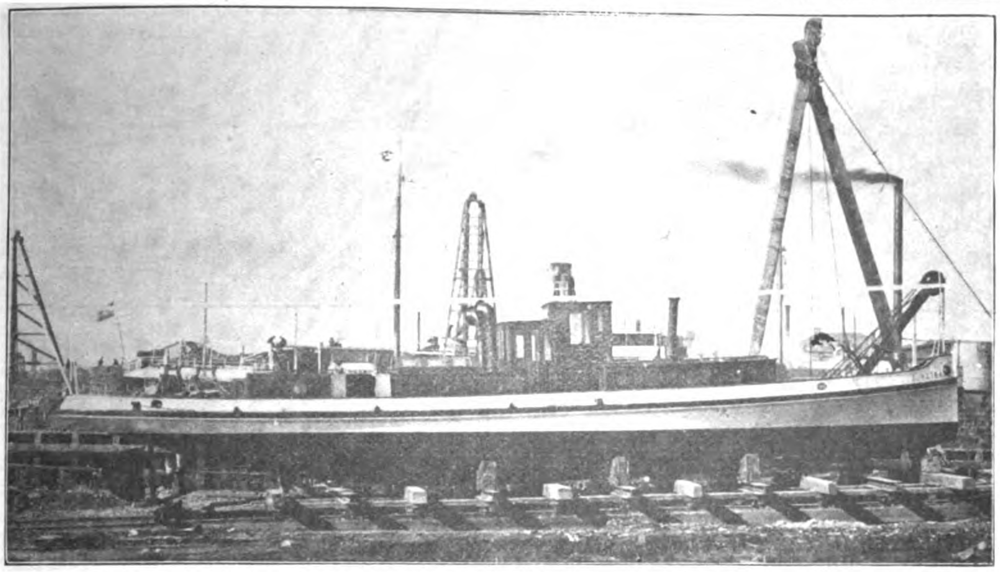

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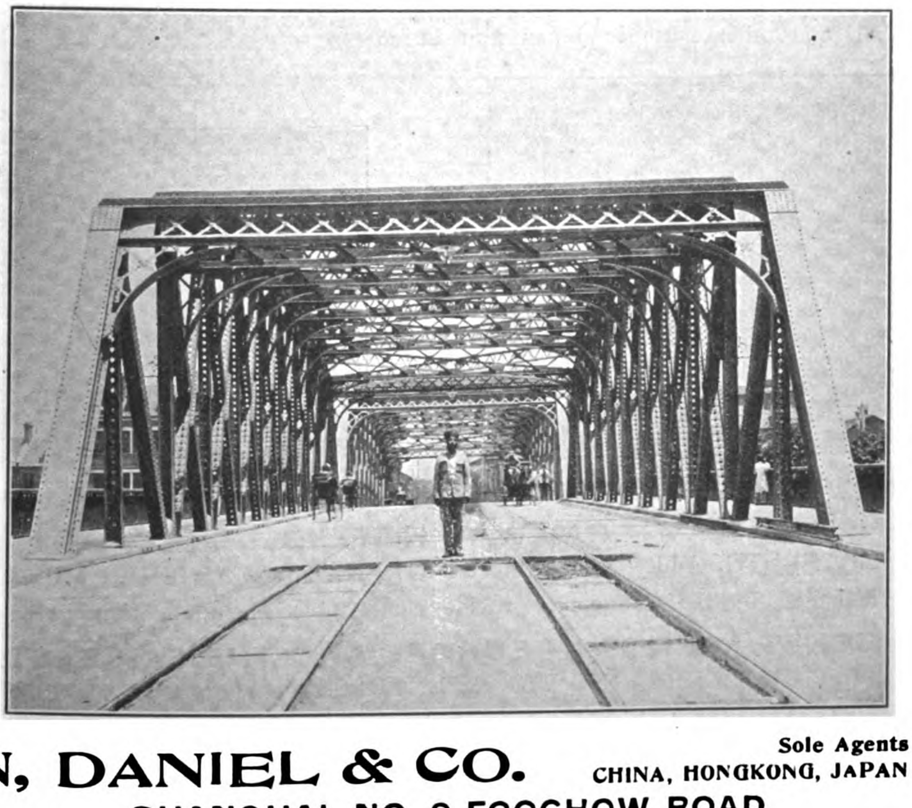

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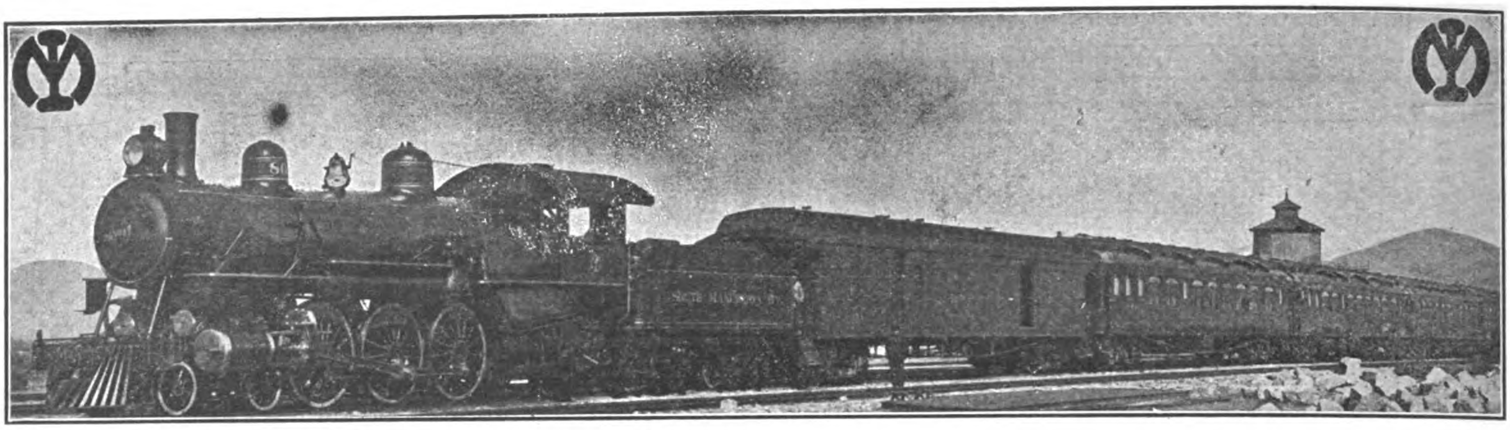

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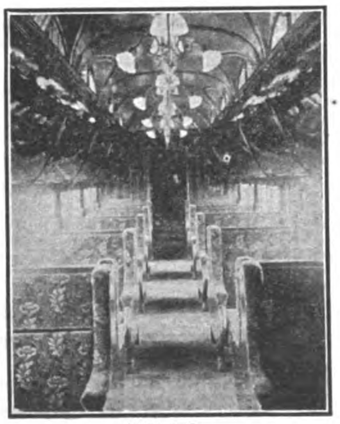

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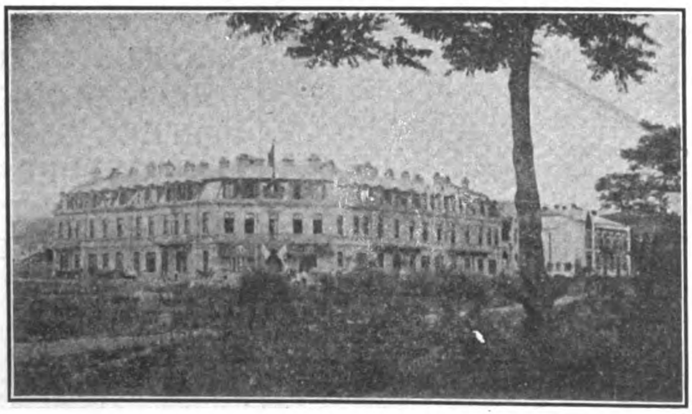

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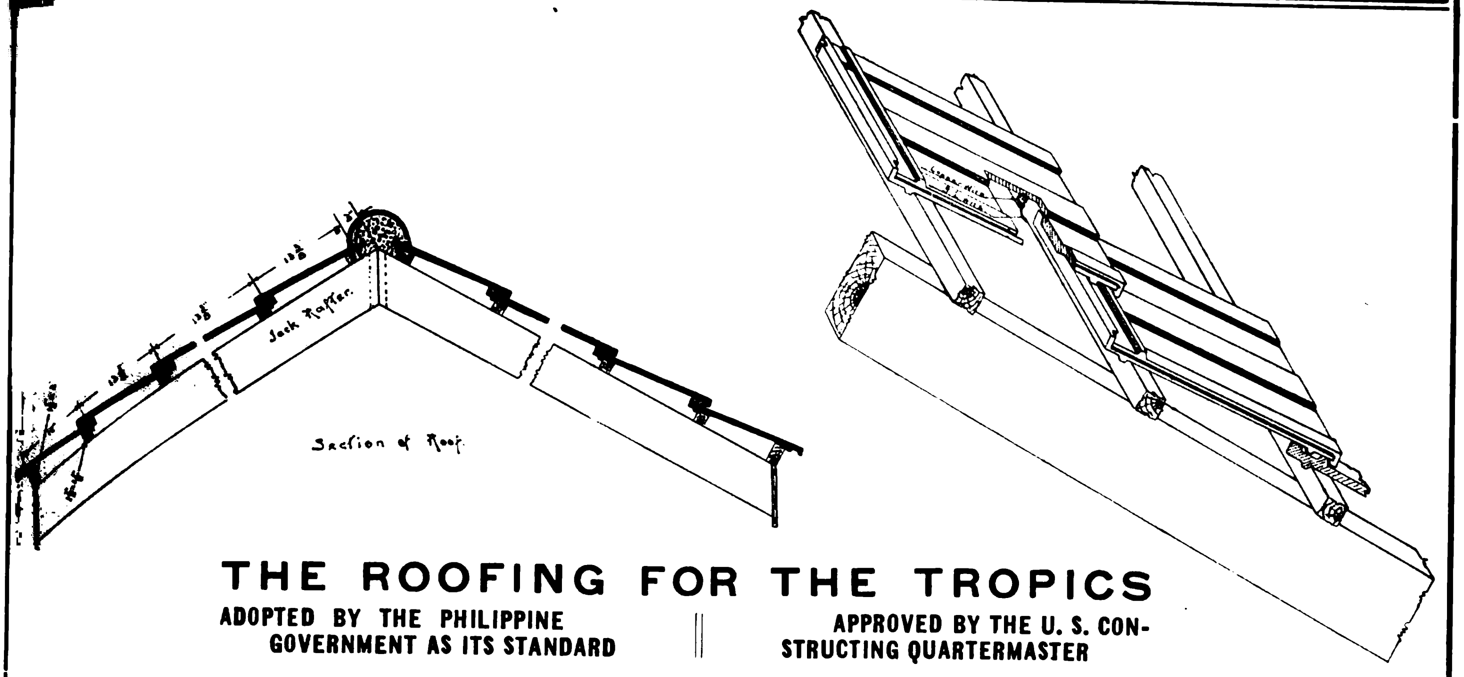

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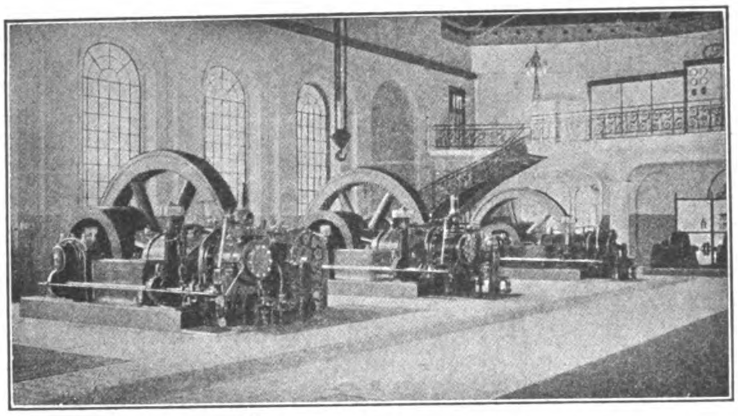

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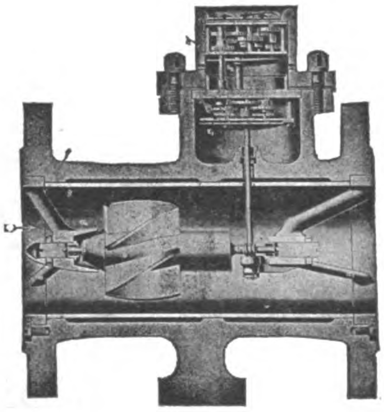

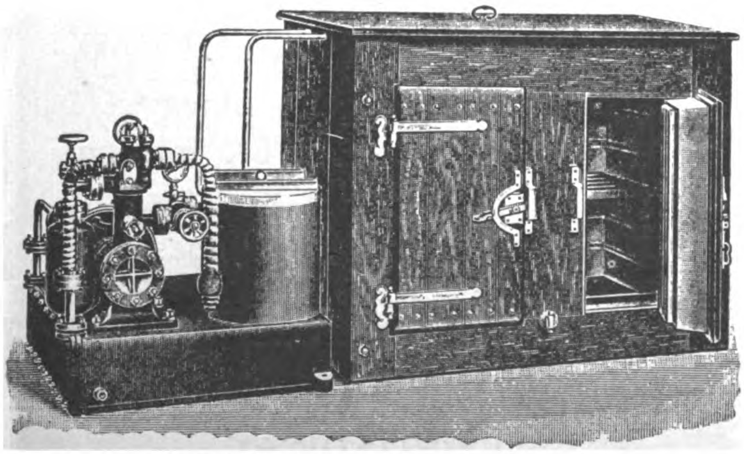

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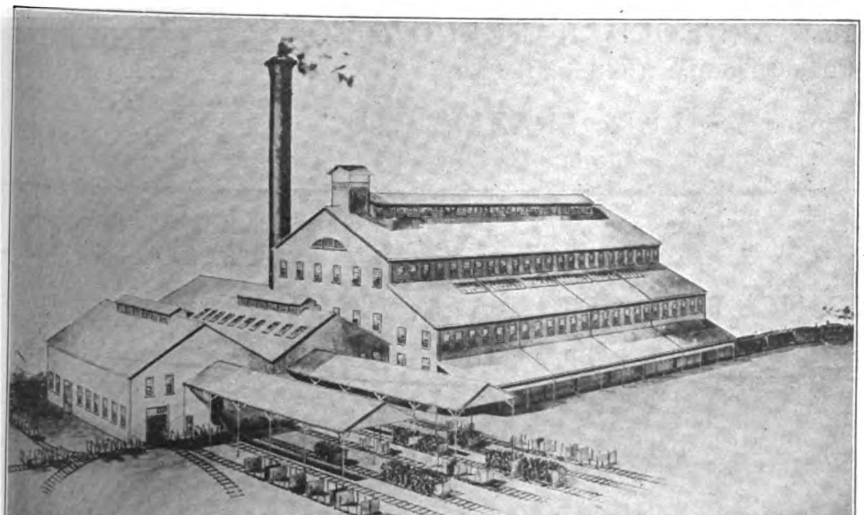

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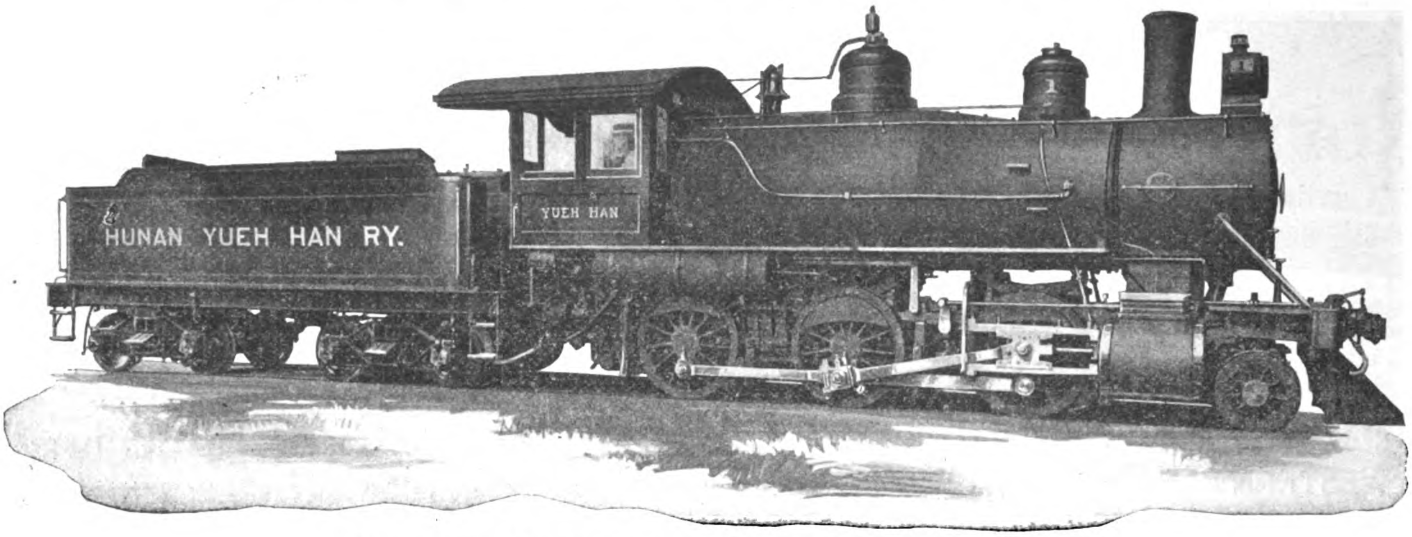

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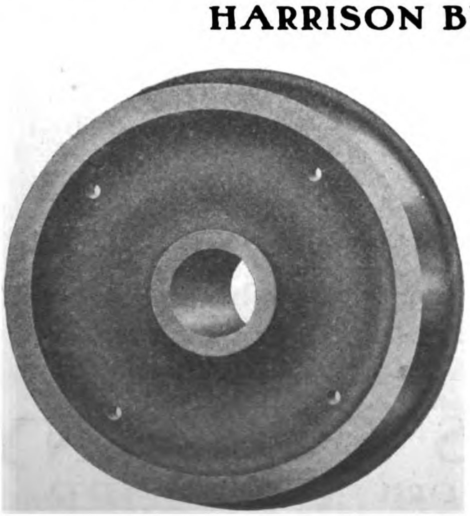

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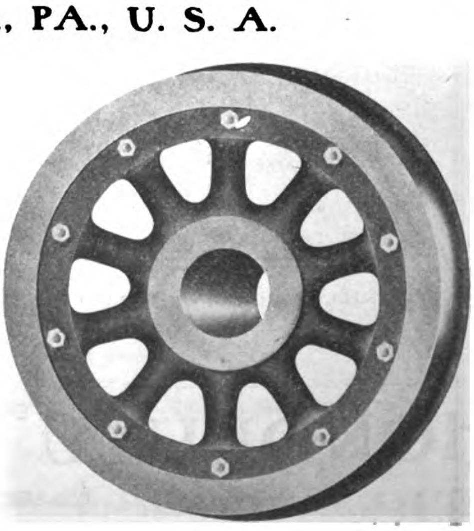

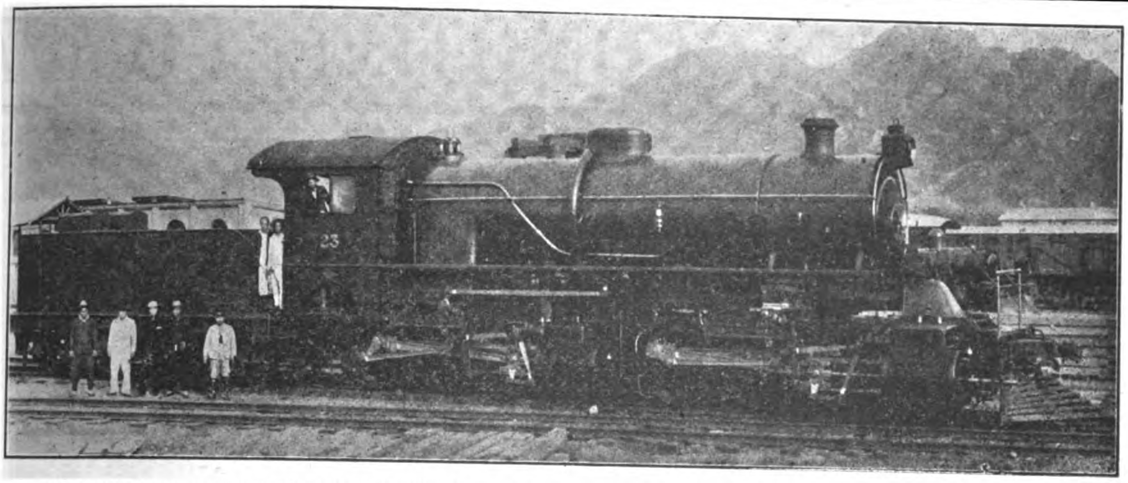

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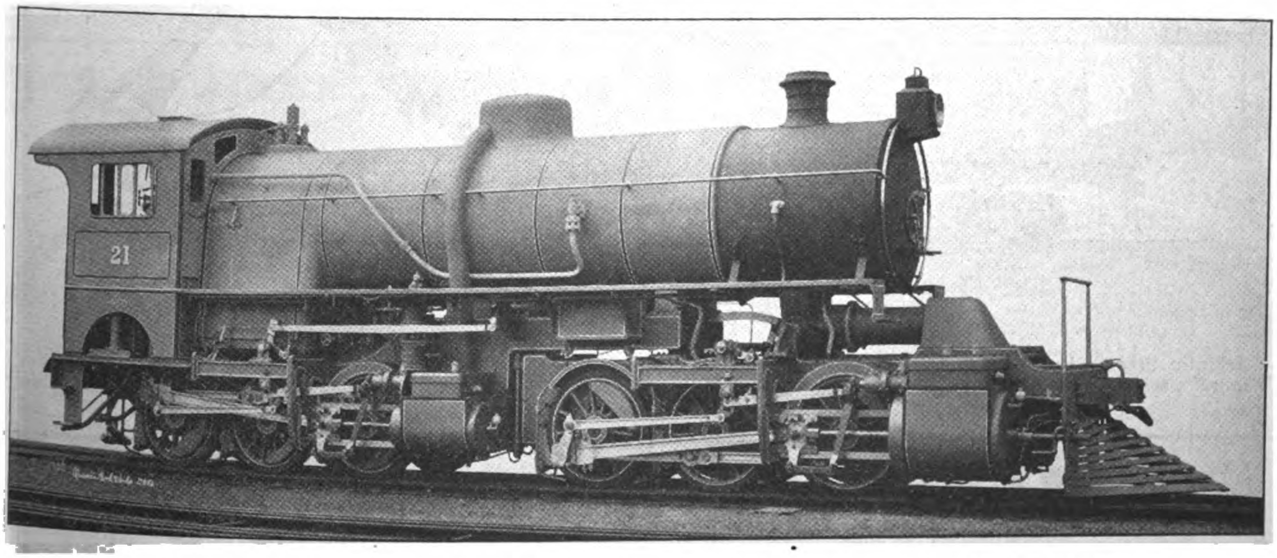

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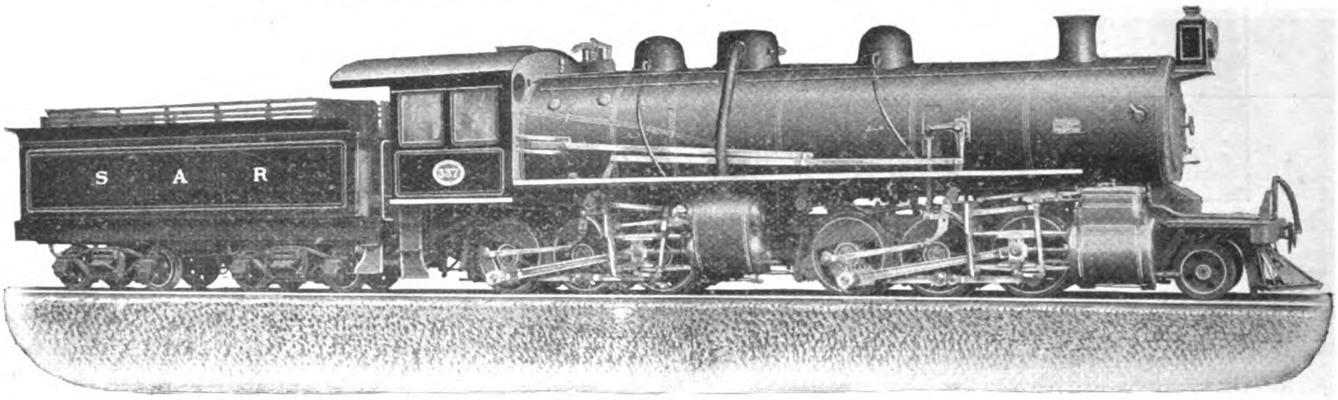
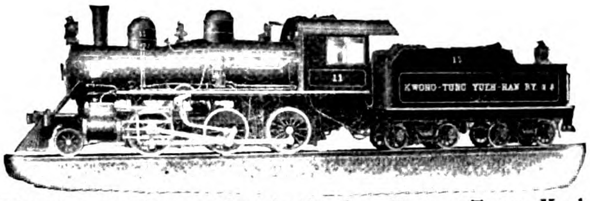
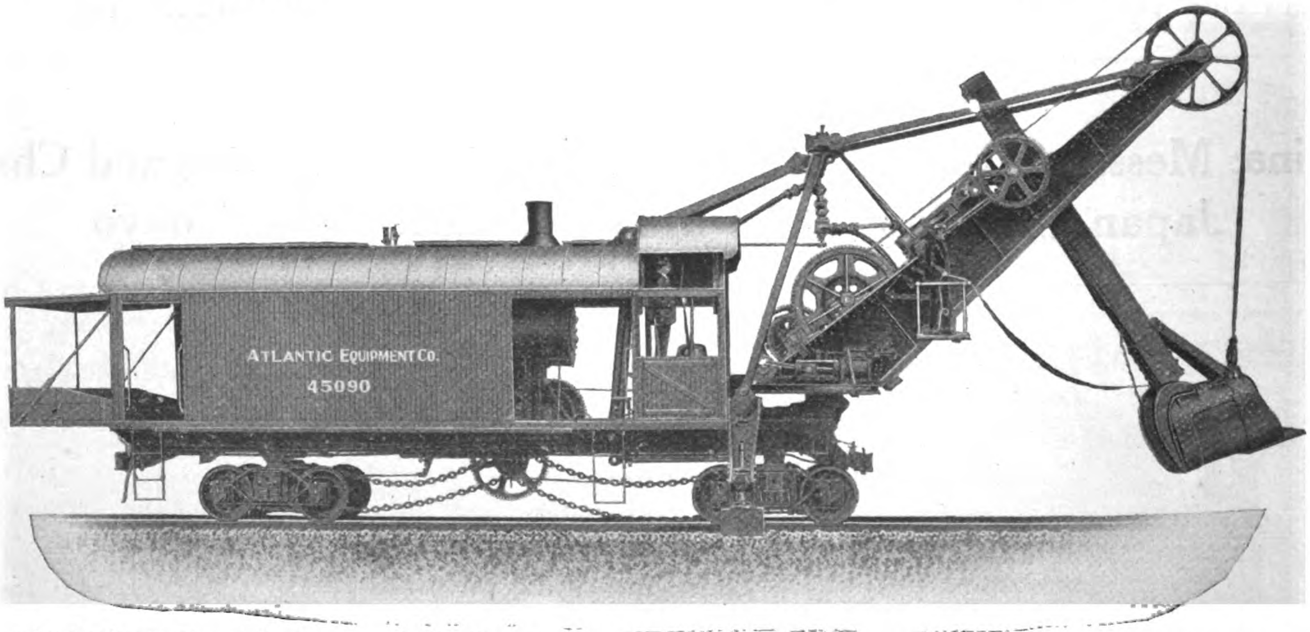


Articulated compound locomotive built for South African Government Railways to operate heavy trains on roads with steep grades and sharp curves.

Six coupled, double end locomotive built for South Manchuria Railway.



Mogul type locomotive built for Kwong-Tung Yueh Han Railway.



Atlantic Steam Shovel for heavy or light digging. Consumes 15% to 30% less fuel than other steam shovels; handles more material; is not top-heavy; has higher lift and shorter boom. Two of these shovels are in successful operation on the South Manchuria Railway.

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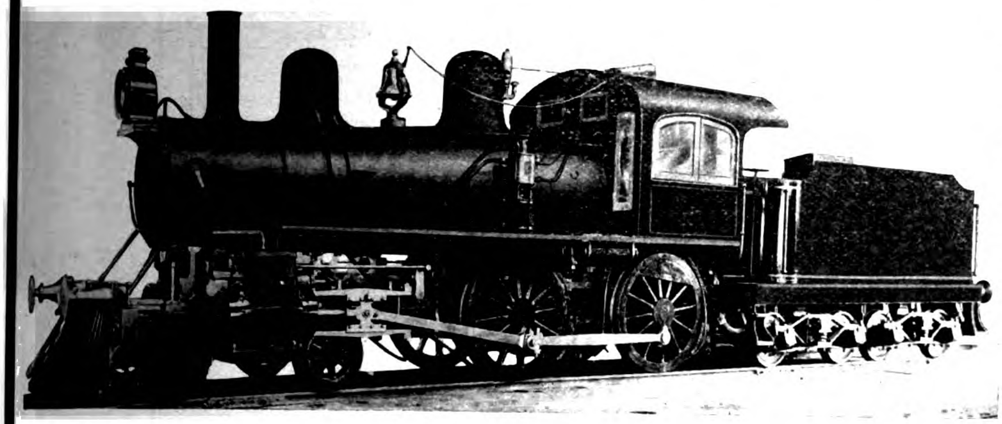

EIGHT WHEEL LOCOMOTIVE
4-4-0-8

Cylinders 15"×24", weight on drivers 58000 pounds, $49\frac{3}{4}$" Extended Wagon Top Boiler, 180 pounds working pressure.
Tractive power 13770 lbs.

Built for
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100 Ton.

Cylinders 3-15"×17", $60\frac{3}{8}$" Extended Wagon Top Boiler, 200 pounds working pressure.
Tractive power 44100 lbs.

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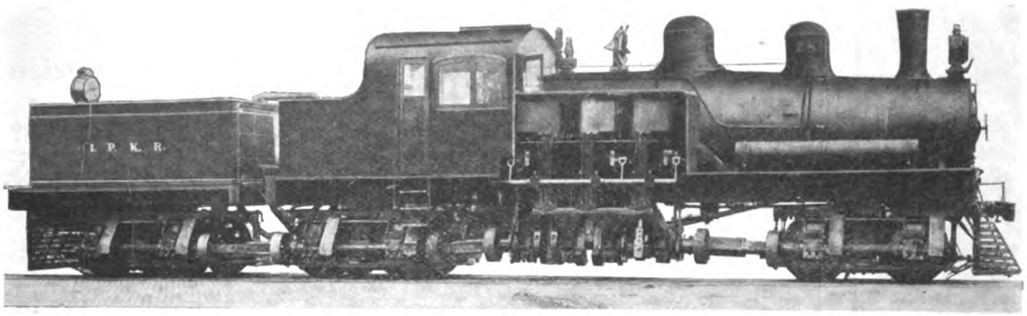

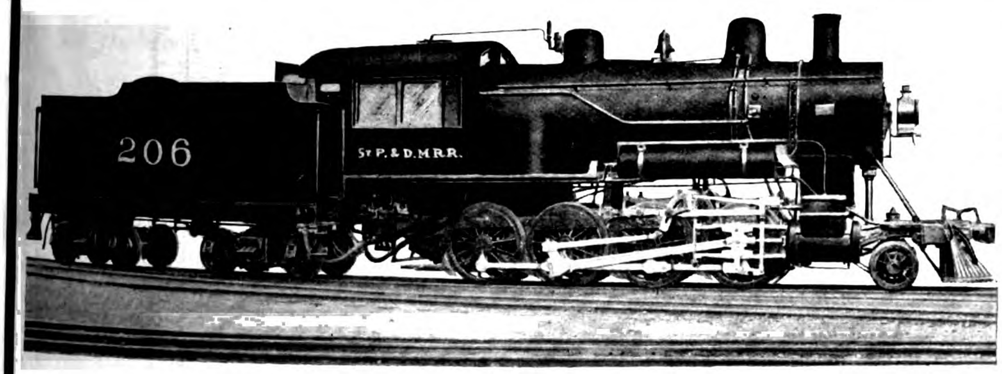

CONSOLIDATION LOCOMOTIVE
2-8-0-8

Cylinders 20"×28", weight on drivers 155000 pounds, 68" Extended Wagon Top Boiler, 200 pounds working pressure.
Tractive Power 34000 lbs.

Built for
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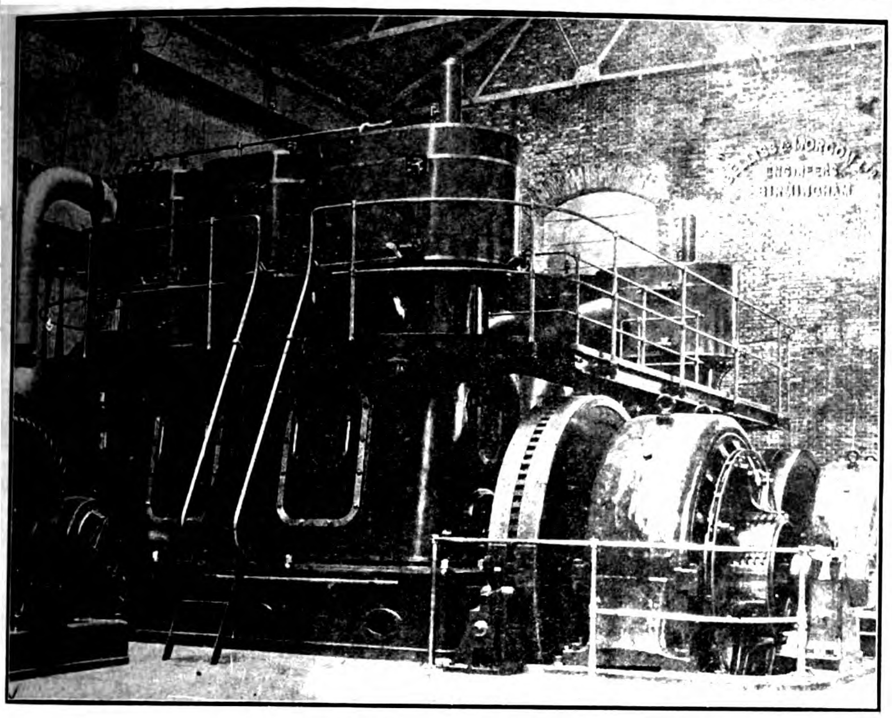

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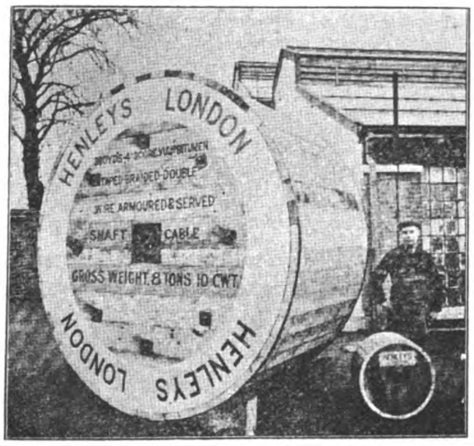

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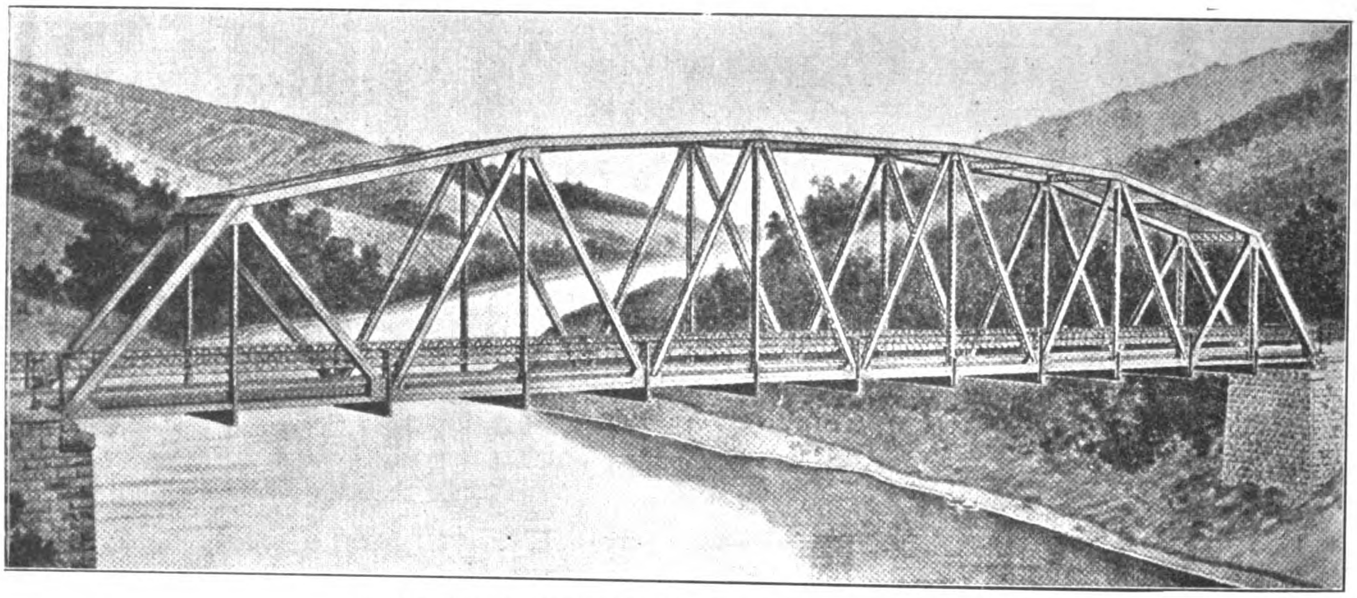

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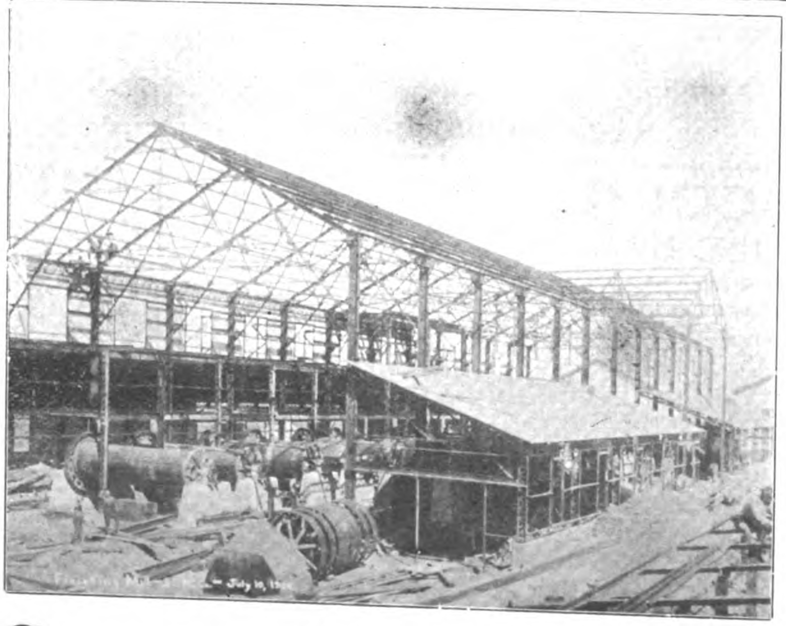

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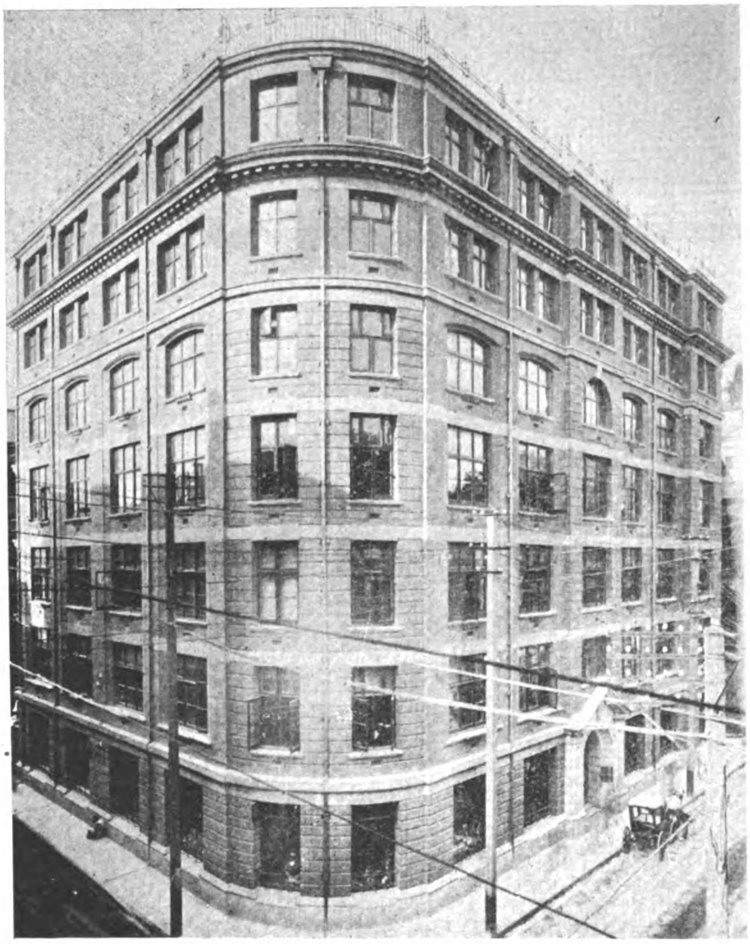

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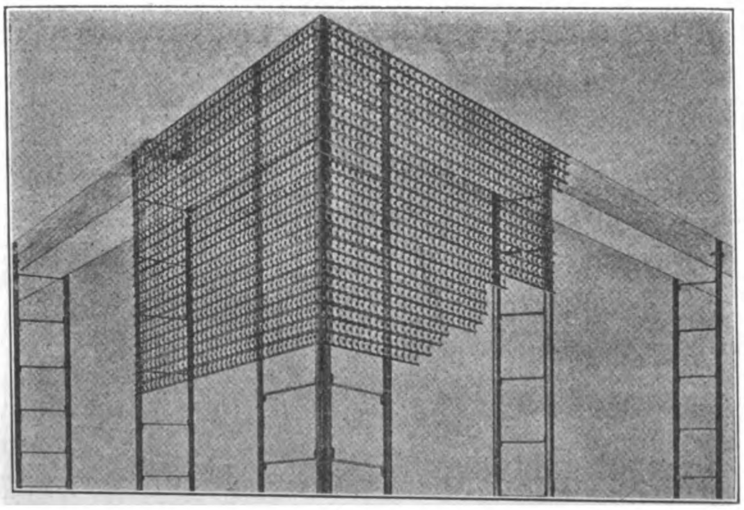

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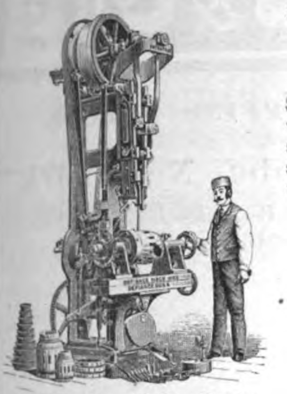

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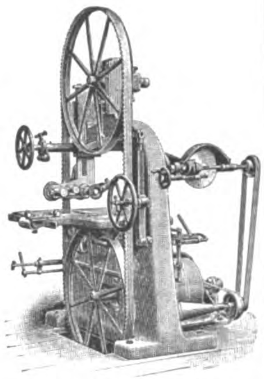

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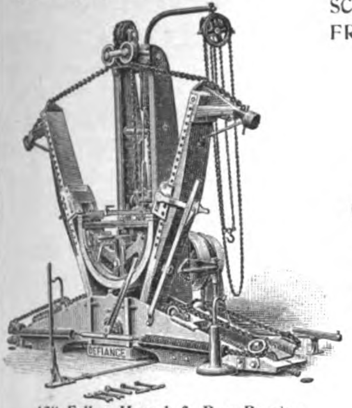

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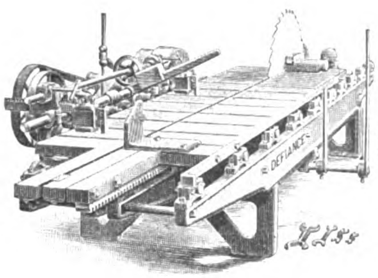

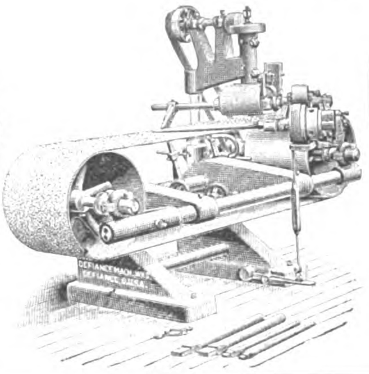

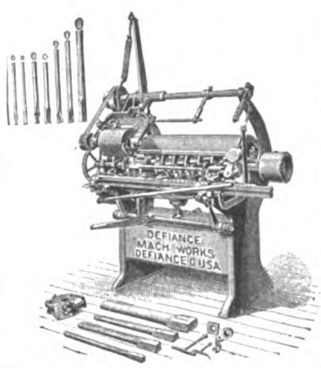

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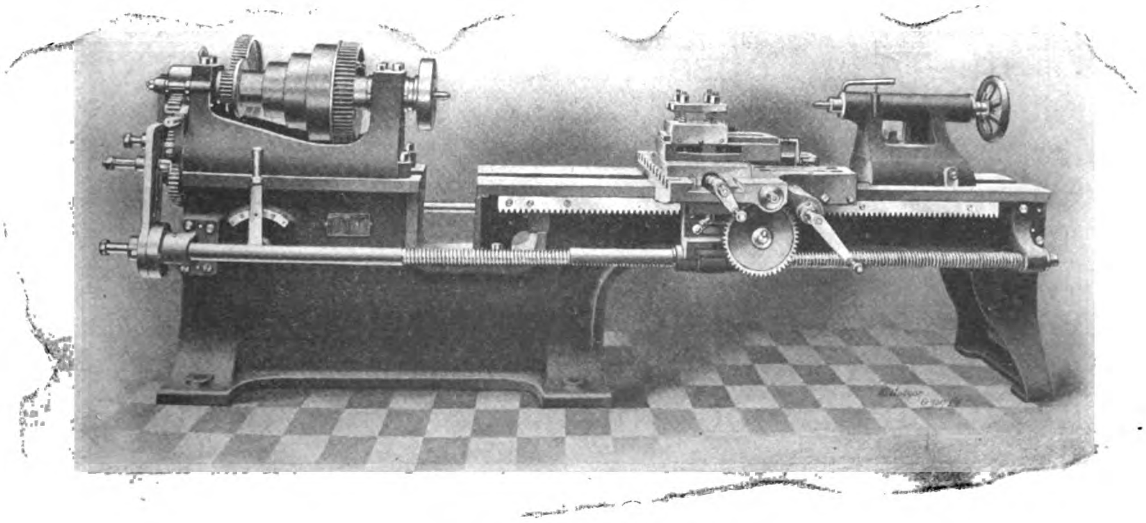

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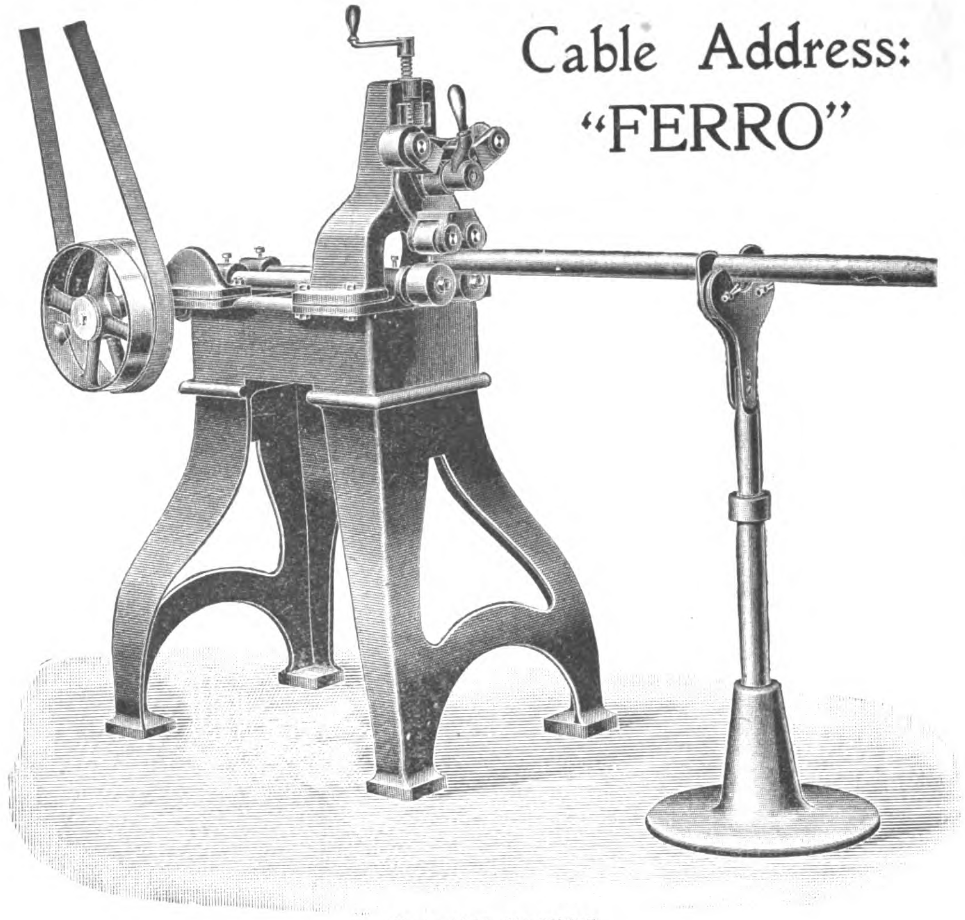

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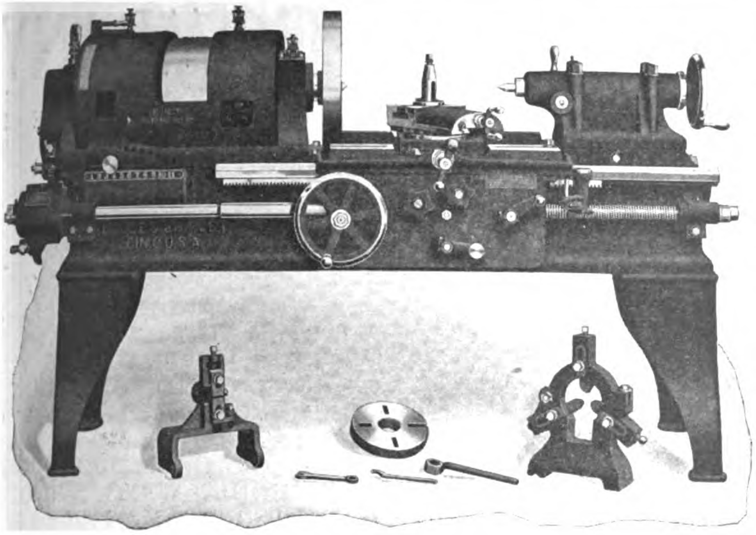

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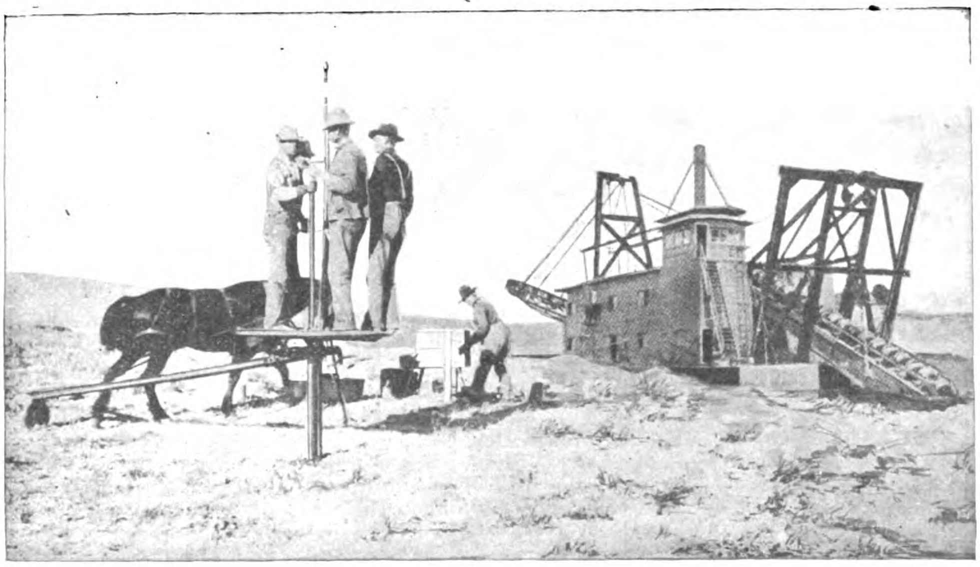

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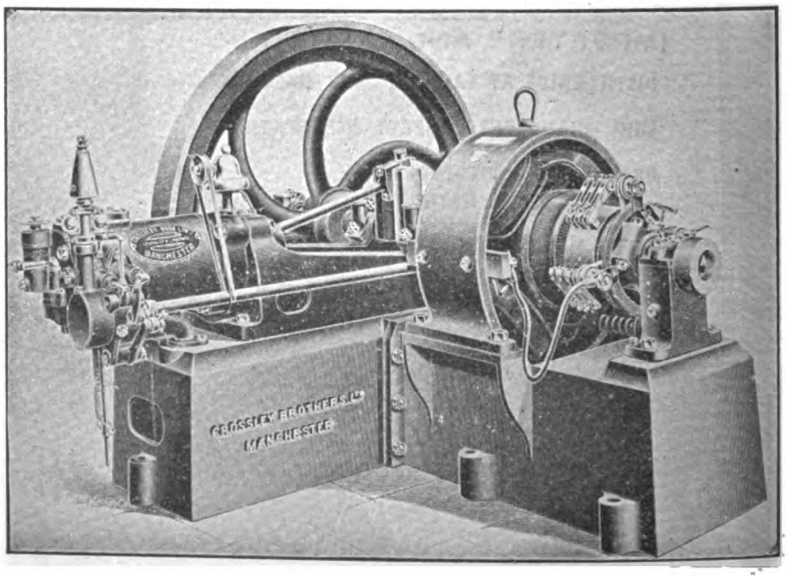

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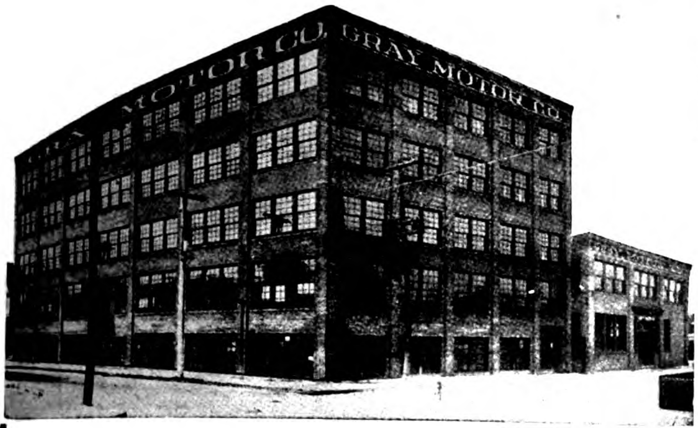

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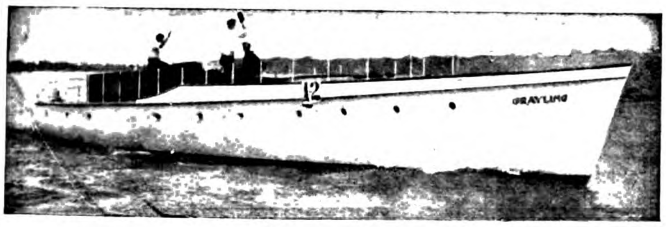

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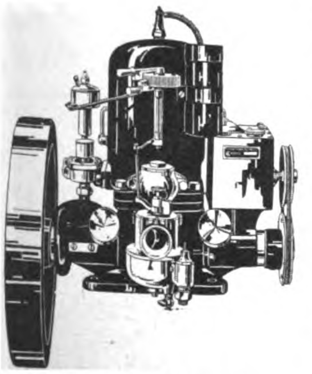

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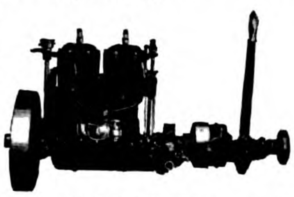

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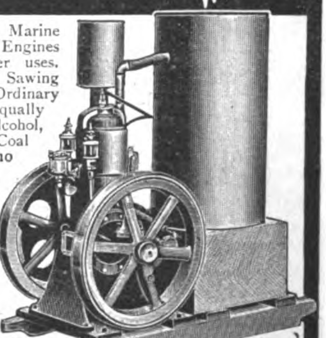

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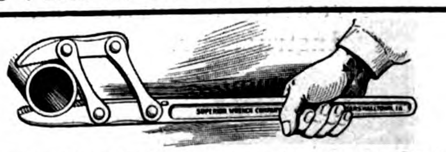

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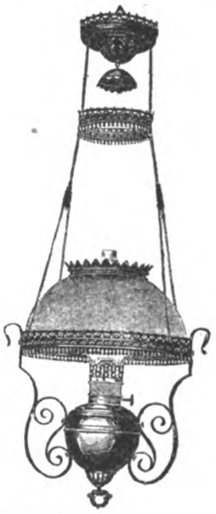

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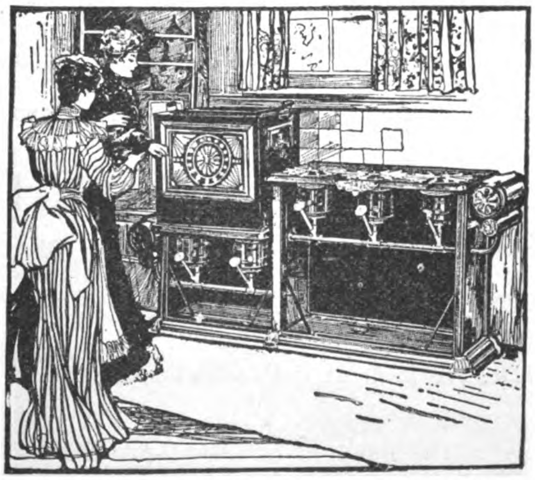

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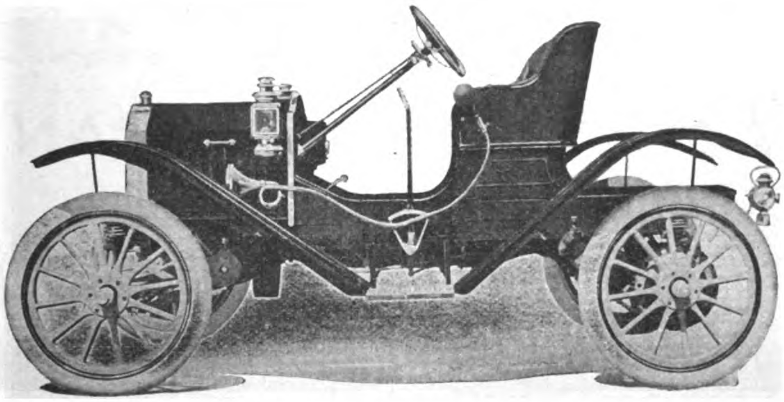

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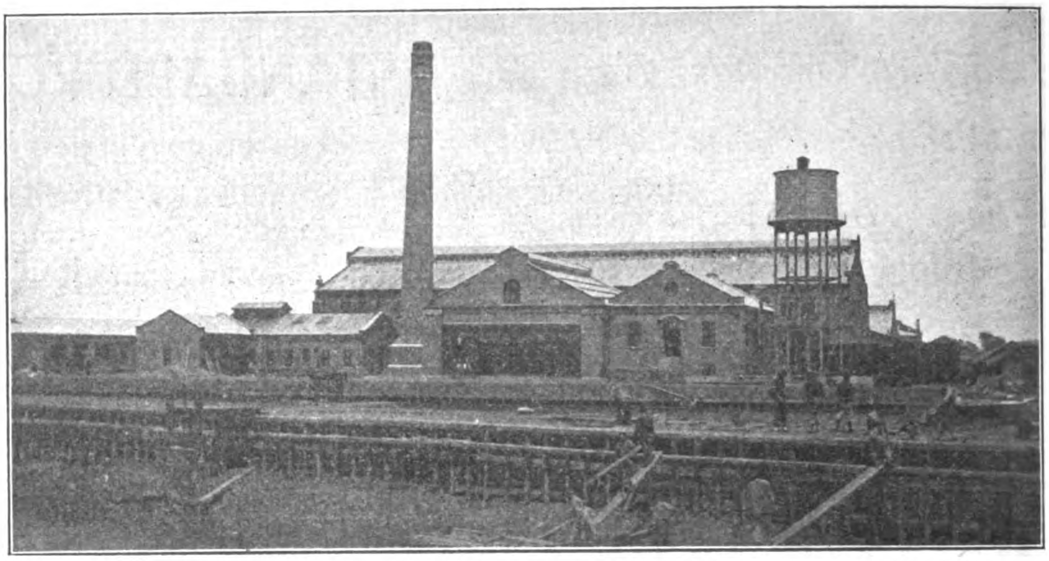

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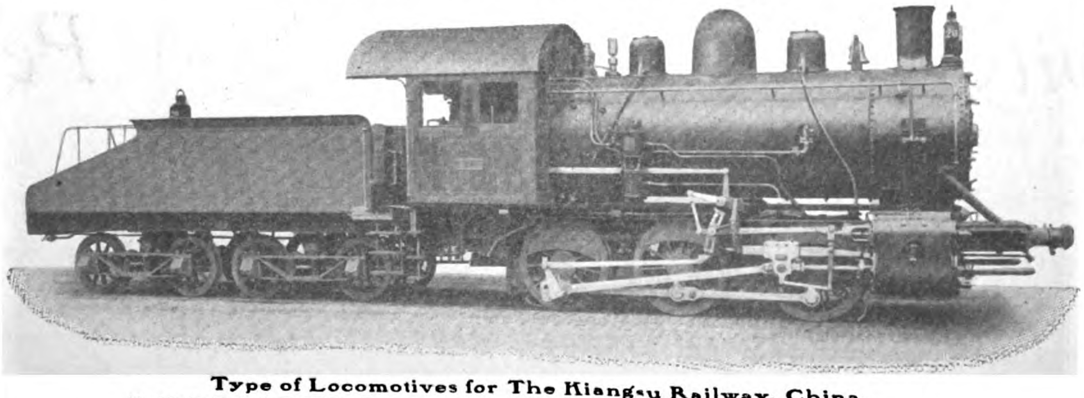

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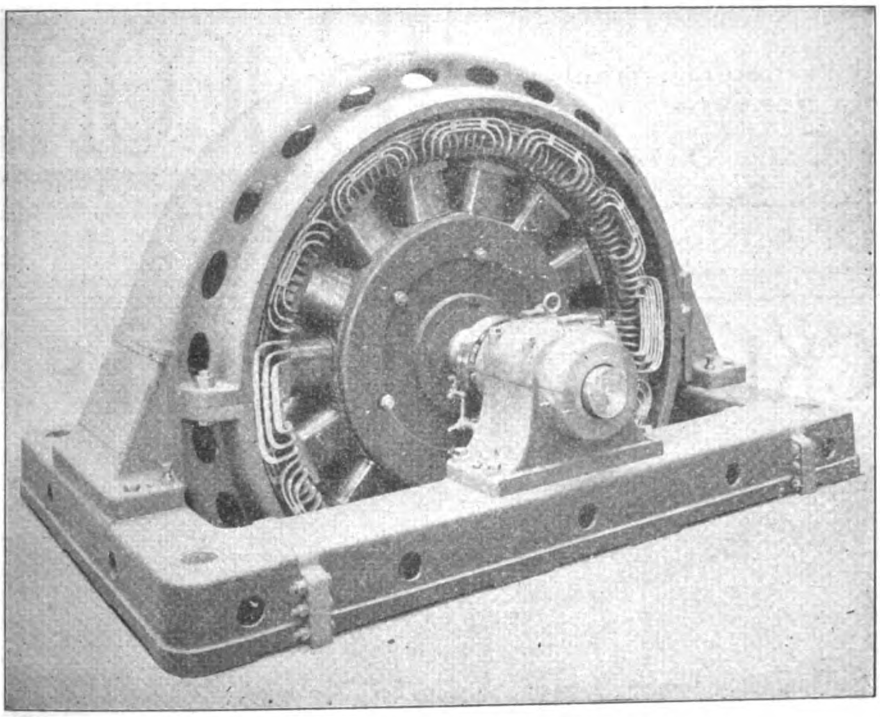

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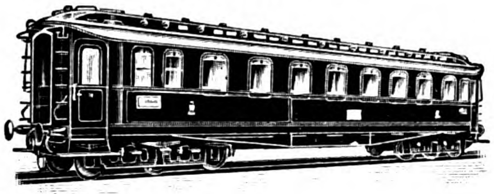

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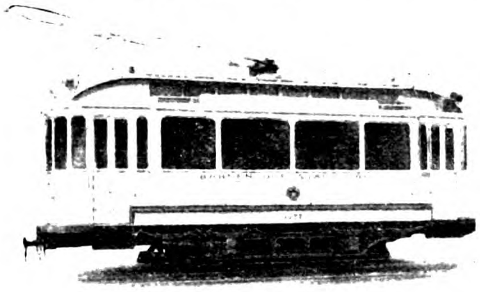

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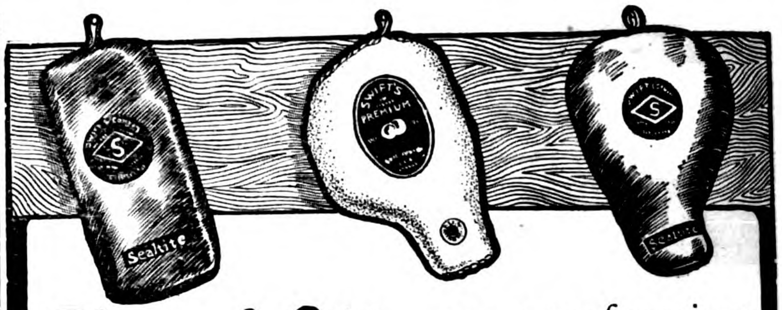

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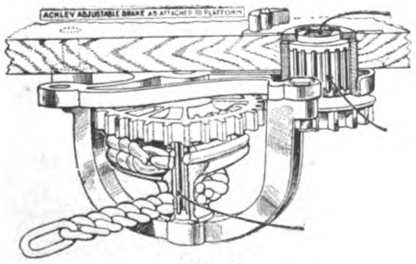

FIG. 1

FIG. 3

The ACKLEY ADJUSTABLE is the only gear brake that can be attached to the platform at any angle, owing to the adjustable yoke.

It requires no machine fitted bearings on the staff—(Fig. 2) simply square the staff in blacksmith shop for loose fit—reducing cost of labor to less than one-fourth required to fit any other geared brake staff.

All movable parts revolve on roller bearings (B, C, Figs. 1 and 3), eliminating friction, thereby giving ease of action in applying brake shoes and releasing.

Three different gear ratios, 12×36, 14×34 and 18×30, all interchangeable in same frame, can be obtained with different sized winding drums, as desired, to take up required amount of slack chain, according to type or weight of car.

It is the only gear brake which has no staff bearing in the frame. The journaling of the pinion (Fig. 4), in the frame (Fig. 3 at D), independently of the staff (Fig. 2), places the gears at a fixed position, preventing **BINDING**, which occurs to gear brakes having staff bearings in frame. (See THE OLD—Figs. 5 and 6, G and I.)

Here is the conclusion: It is EASY AND INEXPENSIVE TO INSTALL; POWERFUL, YET EASILY APPLIED; RELEASES QUICKLY; NO BINDING OF STAFF OR GEARS; ADAPTED TO ANY AND SUITABLE FOR ALL KINDS OF CARS.

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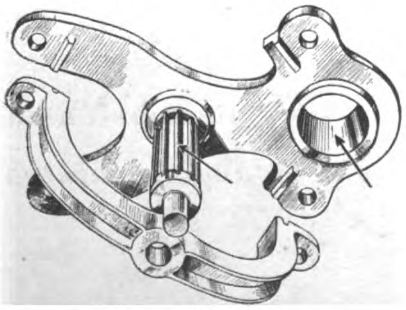

FIG. 2

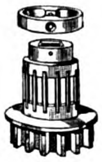

FIG. 4

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Supplement to

THE FAR EASTERN REVIEW

March, Nineteen Hundred and Eleven

JAMES A. FARRELL,

The New President of the United States Steel Corporation

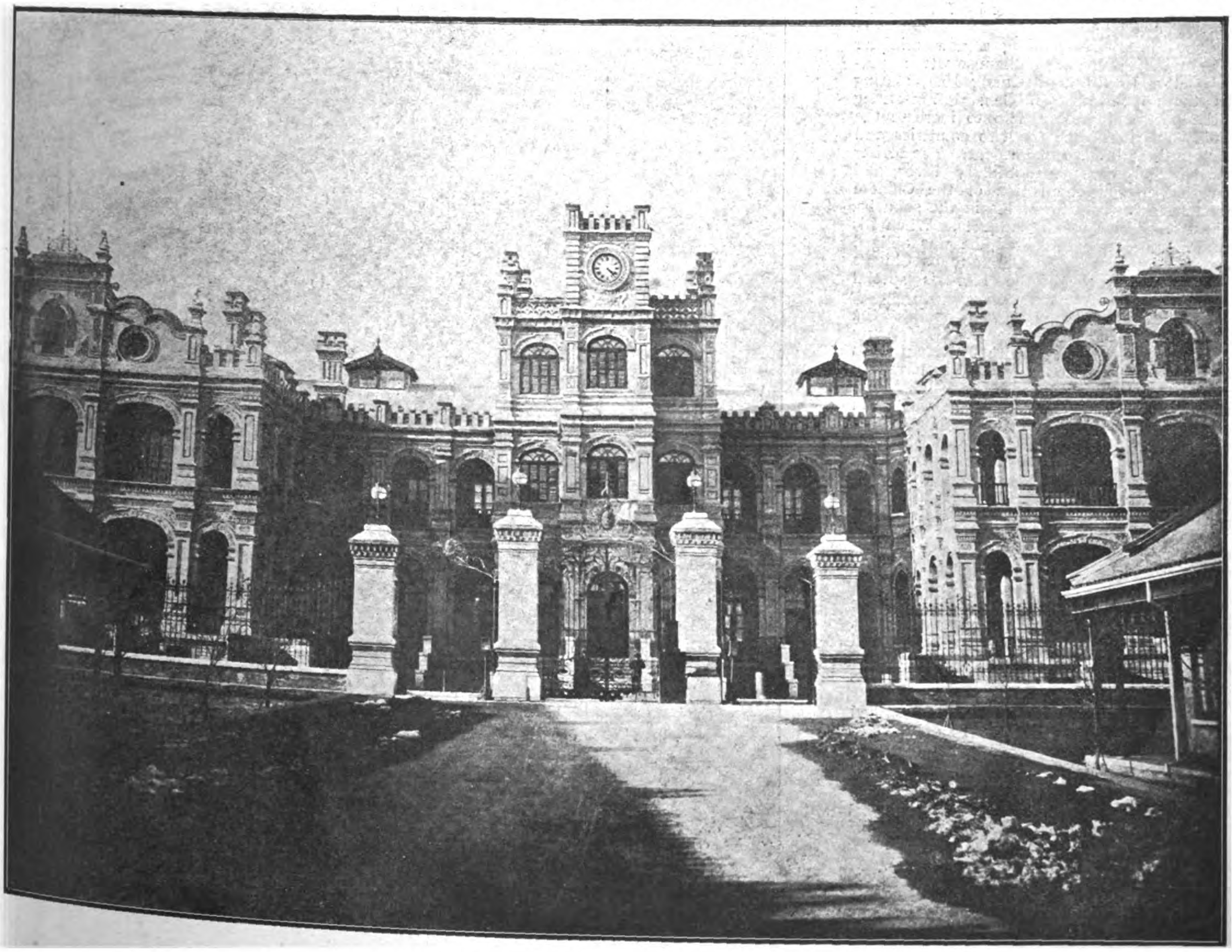
THE FAR EASTERN REVIEW
COMMERCE • ENGINEERING • FINANCE

VOL. IX. MANILA, P. I., SHANGHAI, AND YOKOHAMA, MARCH, 1911 No. 10.

THE CHINESE ARMY

A reorganization of the various Boards at Peking into a responsible cabinet to direct the affairs of the nation is due to take place in the near future, and as a preliminary step an Imperial Edict of December 4th ulto. abolished the old Board of Army affairs and created the new ministries of War and Navy Both services were formerly under the direction of the Army Board, but the new scheme makes the Navy arm a distinct organization under the Ministry of the Regent's brother, H. I. H. Prince Tsai Hsun, and the army under the direction of Lt. Gen. Yin-Chang, the best equipped soldier in the Empire to carry through the arduous scheme of reorganizing and building up the new forces of the Empire. The naval development depends entirely on the supply of funds to carry it through, and as the provincial authorities have not shown any great alacrity in complying with the Imperial demands and appeals for cash, its development will be slow. With the army, however, greater progress is being made and, at the present rate of advance, the program entered into a few years ago will be completed within the specified time. The new Minister of War has entered upon his duties with great zeal, weeding out the incompetents and drones and striving hard to achieve results against the open opposition and passive resistance of the old element displaced from rank and power. As the success of the new scheme will depend in a large measure on the skill and ability of Gen. Yin-Chang, a brief resumé of his career will enable the leader to form a better conception of this leader of New China.

Graduating from the Peking University with high honors, Yin-Chang was sent to Germany to finish his general education and receive military instruction, after which he went to Vienna and completed five years of actual service as an officer of an Austrian infantry regiment, returning to China, a full fledged European military official. He was then appointed to the old Imperial Guards at Peking which



THE WAR DEPARTMENT, PEKING

he reorganized and brought up to a much higher standard. Later, when the Peiyang Military School was established at Tientsin by Viceroy Li Hung-Chang, Yin was made Superintendent. His work in this capacity was of a very high order, and many of the most promising generals and officials of the new army received their first instruction in modern military matters, from the one who is now their chief, and are devoted to him in consequence.

At the time of the Boxer Trouble, the school was attacked from both flanks by the rioters and the Allied Force. His coolness in making a safe retreat in an orderly manner elicited general admiration from the officials of the Allied Forces. After the conclusion of the Peace Negotiations, he went to Shantung, accepting the invitation of the then Governor of the Province, Yuan Shih Kai, to cooperate in restoring peace and order in that province. When Li Hung-Chang and Prince Ching were endeavoring to carry out the post bellum programme, he was also called in as adviser, and then shortly afterwards when Prince Ch'un was despatched to Germany as Envoy Extraordinary to apologize for the assassination of Baron Ketteler, General Yin Chang went as the Vice-Envoy. Through his knowledge of the German language and long residence in Berlin, he was largely instrumental in pacifying the anger of the German people and restoring amicable relations. His ability was recognized then and there by Prince Chun who is now the Regent.

When China was sending a new minister to Germany, Emperor William wrote a personal letter to Emperor Kuang Hsu, stating that the appointment of General Yin-Chang to the post will greatly help to increase the friendly relations with the two countries and which resulted in his appointment. The Kaiser received him with extraordinary favor and made a personal companion of the Chinese minister, taking him for walks in the suburbs, and inviting him to all banquets. When his term of appointment expired, he was obliged to stay another year in Germany as China's representative through the Kaiser's special request.

On his return to Peking, he was appointed the Senior Vice-President of the Board of Army Affairs, but his relations with President Tieh Liang not being cordial, he was transferred to the post of Commander of the Kiang-Pei Army. But at the request of the Kaiser he was again sent to Germany as the Chinese Minister.

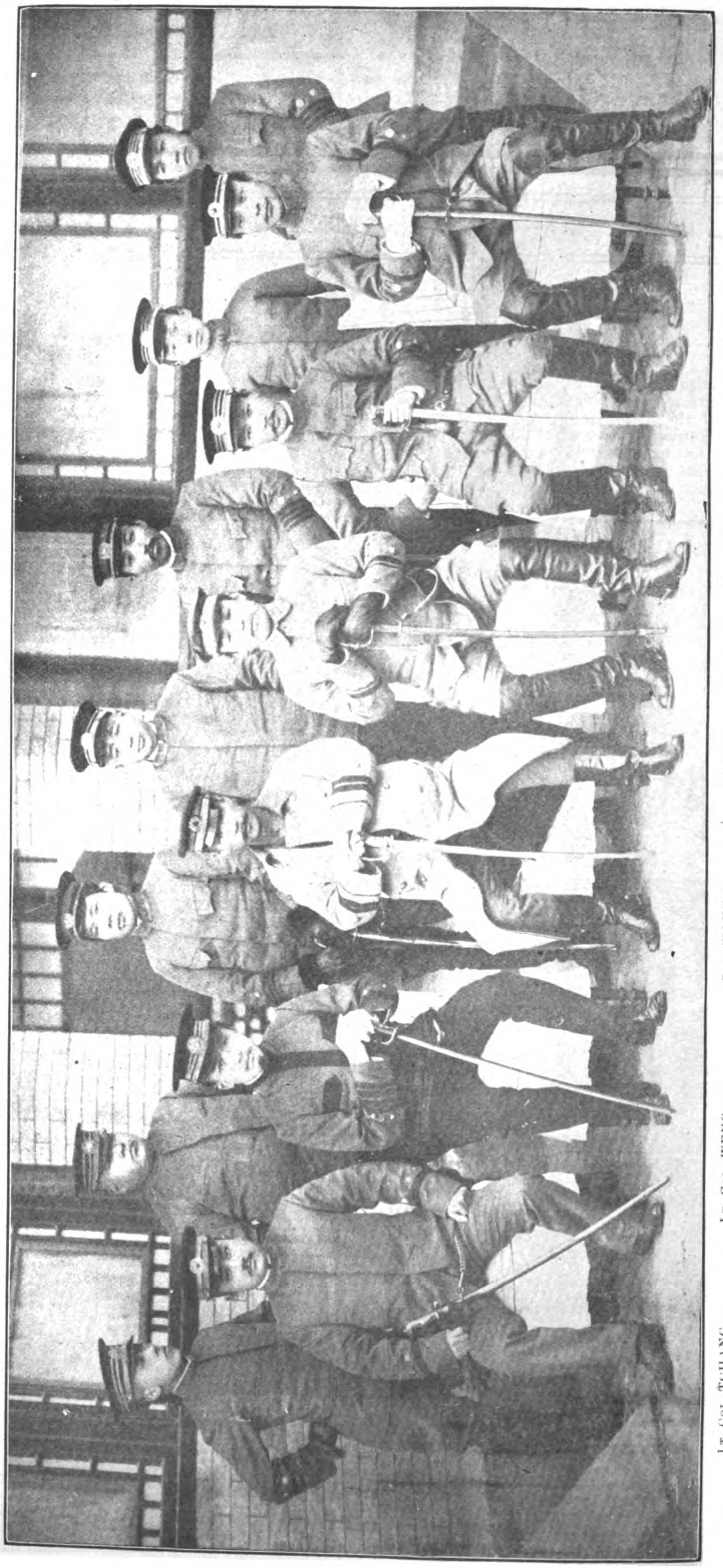
When H. E. Tieh Liang resigned his post, the Prince Regent sent a personal telegram, urging him to accept the position of the President of the War Board, which brought him home again to direct the affairs of the New Army.

He holds a high reputation for honesty, and lives simply and unostentatiously, and is devoted to his profession, preferring the title of General to that of Minister.

Such is the man who holds the full confidence of his Imperial master. Manchu to the core, his loyalty to the dynasty is undoubted, and he may be depended on to exert his utmost endeavours to build up a solid bulwark for its defense.

The Army scheme has been fully described in previous numbers of THE FAR EASTERN REVIEW. The Edict of April 16th, 1906, and the general program approved in August of the same year, called for the organization of 36 Divisions in ten years. Formerly the provincial governors had supreme control over the troops in their respective territories, but as this failed to insure effective operation in times of national need, the powers of the provincial authorities were taken away and concentrated in the Imperial War Board at Peking. The Viceroys and Governors however are still charged with the initial steps of financing, recruiting, drilling and organizing the new troops allotted to their respective provinces. After reaching a certain stage of perfection an inspection is held by an officer appointed from Peking, and if prescribed standards have been attained, the new troops are taken over by the Central Government and enrolled in the new Army. Otherwise a further period of training is necessary.

The period of military service embraces three years with the colors, three years in the



LT. COL. TCHANG LT. COL. WENG COL. WOUNG COL. YI COL. LU COL. LÜ COL. FONG

BRIG. GEN. HA HANG CHANG COL. W. S. Y. TYNGE LT. GEN. YIN CHANG BRIG. GEN. WU LU-CHANG COL. LU TAO-TSEN BRIG. GEN. LIANG PI.

THE MINISTER OF WAR, GENERAL YIN-CHANG, AND HIS DEPARTMENTAL CHIEFS AND GENERAL STAFF OFFICIALS.

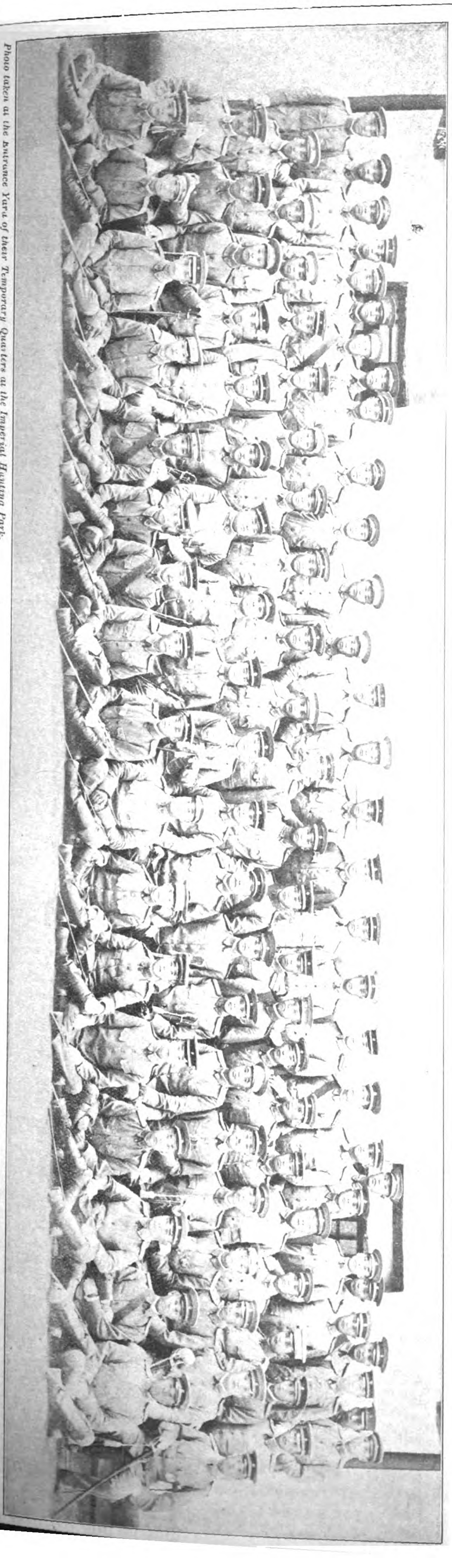


Photo taken at the Entrance Yard of their Temporary Quarters at the Imperial Hunting Park.

THE OFFICERS OF THE IMPERIAL GUARD CORPS, WITH THEIR COMMANDING GENERAL, H. I. H. PRINCE TSAI TAO (IN CENTER SECOND ROW, SEATED) AND GENERALS LIANG PI AND HA HANG CHANG (ON EITHER SIDE OF THE PRINCE)

first reserve and three years with the second reserve and after the tenth year the soldier is exempt from further service. The rapid progress made in the new scheme is sufficient evidence of China's determination to place herself in a position to insure the respect of other powers. In 1907, or one year after the promulgation of the Edict, eight divisions and one brigade had been fully organized and equipped, of which 4 divisions stationed near Peking were under the direct control of the War Board, 2 divisions under the Chihli Viceroy, and one division each under the Viceroys of the Liang Kiang, and Hu-Kwang, in addition to a Brigade of the Imperial Guards. By the end of 1909, there were 9 complete divisions and 11 in various stages of formation, and the end of 1910 showed 16 and one half complete divisions fully organized and equipped, exclusive of the Imperial Guard Brigade. The general program may be said to be about one half completed, leaving five years to organize the remaining divisions, Notwithstanding the many difficulties in securing the necessary funds for carrying it into effect, the Government now contemplates the increase of the army to 42 divisions and the Imperial Guards to two divisions.

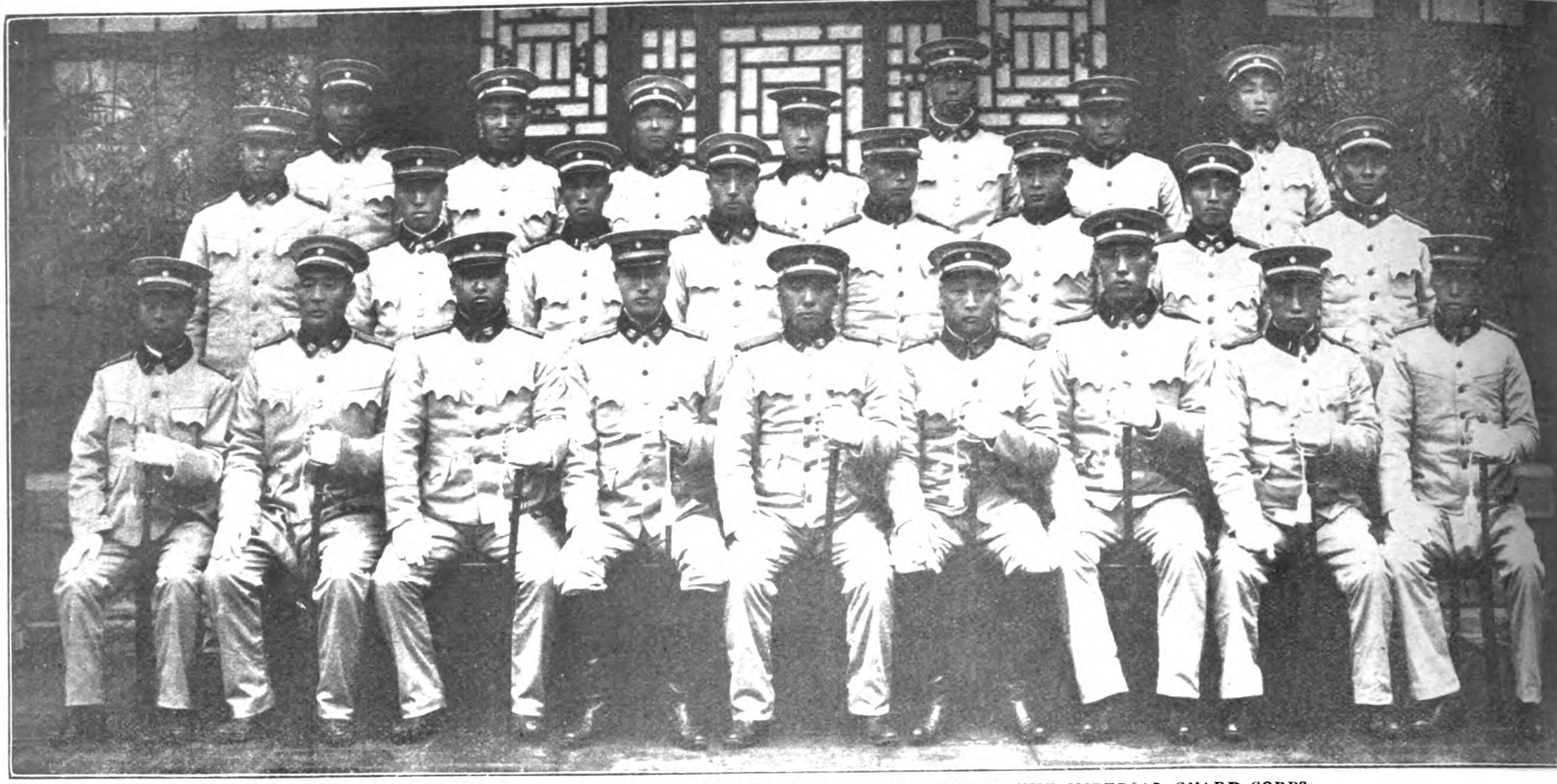
The question of finance is all important, but as there is no budget or means of securing reliable information, the actual expenses of the program are difficult to estimate. Chinese official estimates are proverbially untrustworthy and widely disproportionate in the various provinces. For example the organization expenses of a division in Kuei-Chow Province is estimated at Tls. 1,000,000 ($600,000 Gold) while a brigade for Hupei requires the same amount, and a brigade in Hunan needs Tls. 1,400,000. A division in Yunnan, requires Tls. 3,700,000 for organization expenses, or nearly 4 times as much as is necessary in the adjoining province of Kuei-chow.

The annual expenditure for the maintenance of a Brigade of the New Army in Hupei is said to be Tls. 500,000 and in Kirin Tls. 700,000. In Yunnan, Tls. 1,600,000 are expended for a division and in Chihli Tls. 1,500,000 for the same purpose.

In the year 1909, it is said that Tls. 42,000,000 were expended on the Army both old and new, and on this basis it is estimated that the annual Army expenditures will reach Tls. 85,000,000 in 1916.

THE IMPERIAL GUARDS

The crack Corps of the Army is the Imperial Guards, in which are enrolled as officers many of the younger sons of the Manchu nobility and aristocracy. Before its organization the Imperial Body Guard was made up of the four divisions stationed near Peking under command of the Chihli Viceroy, Yuan-Shih-Kai, with Chinese officials holding all the important commands. Even after these divisions were transferred to the control of the Board of War, the Manchu dynasty and nobility felt insecure and doubtful of the loyalty of the Corps under Chinese officials, and it was then determined to make the Imperial Guards a purely Manchu organization, recruited from the Banners with Manchu officials and the principal members of the reigning family in the high commands. The Emperor or the Regent is the titular Commander-in-chief of the Corps, with the active command delegated to his younger brother Prince Tsai-Tao. This prince is a blood brother of the Regent, that is from the same mother, and resembles him in many ways, having a bright, sunny disposition, affable, intelligent and keenly anxious to learn, and is consequently highly popular not only with Manchus and Chinese but with foreigners. His selection for this command was undoubtedly the best that could be made, as his popularity amongst the younger members of the Imperial Clan and the nobility has attracted many of them to a military life. H. H. Prince Yu-Lang, one of the most able princes of the Imperial Clan, is Comptroller of the Guard Corps. This prince is a typical Manchu, and since his entrance into political life only four years ago, has risen rapidly, and is now a member of the Grand Council, and the probable



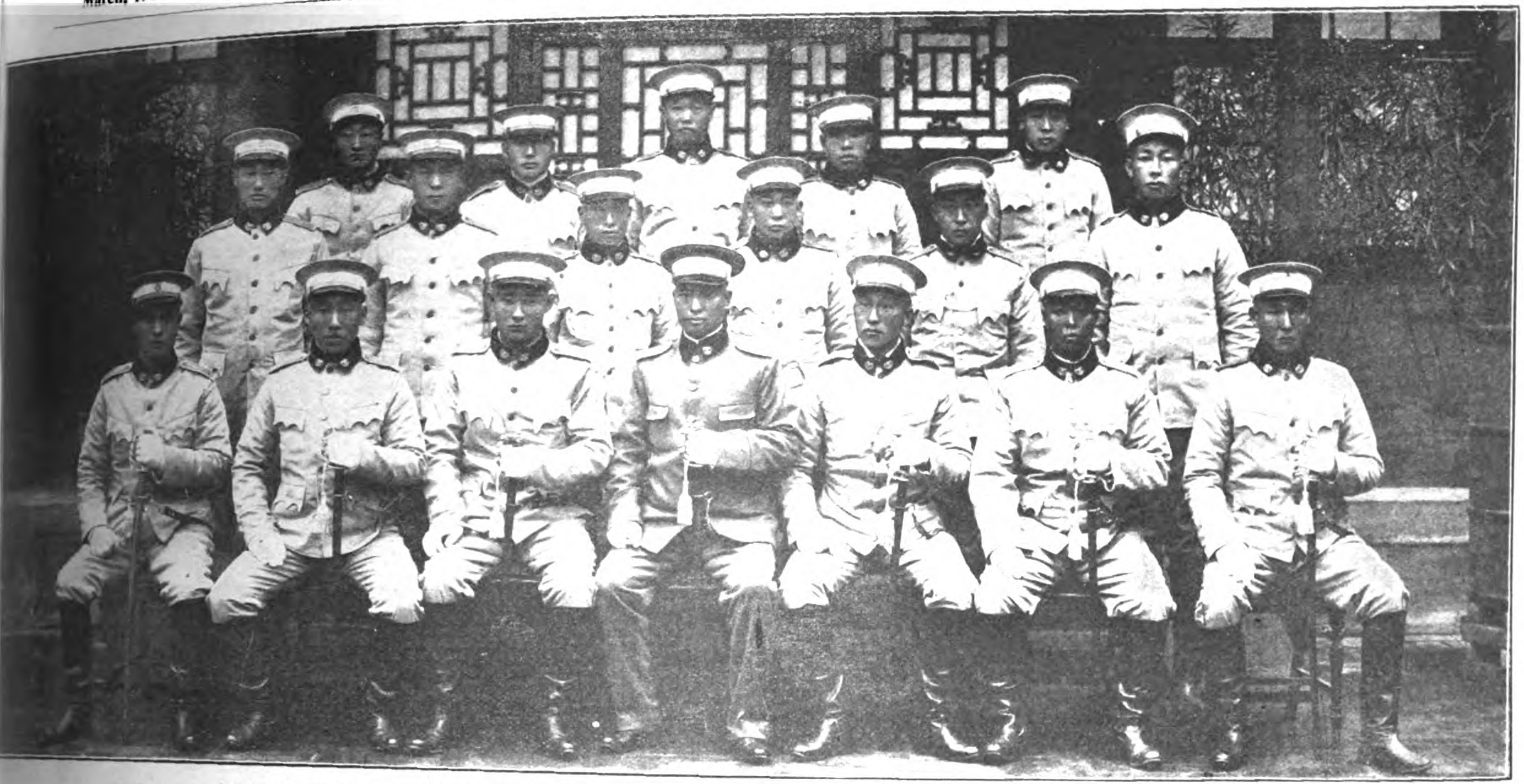
THE COLONEL AND OFFICERS OF THE FIRST INFANTRY REGIMENT OF THE IMPERIAL GUARD CORPS
Photograph taken in the Courtyard of their Mess at Peking.

successor to the mantle of Prince Ching (the "Premier" of China), when that venerable statesman finally retires. Prince Yu-Lang is still in his prime and destined to become one of the great leaders of the near future, sharing with Duke Tsai-tze, the present minister of finance, the distinction of being the only members of the Imperial Clan with the age and experience to assist the Regent in guiding the affairs of the nation. Notwithstanding the heavy drains on his time with affairs of state, Prince Yu Lang has developed a strong affection for the new Army and the Guard Corps, and whenever the occasion permits, lays aside the ceremonial robes of his princely rank, and appears in the trim and natty grey uniform of General of the Guards.

Prince Ching's youngest son, Prince Tsai-fu, has also selected a military career rather than the sedate life of the political office holder, and holds the rank of General and Training Commission of the Guards. Prince Pu-tung (brother of Prince Pu-lun), another of the bright young members of the Imperial Clan, is associate Chief Staff Officer of the Corps, equal in rank to Gen. Ha Han-Chang, the real military genius of the organization. In Gen Ha, China has an able assistant to Gen Yin-Chang. He graduated from the Peiyang Military School while the latter was Superintendent of that Institution, and afterwards went to Japan to complete his education, and on his return was selected to accompany Prince Tsai Tao in his mission last year to study foreign military systems. Following the lead of Japan, he has incorporated into the Chinese organization the best points of Japanese and foreign military science modified to meet peculiar national conditions. Gen. Liang-pi, the active Commander of the 1st Brigade of the Imperial Corps, is a Manchu, as his name of two characters indicates, promoted from the command of a brigade of the Peiyang Army to the more important post in the Guard Corps. He also received the rudimentary instruction in military matters at the Peiyang School when Yin Chang was Superintendent, and completed his course in Japan, and shares with Gen. Ha the reputation of being one of the best generals of the new army.

There are other able officers of the Guard Corps and on duty with the War Department and General Staff. Lt. Gen. Yin-Chang has

H. I. H. PRINCE TSAI TAO
IN THE UNIFORM OF LIEUT. GENERAL OF THE IMPERIAL GUARD CORPS



THE COLONEL AND OFFICERS OF THE FIRST CAVALRY REGIMENT OF THE IMPERIAL GUARD CORPS
Photograph taken in the Courtyard of their Mess at Peking.

H. I. H., PRINCE TSAI-TAO,
YOUNGER BROTHER OF THE PRINCE REGENT AND OF PRINCE TSAI HSUN,

ANOTHER PHOTOGRAPH OF H. I. H. PRINCE TSAI TAO.

surrounded himself with the best of the foreign educated officials, and all staff appointments and the higher commands are filled by those having modern military training. The present administration is in striking contrast to the regime of the late president of the Army Board, H. E. Tieh-Liang, who owed his rapid rise in official life to the favor of friends at Court. He is a typical Manchu official of the old school, elevated to the highest honors, and filling various difficult posts without any reference to his ability to administer them properly. His lack of military training was offset by a knowledge of the classics a high position in the Manchu aristocracy and strong influence with the late Empress Dowager. In his favor it must be said he was endowed with certain powers of organization and executive ability, which carried him through his tenure of office with credit. As favoritism and influence predominated in his own rapid elevation to power, the same system naturally extended to the service under his direction, which was honeycombed with corruption and officered by incompetents. Persona favorites with no knowledge of modern military science were elevated to high commands, and the new army program

H. I. H. PRINCE TSAI FU,
SECOND SON OF CHINA'S VENERABLE STATESMAN PRINCE CHING, TRAINING COMMISSIONER OF THE IMPERIAL GUARD CORPS.

H. I. H. PRINCE YU LANG,
GRAND COUNCILLOR AND COMPTROLLER OF THE GENERAL STAFF.

H. H. PRINCE SU,
MINISTER OF THE INTERIOR, AND IN COMMAND OF THE PEKING GENDARMERIE. ONE OF THE EIGHT PRINCELY FAMILIES.

MAJOR GENERAL HO,
COMMANDING A DIVISION OF THE NEW ARMY AT PEKING.

H. E. MAJOR GEN. FENG SHAN.

MAJOR GENERAL HA HANG-CHANG
THE CHIEF OF THE GENERAL STAFF OF THE CHINESE ARMY. EDUCATED IN JAPAN

MAJOR GENERAL LIANG PI
COMMANDING THE 1ST COMPOSITE BRIGADE OF THE IMPERIAL GUARD CORPS. EDUCATED IN JAPAN

H. I. H. PRINCE PU LUN
PRESIDENT OF THE SENATE AND LT. GENERAL OF THE PLAIN BLUE MANCHU BANNER CORPS

UP-TO-DATE CHINA: CAPTAIN TUNG CHIN-PU,
OF THE IMPERIAL GUARDS, AIDE TO HIS BROTHER-IN-LAW, H. I. H. PRINCE TSAI-TAO

general officers. Before any advance towards even partial perfection was possible, the elimination of this dead wood became highly imperative. The old type official, steeped in the customs and traditions of centuries, and surrounded by cohorts of hangers on and friends awaiting his appointment to power, could not be relied on to remedy the situation. So the Regent turned to Gen. Yin-Chang as the right man for the post. Certain of incurring the deep resentment and lasting hatred of the old school incompetents, Gen. Yin-Chang hesitated before accepting the high honor, but at the earnest solicitation of his Imperial Master and the assurance of every support, he consented to take over the direction of the New Army. Secure in his position, he has cleansed the

H. E. TIEH LIANG,

FORMER PRESIDENT OF THE ARMY BOARD, NOW TARTAR GENERAL AT NANKING

MAJOR GENERAL FENG SHAN,

FORMERLY IN COMMAND OF A DIVISION OF THE PEI-YANG ARMY. A PARTISAN OF H. E. TIEH LIANG. ON THE LATTER'S REMOVAL, GEN. FENG SHAN WAS ORDERED AS TARTAR GENERAL TO WUCHANG.

LIEUTENANT GENERAL YIN-CHANG
MINISTER OF WAR.

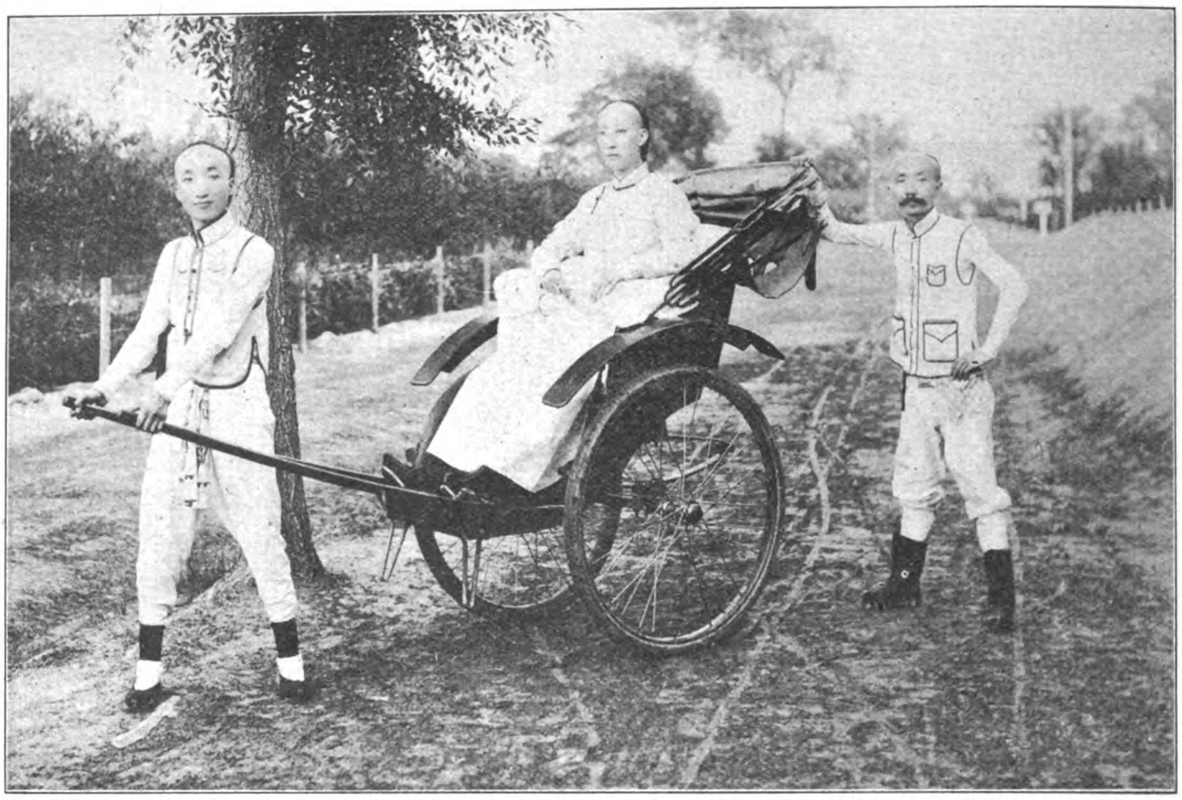
HIS HIGHNESS THE PRINCE OF CHUANG
ONE OF THE EIGHT PRINCELY FAMILIES

Augean stables, discharged hordes of drones, eliminated incompetents, and transferred the higher military officials of the old school to commands in the Banner Corps, or to the posts of Tartar Generals in the Provinces. Thus we find that the present War Department is presided over by a younger and more efficient, up-to-date personnel, all graduates of military colleges and imbued with the spirit of Yin-Chang to improve the conditions and morale of their service.

The photographs reproduced in these pages of the officials of the General Staff, and the 1st Cavalry and Infantry Regiments of the Guards, reveal a type hitherto unknown in China. In their neat grey workmanlike uniforms, devoid of ostentatious display, the Guards make a most favorable impression, and look the part.

Under Yin-Chang, the reorganization of the Army, has taken directions unsuspected by the old clique, and one by one their cherished

H. E. TUAN CHI-JUI
DEPUTY LT. GENERAL OF THE BORDERED RED CHINESE BANNER CORPS.

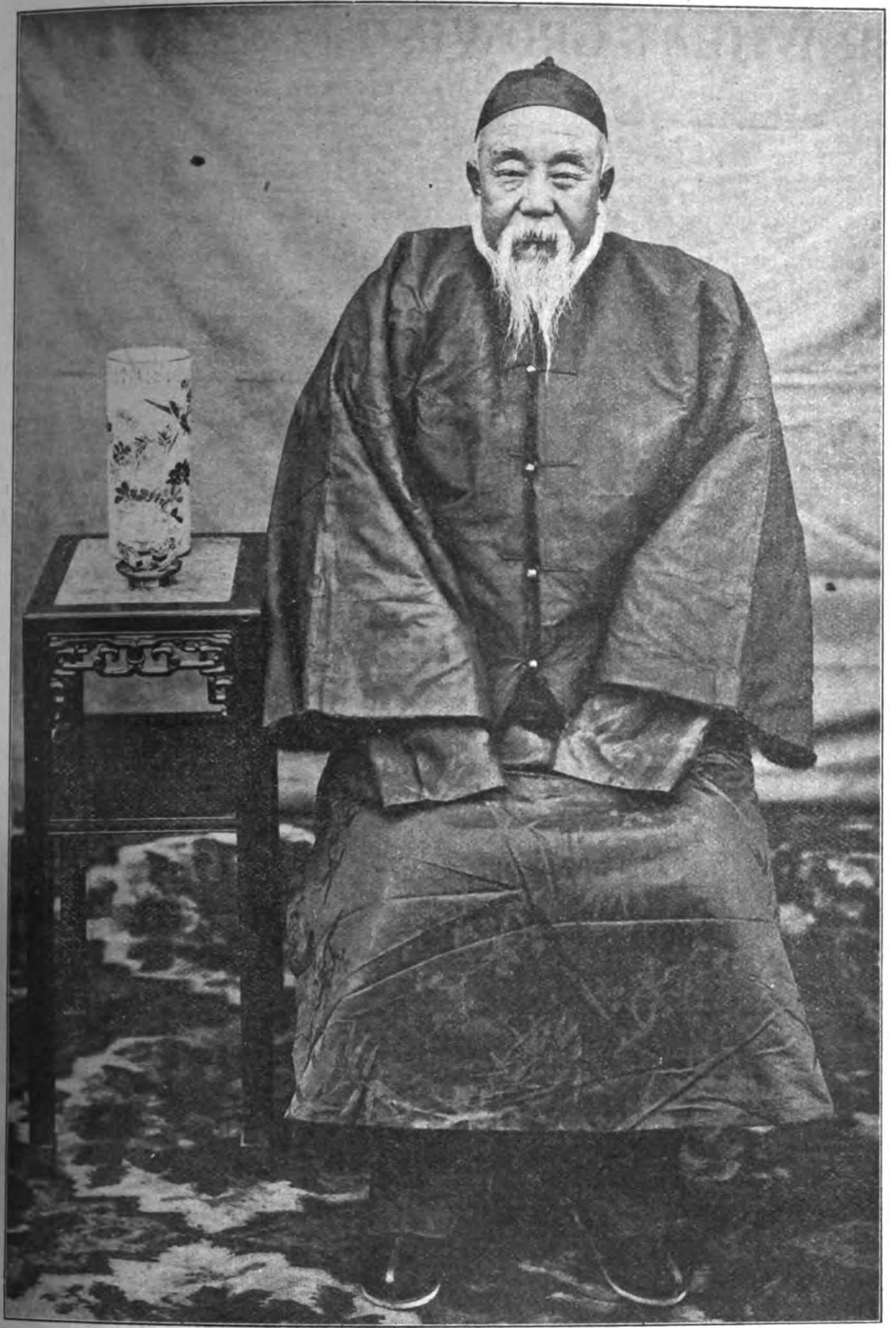


His Highness The Prince of SHUN CH'ENG
ONE OF THE EIGHT PRINCELY FAMILIES. FORMER CHAMBERLAIN OF THE COURT AND ACTUAL LIEUT. GENERAL OF THE BORDERED RED MANCHU BANNER CORPS.

Major General LIANG PI
IN UNIFORM OF PEIYANG ARMY

H. H. Prince NA (Nayentu)
DZASSAK OF THE KHALKA MONGOLS. GRAND CHAMBERLAIN OF THE COURT. LT. GEN. OF THE BORDERED YELLOW MANCHU BANNER CORPS.

H. E. TANG SHAO-YI
IN MILITARY UNIFORM, AS GENERAL OF THE MUKDEN FORCES, WHILE GOVERNOR OF THE PROVINCE OF FENGTIEN.



LIEUTENANT GENERAL CHIANG KUEI-TI,
COMMANDING THE DIVISIONS AT TUNGCHOW OUTSIDE OF PEKING

H. E. CHEN KUEI LUN,
VICEROY OF CHIHLI, THE METROPOLITAN PROVINCE, WHOSE ARMY WAS TAKEN OVER BY THE WAR DEPARTMENT AT PEKING

sinecures have been abolished, and the Commands concentrated with the General Staff. The two remaining divisions of the Chihli or Peiyang Army, under control of the Viceroy at Tientsin, and the independent command of the 4 divisions at Peking, with its separate staff and othe surperfluous posts have been taken over by the new Minister, and some millions of taels saved the treasury. Gen. Feng-Shan who commanded the divisions at Peking, with a staff and retinue exceeding that of the Minister of War, has been transferred to the post of Tartar General at Wuchang, and his military career and ambitions nipped in the bud. There is a story going the rounds at Peking with some semblance of truth in it to account for these changes, and which opens up the inside history of palace intrigues and plots to displace the Regent, and elevate the present Empress Dowager to the supreme control of affairs, during the minority of the Emperor.

A clique of high Manchu officials headed by Tieh-Liang, the Minister of the Army, is credited with plotting to overthrow the Regent and support the Empress Dowager, and only the reluctance of the latter to be a party to the conspiracy prevented its consummation. So long as Tieh Liang held the position of War Minister, with his henchman, Gen. Feng-Shan, in command of the four divisions of the modern army near Peking, the Regent hesitated in removing him. Whatever may be the true facts, it is certain that at the first opportunity Tieh Liang was to all intents and purposes degraded and sent to Nanking as Tartar General and Feng Shan deprived of his important command and relegated to a similar position at Wuchang. The stories of these palace intrigues filter through the gates of the Imperial City and reach the world outside somewhat distorted and magnified, and it is maintained that the plotting and intrigueing to oust the Regent still continues. Only a few months ago, foreigners at Peking learned through the usual underground channels that the Empress Dowager's party was again in the ascendency, and Tieh Liang would be called to the Grand Council and Fang Shan appointed Viceroy of Chihli, but as this has not yet taken place, it indicates that the Regent still holds the whip hand, and with his loyal adherent, Yin Chang, in command of the Army, his younger brother at the head of the Imperial Body Guards, and the other brother directing the affairs of the Navy, there is little probability of the opposition executing a "coup d'état" without someone being seriously injured.

GENERAL WONG HUI CHENG,
COMMANDER OF THE MUKDEN TROOPS

MANCHURIA AND HER WHEAT GROWING POSSIBILITIES

The potentiality of Manchuria is in her soil. It is a fertile Empire of over 360,000 square miles of territory, having all the natural advantages of climate and regular rainfall to insure bountiful harvests throughout its entire area. Today the largest crop is the soya bean, and will probably overshadow any other product for years to come as the demand is steadily growing and the export to Europe and America increasing yearly. The present annual export might be placed approximately at 500,000 tons of beans, 500,000 tons of bean cake and 40,000 tons of bean oil, besides the local consumption.

But in the near future, as the wheat producing and exporting countries grow in population and the annual increased domestic demand exceeds the increased annual supply to a point where these countries cease to export and are later obliged to import, Manchuria, the wheat belt of Asia, gives promise of becoming the largest of the world's producing areas.

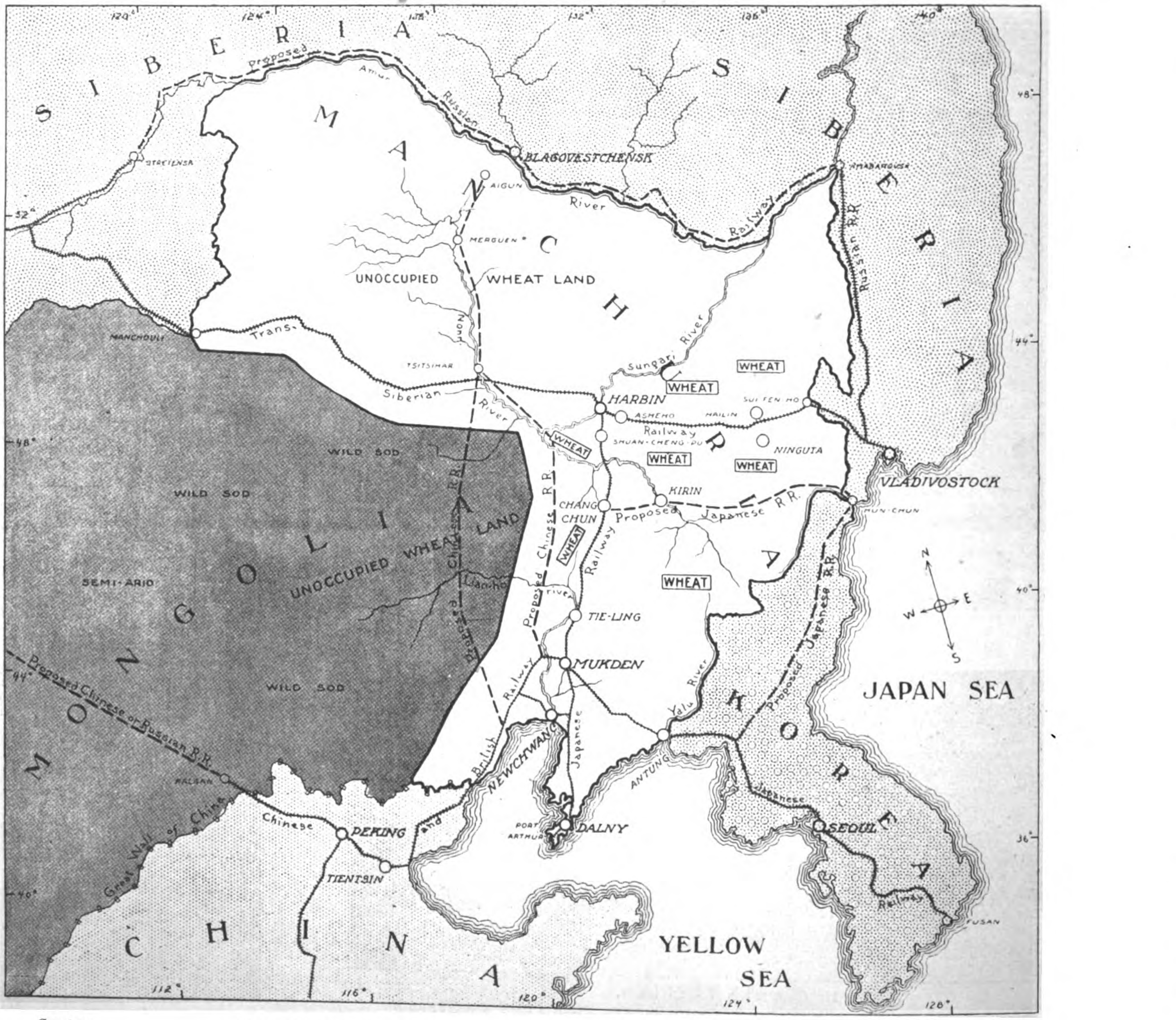
The present wheat crop of this agricultural empire averages 10,000,000 bushels annually, of which about 7,000,000 are supplied to the modern steel roller mills controlled by Russians at Shuan-cheng-pu, Chang-chun, Hailan and Harbin; those controlled by the Chinese at Kirin, Minguta and Asheho and by the Japanese at Tiehting. The balance represents shipments to Siberia and Chinese ports. It has been found that American flour cannot compete with this local product and the once profitable American flour trade has dropped in inverse ratio to the increased production and milling facilities of Manchuria until last year it was insignificant. This annual production does not represent the producing capacity of the limited area cultivated, which represents not over 2% of the entire wheat belt, once modern methods and machinery are introduced and the soil is properly tilled.

Mr. Edward C. Parker, a wellknown American writer and publicist, has made a special study of the agricultural potentiality of Manchuria and his conclusions point to the unusual adaptability of the territory for the production of wheat. Mr. Parker has been widely quoted as an authority on this subject. In an article from his pen appearing in the *Northwestern Miller* he advances his opinion that the world will inevitably look to Manchuria for its wheat supply. He writes:

"With the awakening that has recently come in the United States about wheat supplies and decreasing exports it is to be expected that the United States, as well as the European nations, will not only give greater public attention to the work of increasing the yield of wheat per acre, but also to ascertaining and getting in touch with new regions capable of producing and exporting wheat. A decade ago the wheat of Argentina and the durum of North Africa were hardly known in wheat trading centers; to-day the exports from these countries are recognized factors in the trade. In Argentina there is sure to be a great increase of wheat production capitalized from Great Britain, and in the French colonies of North Africa an increasing export may be looked for.

"A greater and more magnificent wheat territory, only partially exploited, lies along the eastern coast of Asia and north of the fortieth degree of north latitude. The most accessible and most fertile part of this region lies within the boundaries of that portion of the Chinese Empire known as Manchuria, and in the eastern part of Mongolia adjoining Manchuria (see map).

"The area of Manchuria is 360,000 square miles, or slightly greater than that of Minnesota, Iowa, North Dakota, South Dakota, Kansas and Nebraska, the present granary

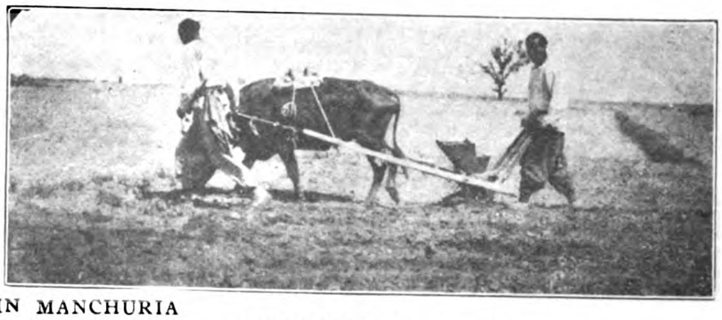


Courtesy *Northwestern Miller*

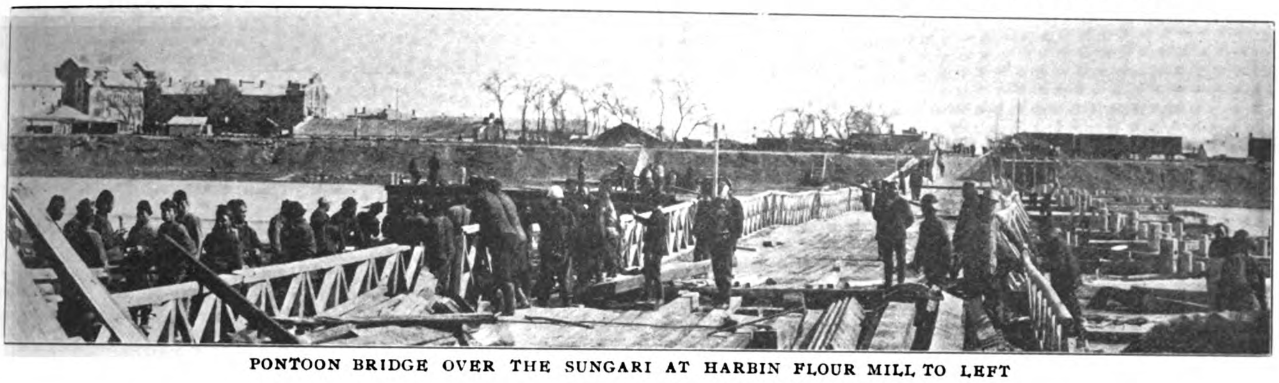
MAP OF MANCHURIA SHOWING WHEAT GROWING AREAS

AGRICULTURE IN MANCHURIA

THE MAN WITH THE PLOUGH

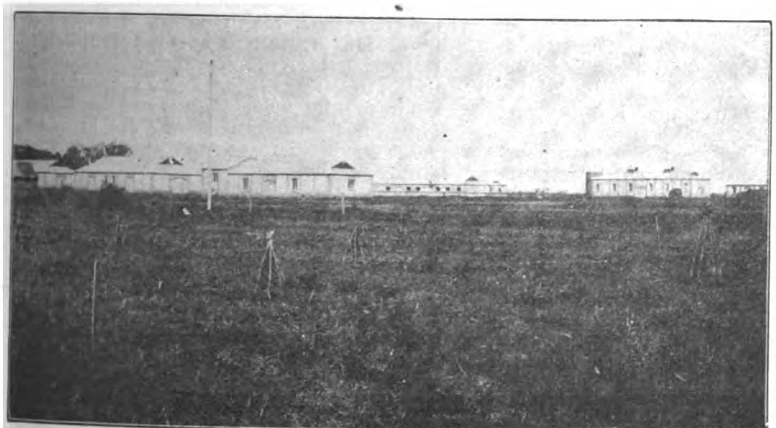


NATIVE SEEDING IMPLEMENT



PONTOON BRIDGE OVER THE SUNGARI AT HARBIN FLOUR MILL TO LEFT

AGRICULTURAL EXPERIMENT STATIONS IN MANCHURIA



THE CHINESE STATION AT MUKDEN

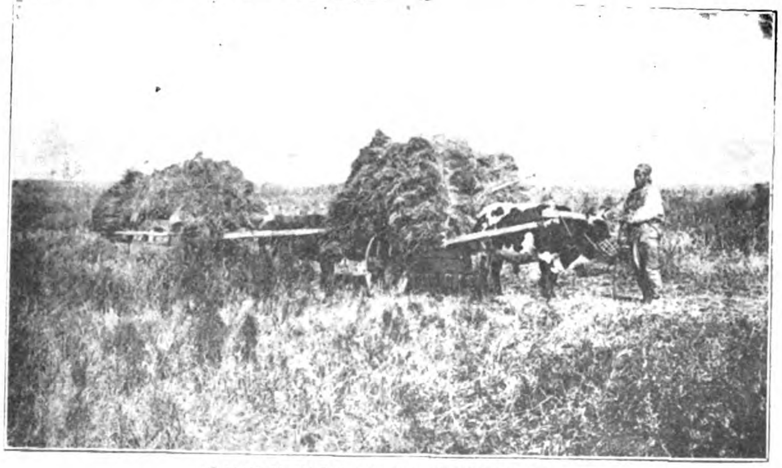
THE JAPANESE LABORATORY AT DAIREN

of the United States. It is a region of sure and bountiful harvests, with seasons of cold and rainfall that rarely vary from the normal, and where drought and flood rarely lay their devastating hands. It is a region that fires the imagination with its trade possibilites, that impresses you with its vastness and its potential wealth. Its fecund prairies, green valleys and broad water courses convince you that nature has substracted her stores of wealth from some other region that she might add to and doubly bless this spot for the habitation of man.

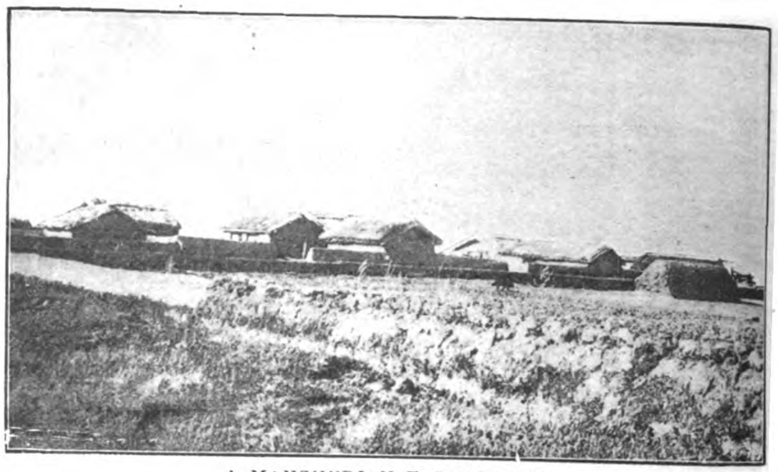
"The annual rainfall in this agricultural empire ranges from 20 to 40 inches, the larger part coming in July, August and September. Spring rains are not as common as in the Mississippi valley, but in the northern two-thirds of Manchuria drought is unknown and moisture is always near the surface in the loamy, retentive soils. For five months in the year the soil is locked up by frost, and enough snow usually falls to provide moisture for rapid spring germination.

THE SUNGARI FLOUR MILL AT HARBIN

THE MANCHURIAN FLOUR MILL AT HARBIN



GATHERING HAY IN MANCHURIA



A MANCHURIAN FARM HOUSE

"Soil and climate are as favorable here for wheat production as in the watershed of the Mississippi. The native wheats are mostly of the bearded and smooth chaff type (similar to velvet chaff grade in the Minneapolis market), and fife, blue-stem and Canadian club types are also seen. It is more than likely that this part of Asia was the original habitat of several of our best types of American spring wheat. Although this region is naturally favorable for wheat production, the crop has never been extensively grown, principally because the yield of wheat is less per unit of land than millet, sorghum or maize, and the more productive and therefore cheaper foods are better adapted to the standard of life, and the purchasing power of the Chinese family. Nor have cash markets for wheat existed at the borders of the country to stimulate wheat production for export."

Noting the remarkable influence of the Manchurian bean on the vegetable oil market Mr. Parker points out that where America hitherto supplied the world with linseed and cottonseed oil, England is now exporting oil produced from the Manchurian product to America and he believed that unless a tariff wall would prevent it "dairy cattle on the Pacific slope will be fed their protein from the fields of Manchuria and soap will be made in America from the Manchurian bean oil."

As the Manchurian bean has influenced the American trade in oil, so is Manchurian flour superseding American flour in Eastern China. "Although wheat has never been extensively grown in Manchuria," writes Mr. Parker, "it has been cultivated in small quantities as far back as historical records of the country exist. Of late years it has been quite noticeable that the wheat-eating habit is growing among the Chinese. Wheat flour becomes an important article of diet in every family that has the price to purchase this comparative luxury. Even the coolie on the streets spends some of his small earnings for a cake made of wheat flour. In every Chinese city and town numberless small bake shops and restaurants may be seen along the streets, where wheat flour is baked in a sort of dumpling, and sold for a few coppers to the buyers of small means. A large part of this local demand for flour has always been met by the countless little stoneroller mills operated by donkey power, that turned out a coarse, poorly graded flour.

"The development of city life in the ports and along the modern railways in the last decade, and the stimulation in foodstuff trade due to the Russo-Japanese war, created a demand for wheat flour that surpassed the local supplies, and American Pacific slope flour was imported in large quantities to meet the demand. But the past season the imports of American flour dwindled to almost nothing, due principally to the depreciation of silver currency (the buying medium of China) and the resulting high silver prices for American flour bought on a gold basis.

TABLE I.

IMPORTS OF FLOUR (MOSTLY AMERICAN,) 1900-1909, PORT OF NEWCHWANG

(Barrels of 196 lbs.)

—Annual Average—

Years—	Foreign	Native	Total	*P. C.
1900-1904	36,224	22 473	58,697	62 00
1905-1909	137,061	107,386	244,448	56.00
1908	103,382	43,666	147,048	70.00
1909	153	88.817	88,970	.17

*Annual import foreign flour.

Mr. Parker believes there is no future for the American flour trade with northern China, even though the United States could continue its large exports of flour. The British and Chinese steam mills at Shanghai, with the winter wheat fields of Honan province tributary to Shanghai, and the Japanese, Russian and Chinese mills in the midst of the spring wheat fields of Manchuria, are sure to capture the flour trade of the Far East as soon as they perfect the technique of their business and the shrewdness of their salesmanship.

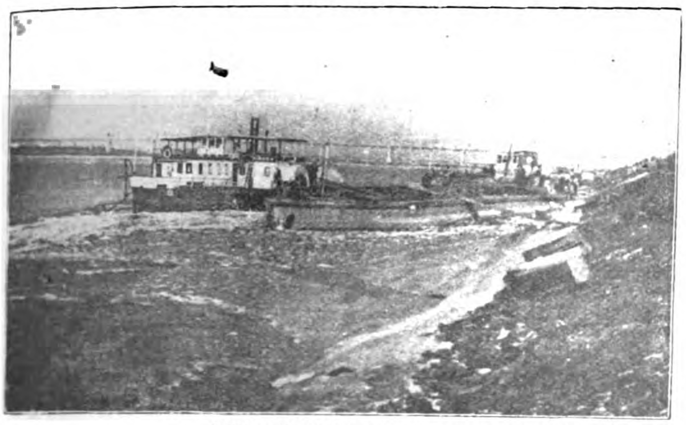
"The customs statistics shown in table I," he continues, "reveal a gradual increase in the imports of native manufactured flour (principally from Shanghai), and in all the interior trade centers the Japanese and Russian flour holds the market. These mills, although lacking the labor technique of the American mills, have advantages in cheap wheat, cheap labor and small transportation charges to markets that give them the inside track on the business. No. 1 wheat, at the present time, Jan. 1, 1910, is worth at the mills 84c., United States gold, per bu. and at harvest time wheat was selling for 66c., United States gold, per bu. The highest and lowest prices for wheat recorded during the past three years have been 56c. and 84c., United States gold, per bu.

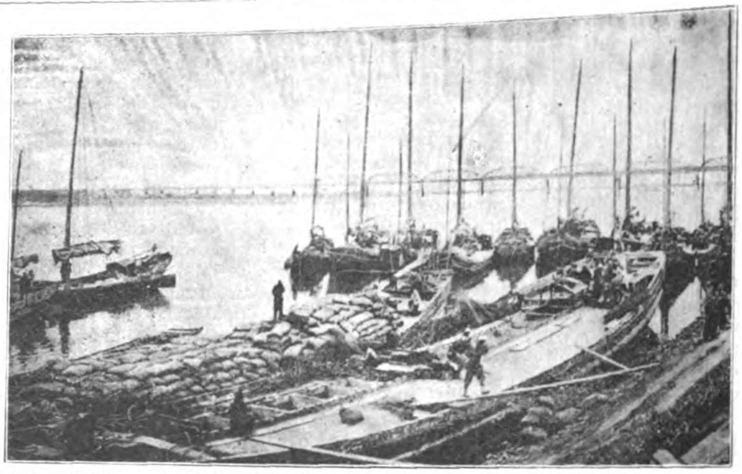
"Flour manufactured by the Japanese at Tie-ling with American milling machinery, and corresponding in grade to 'second patent,' is selling in Mukden this winter for $3.93, United States gold, per bbl. of 196 lbs, and Russian flour from the Harbin mills of similar quality is selling for $4.68, United States gold, per bbl. Against these prices American millers cannot compete in these days of 'dollar wheat' in America, and it is quite probable that Manchuria will cease to import flour and commence to export before another decade has passed.

"The present annual wheat crop of Manchuria is approximately 10,000,000 bus. Of this amount 6,729,781 bus. may be accounted for in the wheat supplies consumed by the steel roller mills, the most important native stone-roller mills, and the exports of wheat to Siberia and southern China; the balance being an estimate of the amount consumed by the small native mills.

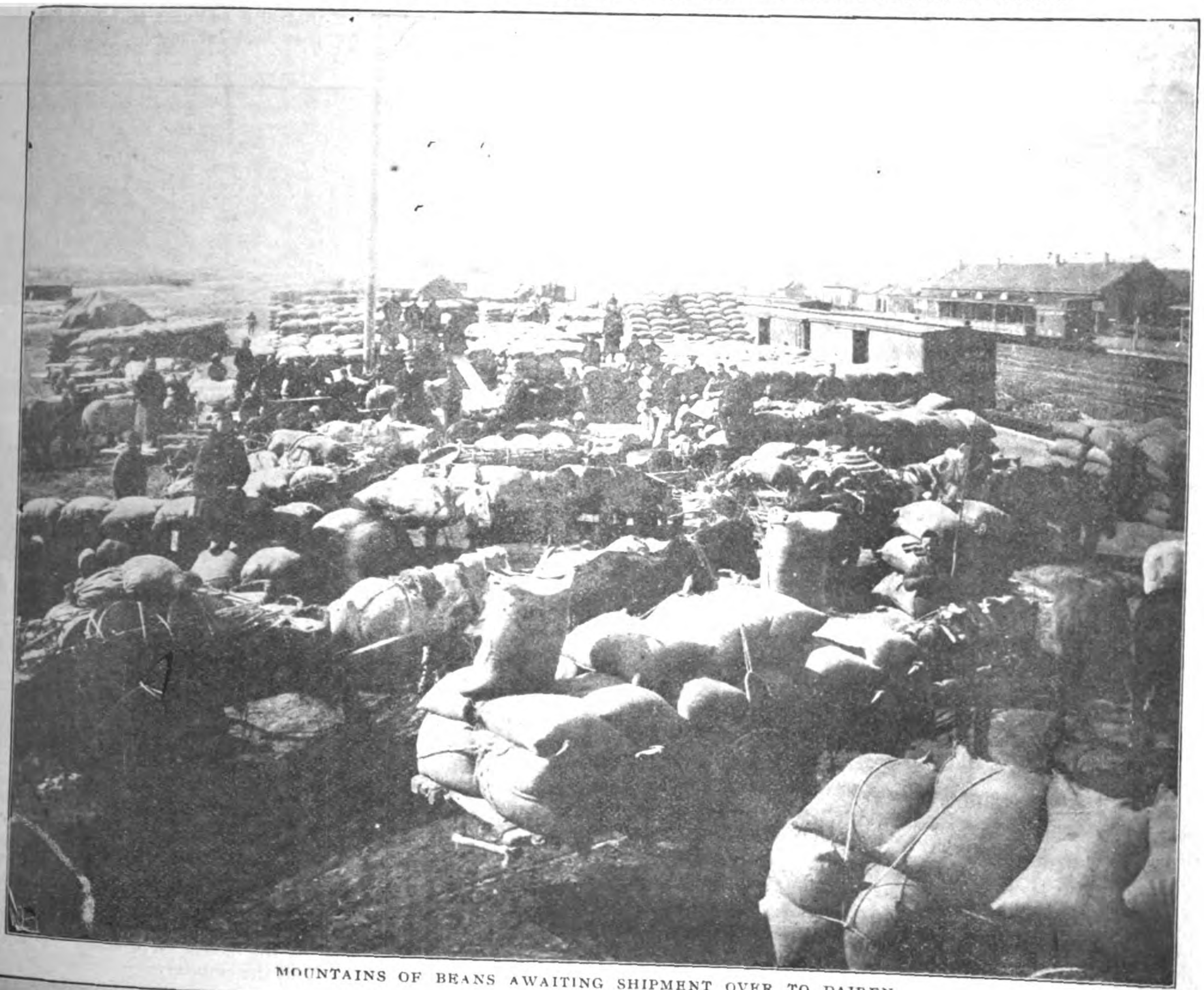
MANCHURIAN KAOLING (MILLET) FIELD

GOATS GRAZING ON MANCHURIAN HILLS

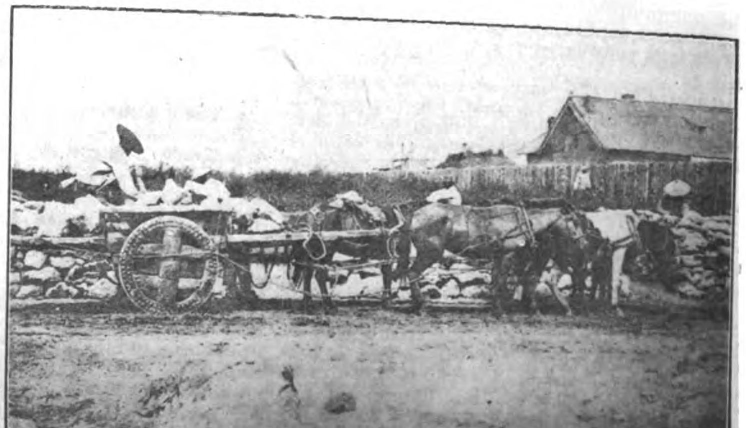




RIVER TRANSPORT IN MANCHURIA:—SUNGARI RIVER STEAMER AND GRAIN BARGES AT HARBIN



MOUNTAINS OF BEANS AWAITING SHIPMENT OVER TO DAIREN



TRANSPORT IN MANCHURIA—THE TYPICAL MANCHURIAN CART

"Harbin, a Russian city on the Trans-Siberian railway, is the largest center in the wheat trade. Steamship company and railway statistics show that 5,400,000 bus. of wheat passed into Harbin last year, of which 3,600,000 were milled locally and 1,800,000 were exported on the Sungari river to the Siberian military posts along the Amur river. This is the only important movement of wheat in the country, all other stocks being consumed locally.

"Wheat comes into the mills and to the rivers and railways from almost incredible distances. In the winter, when the rough, ungraded roads are frozen hard and smooth, the natives haul wheat for 200 miles, in some cases, by means of a heavy, two-wheeled cart drawn by four to eight mules. Long trains of these carts, travelling together for protection and companionship at night, can be seen on the main highways all winter and are the most picturesque feature of Manchurian life.

"Wheat production is carried on by the most primitive of methods, more primitive donkeys, beats out the grain on a hard, clay floor and the winds of the earth do the rest. The farmer in Manchuria grows no grass crops, he keeps no live stock except a few work animals and a few pigs, but Nature refuses not her increase to him. The brown, loamy, fecund soil gives birth to crop after crop of food for man and beast.

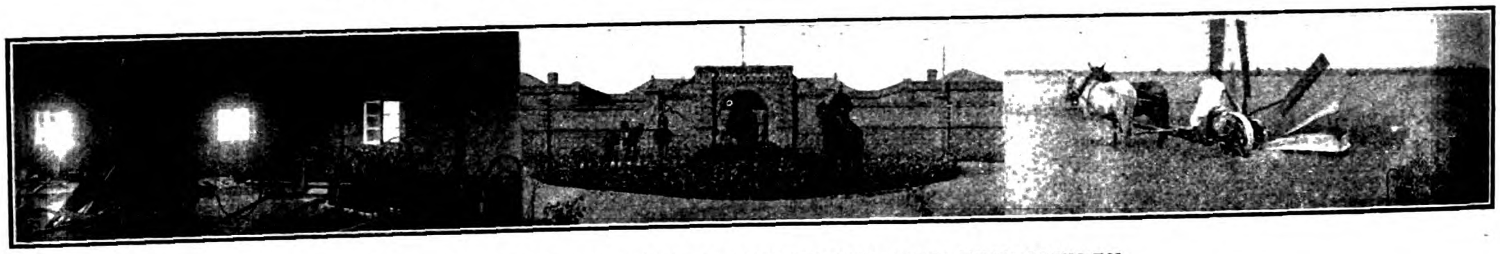
"Considering the small area of land devoted to wheat at the present time, and considering the large areas of unoccupied land in the north of Manchuria and eastern Mongolia, it may be said that this region of Asia is capable of producing from 300,000,000 to 400,000,000 bus. of spring sown hard wheat, even with native methods of culture. Whether this amount of wheat is ever produced in Manchuria, and if produced what per cent would be exported, are matters hard to estimate in view of present conditions ni Manchuria. The facilities for producing a large surplus of wheat for export are present, but the future colonization and development of this great country are more or less indeterminate."

Regardless of the political dissensions respecting this territory the development of the Manchurian wheat belt will be stimulated whether controlled by China, Russia or Japan. Mr. Parker does not believe that either the Japanese or Russian will ever colonize the land, but they will encourage the expansion of the wheat growing industry by installing mills and opening up markets. Of the Chinese as colonizers Mr. Parker says:

"The Chinese colonize slowly. No leaving home for them unless pressed by economic necessity. Up in Northern Manchuria the rivers run north into Russian territory and Chinese colonization for a long time to come will be slow and difficult. Yet where the Chnese settles, his roots go deep. He is patient and long suffering; he has not nerves: his wants are easily satisfied, his naural increase is great, and through these qualities aud his thrifty industry he stays where he is planted.

"It is highly probable, therefore, that Japan and Russia will continue to dominate and develop the transportation, milling and storing of wheat in Manchuria, and that in the northern wheat lands Russian example and influence will slowly increase machine production by the Chinese colonists. Eventually China wlll probably get her railways into the wheat lands of eastern Mongolia and northwestern Manchuria, and Chinese colonists from the south will follow in its wake. They will never produce great crops of wheat for export until they take up machine production, and that alternative is generations away from the present. With native methods of production, however, the yare now producing wheat for export; and as the land becomes occupied there is little question but that the amounts of wheat available for export will increase.

VIEWS SHOWING STOCK UTILIZED FOR BREEDING PURPOSES AT MUKDEN FARM.



AMERICAN MACHINERY USED ON GOVERNMENT FARM NEAR MUKDEN.

even than in the days of the scythe and the cradle in America; and yet the facility with which the work is carried out is a constant marvel to those who are accustomed to machine production. In many seasons of the year the farming communities are sleepy and apparently lifeless. On all sides your eye restson broad, waving fields of millet, sorghum, corn or wheat, but not a man can be seen tending the crops. Here and there in a village sits an old man smoking his long stemmed pipe, and an occasional coolie sleeps by the roadside with his head in the bright sun and the flies buzzing over his face. No noises, indicating industry and busy people, arise to disturb the seeming lifelessness of the community. Only an occasional shrill, scolding squabble among some of the housewives tells you that you are not in a deserted village.

"But when the busy seasons of seed time and harvest come around, the very earth seems to open and give birth to coolies. The fields are dotted with patches of blue cotton piece-goods scattering and covering seed, gee-hawing oxen and guiding a rude plow, cutting the long stalks of sorghum with a corn knife, or pulling wheat out by the roots and shocking it in neatly capped shocks.

"At these times the slow-going, patient coolie works from daylight to sunset, and harvest is completed in an incredibly short time. The threshing of all cereals begins in October and continues way into the winter; every day when the wind blows, for the native uses no mechanical contrivance to separate the wheat from the chaff. A stone roller, drawn by a pony, or a couple of

There will be wheat enough in Manchuria to mill and supply the wants of northern China, and no doubt an insistent foreign demand at high prices will in the future call forth many millions of bushels of wheta for export. If we Anglo-Saxons must have wheat flour in our diet, and are willing to pay high prices for it, the Manchurian farmer will be quite content to bend his back sowing and garnering for us, and make his own diet from the more productive and cheaper foods, such as millet, sorghum and maize."

The following table was compiled by Mr. Parker from trade records for the year 1909 but does not include the wheat consumed by the thousands of small stone mills through-out the country:

ANNUAL WHEAT AND FLOUR TRADE OF MANCHURIA

Trade Centers and Trade Routes	Bus. wheat ground by steam mills	Bbls. flour produced by steam mills	Bus. wheat ground by native mills	Bbls flour. produced by native mills	Bus. wheat exported	Bbls. for'gn flour imported	Bbls. native flour imported	Bbls. native flour exported
Harbin District (Russian)	3,600,000	800,000	....	....	....	....	....	....
Ninguta (Chinese	893,200	198,488	60,270	13,394	....	....	....	....
Kirin (Chinese)	9,000	2,000	....	....	....	....	....	
Tie-ling (Japan in Manchuria)	291,666	64,500	....	....	....	....	....	....
Tie-ling (Chinese)	....	....	70,000	15,555	....	....	....	251,323
Manchuria to Siberia...	....	....	....	....	1,800,000	....	....	
Manchuria to Southern China	....	....	....	....	5,645	....	....	....
All customs ports	....	....	....	....	....	22,651	207,381	....
Totals	4,793,866	1,064,988	130,270	28,949	1,805,645	22,651	207,381	251,323

THE FAR EASTERN REVIEW

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THE NEW AMERICAN DIPLOMACY IN THE FAR EAST

Once again echoes of discontent reach the Far East from American financiers not included in the Group co-operating with the administration in its Far Eastern policy. That some grounds for irritation on this score should exist is quite natural, as others were first in the field for participation in the Hukwang Loan. It appears that repeated pressure has been brought to bear on Washington, to sanction the admission of other banking firms into the Group, or secure endorsement for independent operation in China, and a final and definite reply has been forthcoming that the present arrangement must stand as it is. Such a decision undoubtedly carries keen disappointment to those who have aspired to be taken into the confidence of the Administration, and creates a natural feeling of resentment against the policy of the Government. As was pointed out last year in discussing this same question, there are weighty reasons why only the strongest and most influential American bankers should be selected to co-operate with the Government in the expansion of its Chinese policy, as the national prestige cannot survive another Canton-Hankow fiasco, with all its charges of graft and corruption on the part of Americans. It was also made clear at that time how the Americans were maneuvered off the board through the intrigues of others with high Chinese officials, and the concession surrendered in deference to China's desire to regain control and construct the road with her own money. As the firm of J. P. Morgan & Co. shouldered all the odium attached to this fiasco, despite their evident good faith and desire to restore American financial prestige and complete the road, common equity demanded that they should receive the first consideration of the Government in any new loan enterprise in China. The Chinese Government also owed something to this firm, for the unfair criticism to which they had been repeatedly subjected as a result of their acting as agents for the sale of the concession. It stands to reason that the Administration at Washington would never place itself in a seemingly untenable position unless some highly important reasons guided their policy. Whether right or wrong, the Administration has committed itself to a course of action, which it believes is best for the larger national interests. Naturally some disappointment is displayed in certain circles, but we hold that this discontent, however justifiable, should not find expression in an attack on the general policy of the Government, in its so called "Dollar Diplomacy."

For years America has lived within itself, quite independent of the rest of the world for its material prosperity, content solely on keeping pace with its marvellous internal development. Food and other natural products made up the bulk of the nation's exports, and the manufactured articles were consumed at home.

No combined or intelligent effort was made by the manufacturers to secure foreign trade, and discouragement rather than assistance met the far sighted man who ventured into this field. How often have we been told in the past by the heads of our greatest manufacturing enterprises, "It is against our policy to advertise or incur expenses in developing foreign markets. We don't need the business, as our works are filled with domestic orders for a year ahead."

But the pendulum is swinging the other way. The panic of 1907 was a revelation. The cyclone hit with its full force those whose policy rejected the foreign fields, while many enterprises safely rode out the storm, with the aid of their export trade. It will not be long now before the American manufacturer will be compelled to divert some of his energy into the export field, as the home development already shows signs of falling off. Where will he turn and compete on equal terms with the European manufacturer, already with the advantage of lower priced labour, and government subsidies on their side? The cry for help will then go up to Washington in no uncertain manner, and those who now sneer at and decry the "Dollar Diplomacy" of Knox will bless their stars that one Secretary of State had the foresight to pave the way abroad by using his best endeavours to extend the field for American loans, through financiers whose names are a guarantee of good-faith and stability.

As regards the success of this new diplomacy in the Far East, it is too early to express the opinion that it has brought neither profit to the Group or prestige to the country. It is apparent however on the face of things that no tangible results have yet been secured, but this is due to obstructions not easily overcome in a few months, rather than to any inherent weak spot in the policy. The question has been asked in America if the Hukwang loan is held up because of the indisposition of the lenders to leave the expenditure of the funds solely in Chinese hands?

The application of this loan hangs fire because the Central Government at Peking is too weak and vacillating to impose its Imperial will on the provinces against their protest. And until this vital question of sovereign rights is settled one way or the other, railway construction throughout the Empire will remain at a standstill, as no official can be found to preside over the Board of Posts and Communications willing or strong enough to assume any responsibility. The Regent, Grand Council, Waiwupu and Board of Finance are apparently anxious for the foreign loan to be applied, as the construction of the railways is highly imperative for national defense. None of them, however, seem to have sufficient courage to brave the threatened revolt in Hunan if this course is adopted, and shirking their responsibility to the nation and obligations with friendly foreign powers, they unload the difficulty on the shoulders of the President of the Railway Board and signify their willingness to abide by his decision. The situation is such however that if he conforms to the pretended wishes of his superiors, the Hukwang gentry will raise such a disturbance that in the end he will be sacrificed to quell their anger. The Regent, members of the Grand Council, and every leading official of the Empire in power at Peking are at present playing furious politics to save their official skins against the inevitable day of constitutional government. The Regent is catering to the people, and educating the Chinese proletariat to believe that the dynasty is solely concerned for its welfare, and in the last conflict with the old regime, he can be depended on to throw over its adherents and take up with the new order of things as the safest and only plan for the preservation of the dynasty. And the wily old conservative officials in Peking have not passed all their lives in such an atmosphere of intrigue and duplicity without knowing their own, and they too are closely watching for the cat to jump, so as to jump with it. No professional tight rope walker can compete with his Chinese political prototype in balancing in the right direction to preserve his equilibrium. And they know that whoever is appointed to the Presidency of the Railway Board, and complies with the Imperial wishes, will be sacrificed to the Hunan gentry, as the Government lacks the stamina to uphold and support him. In the face of such conditions no official will risk political oblivion to please the Powers that Be. This explains Tang Shao-yi's retirement from the Presidency of the Railway Board, and the appointment of Sheng Kung Pao to the post. If Tang is considered the ablest diplomat of China, his successor is also astute and wily, and his intimate relations with the Hukwang gentry, as president of the Han-Yeh-ping enterprises, makes it extremely doubtful whether he will brave their displeasure. The Pinghsiang Colliery and Railway, Tayeh Iron Mines and Hanyang Iron & Steel Works under his able direction have contributed largely to the material prosperity and advancement of the Hukwang provinces, and Sheng's influence, if properly directed, might overcome the hostility to the loan. This appears to be the only solution to the present situation. Sheng cannot be expected to incur

the people's ill will in a province where he has so much at stake, and the foreign financiers will not alter the terms of a loan which is considered as already conceding far too much for the proper safeguarding of its expenditure.

So the only solution would seem to lay in Sheng's ability to win over his people, or an unlooked for stiffening of the Regent's backbone, in exacting compliance with the Imperial desires in the face of almost certain revolt. On the outcome of the situation hinges China's railway development in the next few years. The opposition of the Hukwang gentry is based not so much on the acceptance of a foreign loan, as on the terms of the agreement which shifts the control to Peking and deprives them of directing its expenditure. It is a mistaken idea that the Chinese are opposed to all foreign loans. The proof of this can be found any day in Shanghai, for nearly every provincial railway project has been hawked around the financial market seeking a loan for construction, but for lack of sufficient guarantees have been rejected by the responsible foreign banks and commercial houses. So it is hardly fair to cavil at the diplomacy of Knox for delay in applying the proceeds of the loan. Instead, his policy should merit the approval and loyal support of the entire country for the opportunities opened for American trade.

There is a disposition in some quarters to criticize the final terms of the Hukwang loan and accuse the State Department of slighting the manufacturers for the benefit of Wall Street. The American Financial Group, in its negotiations with the European bankers, had held firm for several months on the question of equal participation in the appointment of a purchasing agent, to insure equitable treatment in the awarding of tenders. Guided by previous experience where American material although lowest in price had been rejected by European Engineers in China on the grounds of inferiority, there was some justification for this attitude. The negotiations were brought to an end and the agreement signed, by the Americans waiving the right to nominate a purchasing agent, on the condition that all material be purchased in the open market at the lowest tender, thus insuring fair treatment to all parties. In addition to the official terms of the Loan Agreement, the European Groups signed a private understanding with the Americans, to the effect that their respective purchasing agents, before entering into their duties, must obligate themselves to an impartial awarding of tenders. So although it would appear from the wording of the loan terms, that the American manufacturing interests had been sacrificed to Wall Street, the real facts reveal that as far as possible the American Group and the State Department have benefited the manufacturers by eliminating preference for materials of any one nationality, and guarding against unfair methods in the awarding of tenders. Echoing the traditional slogan of Great Britain, the Americans join in the cry, of "A Fair Field and No Favor," as their only stipulation for a chance to compete in China's railway development.

And no American can criticize the diplomacy and methods which have opened the door for products of his country to compete on equal terms with Europe. As yet no profit may have resulted from the "Dollar Diplomacy" here revealed, but assuredly there is some appreciation due those who have paved the way, and created the opportunity.

From the Hukwang Loan we turn to the Chinchow-Aigun railway affair, which, although sanctioned by China to be financed by Americans and constructed by British, was bitterly opposed by Russia and Japan supported by their respective allies, and the scheme held up. In other words, America was isolated and her diplomacy brought face to face with the opposition of four great powers. Now according to some writers who misunderstand the temper of America, the latter should have plunged into war over this interference with her policy in China, but the Americans haven't lost their heads to the extent of waging war on four powers for the sake of an insignificant political railway in China. The Government has adopted the wiser course of meeting diplomacy with diplomacy, and a solution is being reached through friendly negotiations.

It might be urged that the State Department and the Financial Group have brought little prestige to America as a result of this affair, but it is too early for recriminations and the end may prove entirely satisfactory to all concerned. At any rate, Knox's diplomacy tore away the veil, and uncovered the position of the other great Powers, so that America knows for a certainty where she stands in the game. Her eyes have been opened, and from now on she can play her hand from the same deck of cards as her opponents. There may be little profit in the game at present, but the cards are still being shuffled and with an honest deal, some winnings may yet accrue to the player whose attention is now riveted on the board. Any diplomacy which will awaken the country to a sense of its true position in a losing game, is certainly to be commended, and the nation owes something to Knox and the Group for their share in bringing about a situation from which it may yet emerge with profit and prestige instead of loss and ridicule.

And again in the matter of the Chinchow-Aigun railway agreement, some American manufacturers have raised the cry that Wall Street is the sole beneficiary of the negotiations through the construction contract passing into British hands. But a clear exposition of the facts in the case shows that it was a most equitable division. The same argument was also raised in Great Britain to defeat the entrance of Pauling & Co. into the field, as an alleged secret agreement was published some months ago, wherein it was stated that Pauling & Co. had agreed with the American Group to purchase in America all the material for the equipment of the line. As a matter of fact the Agreement with the Chinese Government carries on the face of it, equitable treatment to all parties, as the construction is to be carried out by contract at a flat price per mile. Under such specifications, the contractor's profit is his first concern, and the materials must necessarily be purchased in the open market without undue preference to any one nationality. The contractors are undoubtedly intensely loyal to British products, but their first concern is their own pockets, and if American materials are cheaper than British on the same specifications, and other conditions being equal, it is clear they should receive the order. And the understanding between Pauling & Co. and the American Group, insures a fair field for the materials of both countries. Surely nothing could be more satisfactory. For China, it is the best arrangement yet concluded for railway construction in the Empire, and makes impossible the wasting of funds, and additional loans to cover hasty estimates and other deficits, besides eliminating the usual five per cent purchasing commissions. International jealousies and politics have delayed execution of the contract, but there is every reason to hope that a friendly solution will be found to the present negotiations, and the line will yet be constructed with some changes of route to satisfy Russia's ideas. And while neither prestige or profit has yet redounded to the so called new American diplomacy underlying the scheme, the country should feel highly gratified that its traditional policy has such an able exponent in the person of the present Secretary of State.

We turn now to the $50,000,000 Currency loan which has been hanging fire for some months. The critics of the Government at home sneer at the protracted negotiations, and ignoring the intense opposition of certain interests at Peking, ask if the loan is blocked because of the Chinese unwillingness to accept an American financial adviser. And this appears to be the general idea on the situation.

Pending the final outcome, it is too early to discuss the negotiations leading up to and surrounding this loan, but there are some facts which will bear the light of publicity. Criticism has been directed against the Americans for inviting the European Groups to participate in the loan on equal terms, and forming the quadruple syndicate for future financial operations in China. This action was justified and made almost imperative by repeated declarations of American policy towards China, notwithstanding the fact that the currency loan was signed in the preliminary draft as a purely American undertaking. In the first place, it is possible that a large number of the bonds would ultimately find their way to the European market, and be held there, and commercial fairness demanded that the European bankers be admitted to a share of the profits. Again the specific object of the major part of the loan was reformation of the currency. The advent of a stable currency in China would result in depriving the European banks established throughout the Empire of large profits now enjoyed through the fluctuation of exchange. While the opposition of the European Banks might not defeat the proposed reform, their co-operation would materially advance its successful application. And again common equity and fairness entitled them to some share in the profits of the loan, as an offset against the decline of their exchange business. There are other good reasons why it was considered politic to admit the European Groups to a share in this special transaction and organize for the purpose of lending money in the future to China. However, it is understood that if China refuses to admit the desirability of the quadruple arrangement, and insists on a purely American character of this special loan, the American Group stands ready and willing to carry it through. The appointment of an American Financial Adviser for the Chinese Government, or to supervise the expenditure of the loan, has never been urged. The Americans have held to the position that the application of the loan funds for the purpose of currency reform was highly important at this juncture to the future of China, and every safeguard should be thrown around it to provide against the funds being diverted for other purposes.

Currency reform in China paves the way towards other and greater reforms. China has endeavoured for some years past to have the Powers consent to a revision of the existing treaties, which will permit the increase of import duties and abolish the likin and transit dues. Great Britain and others have declined to consider the overtures on the ground that China has persistently ignored the Mackay Treaty and refused to reform her currency and comply with other important provisions.

With her currency on a stable basis, the first step towards the revision of the treaties would be made. There are other highly important considerations why the reform of the currency is imperative to the welfare and progress of the Empire, and why every precaution should be taken to insure the faithful application of a loan to this purpose. The American Group have not attempted to dictate to China the acceptance of any particular currency scheme, before advancing the funds. In effect they say to the Chinese Government, "Draw up any good and feasible scheme you believe will bring about the desired reform, and all that we ask is that someone be appointed to see that the funds are expended in accordance with the program outlined." There is no suggestion of a Financial Adviser to the Government, with all the powers that go with such an office. The status of the appointee would be more in the nature of a Secretary or under Auditor.

It will be remembered that of the $50,000,000 to be borrowed, $35,000,000 was allotted to the currency scheme, and $15,000,000 was to be applied to urgent requirements in Manchuria for the development of railways, harbours, industries, etc., and to cover a deficit in the treasury. It is understood that a part of the funds was to be appropriated for the development of Hulutao Harbor, and the construction of a section of the Chichow Railway. It is not difficult to read between the lines and understand the real reasons underlying the deadlock in the negotiations, and time will prove to the critics of the Administration that American diplomacy has again pursued its traditional lines of friendship towards China, and fully merits the commendation of the nation, instead of hasty and illtimed criticisms.

—G. B. R.

JAMES A. FARRELL,

The New Head of the United States Steel Corporation.

The elevation of James A. Farrell from the presidency of the United States Steel Products Company—the selling branch of the parent corporation—to the head of the great Steel Corporation itself, marks a turning point in the policy of the financiers controlling these gigantic enterprises. The significance of this step has apparently been overlooked at home, and surprise manifested that others high in the industry were sidetracked to give place to Mr. Farrell. But a little careful thought will demonstrate the undoubted wisdom of his selection, and the lesson should go straight home to the hearts of every head of the larger manufacturing enterprises in America, who have steadily refused to look into the future.

The time has arrived when the United States must emerge from her splendid trade isolation and develop foreign markets for her manufactured products. The days of dumping the surplus of the mills into the export field, or compelling foreign customers to wait a year or more for the filling of their orders has long since passed away. The marvellous development of the domestic field has reached its climax; the country is gridironed with railways, and in place of the unprecedented prosperity of the last two decades due to internal progress, a lull in new railway construction is faced, with the consequent falling off in the demand for steel and railway material. And as the steel industry is the backbone and barometer of the national industrial prosperity, the business of the machinery and allied trades expands or contracts in sympathy with its fluctuations.

The mills and establishments of the leading American manufacturing enterprises have been erected and are operated to keep pace with the enormous protected domestic consumption. If conditions at home show signs of a falling off in sales, the markets must be developed elsewhere, to insure constant operation of the plants and interest on the investments.

The era of organization and high financiering is disappearing. Nearly all the protected manufacturing industries have been developed into huge combinations and cost of production and marketing reduced to a minimum, and now the country faces the problem of finding a constant outlay for the products.

When the United States Steel Products Company was organized in 1903 to handle the export end of the parent corporation, the financiers scanned the field for the best equipped and qualified man to build up this important trade. In the manager of the foreign department of one of their own component companies they had a man who successfully developed his branch of the business and made the name of the American Steel & Wire Company known throughout the world, and they selected him to guide the policy of the larger Products Company. But before accepting the position, he exacted the stipulation that a certain percentage of the entire steel output of the corporation be allotted to him for marketing abroad, and then sure of his ground, and safe in the knowledge that he could fill his orders promptly, he went to work. Under his expert management and knowledge of foreign conditions a huge business has resulted, the exports of steel and steel products increasing rapidly from year to year, until in 1909 they were 10.3 per cent of the entire sales of the Corporation. This represented a gain of 26.3 per cent over the business of 1908, and 1909 closed with unfilled orders on the books of the Products company destined for foreign fields amounting to nearly 500,000 tons.

The report for 1910 has not yet reached us, but the indications are that the year closed with another substantial advance, and passing the tonnage limit allotted for export. It follows that at the beginning of the new year the president of the Products Company had to request a still larger proportion of the steel output of the country for his branch of the business. When the time came for the election of a new president for the great parent corporation, the financiers have turned to the man who could save the situation and market the goods. And they unanimously elected the one who had made it possible for American steel to gain a firm foothold in foreign countries against the competition of the world. And the old Captain of Industry who, safe from the competition of other producing countries, organized and created things for the protected domestic field, gives way to the first of a newer type whose ability and judgment makes possible the dreams of his predecessor and insures the future industrial welfare of the nation.

In James A. Farrell, the newly elected president of the United States Steel Corporation, is typified the future Captain of Commerce who will lead the country in the great international struggle for trade supremacy in the markets of the world. There is a moral to the selection of Mr. Farrell and the recognition of his ability by the greatest financial interests of the country, that other heads of corporations should profit by.

THE PHILIPPINE CARNIVAL

The Fourth Annual Carnival, held in Manila under the auspices of the Philippine Carnival Association and concluded March 2, was an unqualified success. This annual Philippine fiesta may now be recognized as a permanent Philippine institution.

According to the report of Secretary Scott the total of receipts from every source was ₱122,533.40 and the total of expenditures, ₱94,792.84, leaving a balance of cash on hand of ₱27,770 56. In addition, assets in the form of bills receivable to the value of ₱9,868 69 and property in hand to the value of ₱13,700 make in all working capital amounting to ₱51,339 65 for the ensuing year. The general daily attendance was greater than during the 1910 Carnival, for while the latter extended over a period of ten days, the 1911 Carnival was confined to eight days and the receipts for admission showed a falling off of but ₱5,599. These figures demonstrate that the institution is growing in popularity and that it has the substantial support of all progressive classes in the islands. And what gives the greatest satisfaction to the authorities, the active interest of all classes of Filipinos has been more general than ever before.

In the provincial exhibits in which 19 provinces participated, marked evidence of progress was noted in the development of native industries, and in the exhibit of the Educational Department the evidence of the stupendous influence of practical training in the arts and trades and the interest displayed by all the people made a profound impression on the thousands of interested visitors.

Another important feature of this carnival was the extensive exhibit of live stock and poultry, a new feature. This was a surprise even to residents of Manila and the result of the active interest of the Bureau of Agriculture in developing the improved stock was manifested here in the selected animals on exhibition.

The bench show held under auspices of the Kennel Club proved one of the leading attractions of what was termed the "Main Stem."

The bureaus of forestry, science, health, printing, agriculture, internal revenue and indeed every department of the Insular Government vied with each other in making the exposition representative of things Philippine.

The co-operation of the merchants was also evidenced by many individual exhibits representative of Philippine manufacture and trade. Among these the cigar and cigarette manufacturers made an extensive exhibit, the Compañia General de Tabacos de Filipinas, Germinal, Alhambra and La Prueba, all being representative while others showed their interest in a substantial way.

In the machinery display a marked improvement was noted compared with 1910. Engines, mining, agricultural and manufacturing machinery were displayed by local representatives. Among these Mr. Frank L. Strong had a complete plant in operation demonstrating all kinds of machinery from a compressed air drill to a huge ventilating plant while a small electric installation served to illuminate his section. This building was the center of attraction for all provincial visitors, and all went away greatly benefited by increased knowledge of the advantages of modern methods and machinery in the development of the insular industries.

Other firms in Manila were also represented in this department, among them Messrs. Castle Bros. Wolf & Sons who make a speciality of agricultural machinery.

Of especial interest was the display provided by Messrs. Ynchausti & Co., the leading distillers in the islands.

The most striking feature of this carnival, and which reflects great credit for enterprise on the Board of Directors, was a series of Aeroplane Flights by Mr. Mars. There were eight flights in all, and every one of them successful. No record flights were attempted, but an altitude of 5,700 feet was made on one occasion and none were less than 2,000 feet. The highest altitude made we believe marks the record so far in the Orient. Perhaps no feature of the Carnival served to attract wider attention than these flights.

There were many visitors from Far Eastern Ports and expressed themselves pleased with the exposition and general experience as guests of the Leal City.

Director General Stewart is to be congratulated on the success of 1911 Carnival, but he modestly gives the credit to his able staff and to their loyal support places the success of the week's festival. Throughout there was a demonstration of the effectiveness of team work backed by the spirit of co-operation. The civil authorities, the military and naval departments, the merchants, manufacturers, and agriculturalists, together with the residents of Manila and the provinces, demonstrated what may be accomplished by working together.

Out of the annual Carnival have developed plans for a permanent annual exposition of Philippine products in the city of Manila and an act of the Philippine Legislature of January 30 appropriating the sum of ₱50,000 for expenses incident to the establishment of this institution. The first annual exposition is to be held this year or in 1912 at the discretion of a Philippine Exposition Board.

The credit for the sentiment that made this legislation possible must be given the Philippine Carnival Association in its four years of active work in spreading exposition gospel.

FAR EASTERN TRADE SITUATION

The address of Chairman Balloch at the half-yearly meeting of the Hongkong and Shanghai Banking Corporation held in Hongkong, February 25, while conservative in character, was most optimistic in tone. This authoritative review of Far Eastern finance and trade is indicative of the general spirit prevailing and gives promise of increased activity in leading lines. We take some pleasure in reproducing here a few excerpts from Mr. Balloch's address as follows:

"In the Straits Settlements and Federated Malay States mining, agriculture and trade generally continue to show satisfactory progress. There is a considerable increase in the export figures, mainly due to the larger export of rubber and the enhanced price of tin. Tin continues to hold first place in the stable products of the Malay States but it has a growing rival in rubber which may some day challenge it for the premier position in trade figures.

"From the great rice producing countries, Burmah, Siam and Cochin-China, last year's exports were all up to the average, and the native cultivator must have done well. Crop prospects for the current season are reported to be favourable, with the exception, perhaps, of those of Siam, where the yield is estimated to show a falling off; but results are so dependent on climatic conditions which may vary fron day to day that, in places where official figures are not supplied, forecasts for rice harvests should not be taken too seriously.

"In the Philippines the feeling is gaining ground that the long period of depression is passing and that a steady improvement in trade may now be looked for. The low price of hemp and sugar is no doubt affecting the purchasing power of the natives, but, as some set off against, better prices have been obtained for copra and the export of this product is steadily increasing.

"Advices from Japan lead us to believe that expansion in the internal trade of that country may reasonably be expected. Export figures for the past year were the highest on record while import figures also showed a consider-

(*Continued, page 361.*)

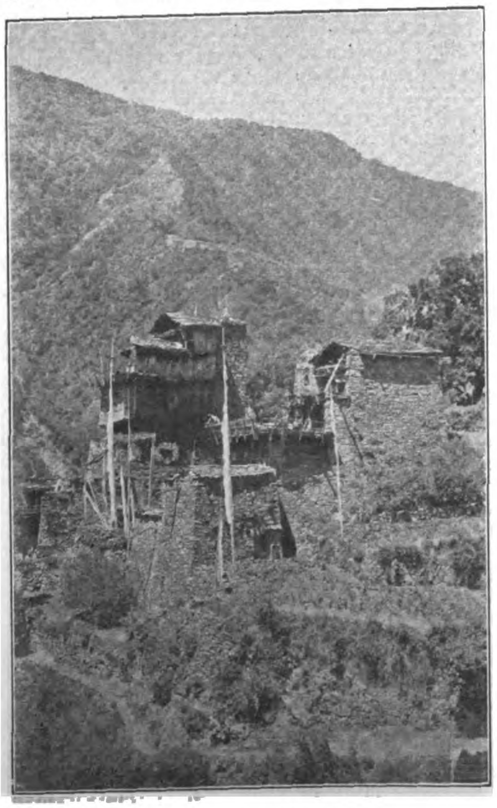
CHINA AND TIBET

The Transmigrations of an Official Property Soul

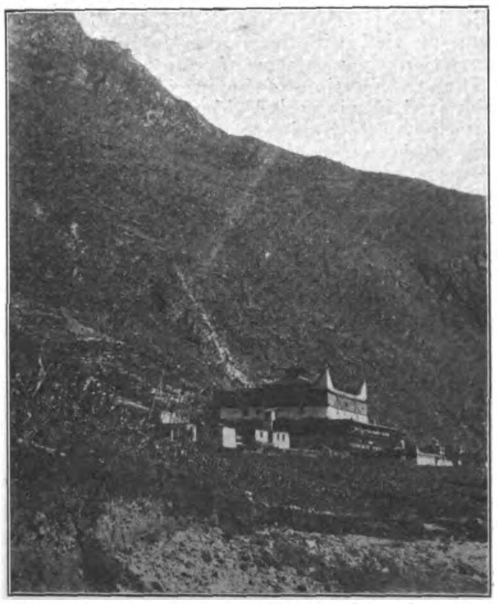
One of the many perplexing problems the Chinese Government has to solve, arises from the overthrow of the Lamaistic power in Tibet, and the proposed substitution thereof by a provincial form of government. The rapid flight of the Dalai Lama last year before the troops of Chao Ehr-feng, and his destitution by the Regent of spiritual rank and titles, apparently simplified the political phase of the problem, but the end is still far off, and through intrigue with other powers, or the fanaticism of his many followers, the Dalai Lama may yet breed trouble for China. Although China's right to direct and approve the election of a Grand Lama has been exercised for over 200 years, the power of removal was never invoked until last year, and in this lies the root of the present trouble. As a matter of fact, China never before had the occasion to exert her undoubted prerogatives in the matter of an unruly Grand Lama, as the Regents at Lhasa were very solicitous in watching over the health of their charges about the time they arrived at an unruly age. At the age of nineteen or thereabouts the different Grand Lama's were ceremoniously escorted to an elaborate picnic on the shores of a lake near Lhasa, and after drinking of the waters returned to the Potala, where a slow sickness always terminated their earthly career. There appears to be no good reason why the water should not have been brought to the palace, and there are a thousand other ways which occur to one in which his soul might be assisted in escaping from its human shell, but the lake story comes from one who has been in Lhasa and ought to know, so in lieu of any other definite or authentic version it may be accepted as near the truth. The present Dalai Lama, however, on arriving at his majority positively refused to attend the entertainment prepared for the benefit of his soul and perversely persisted in eating or drinking only such food as was cooked by his mother who had guarded her offspring during the tender and secure years of his minority. And for the last few years as a matter of further caution, his three young sons were graciously permitted to eat of every dish before their devoted parent would himself partake. And to this careful abstinence in drinking and eating and a divination of the psychological moment to hastily depart on long journeys, the body of the present Grand Lama has retained possession of the soul handed down

THE LAST NEPAULESE MISSION THAT RENDERED TRIBUTE TO CHINA

Photo taken in Peking during visit in 1908

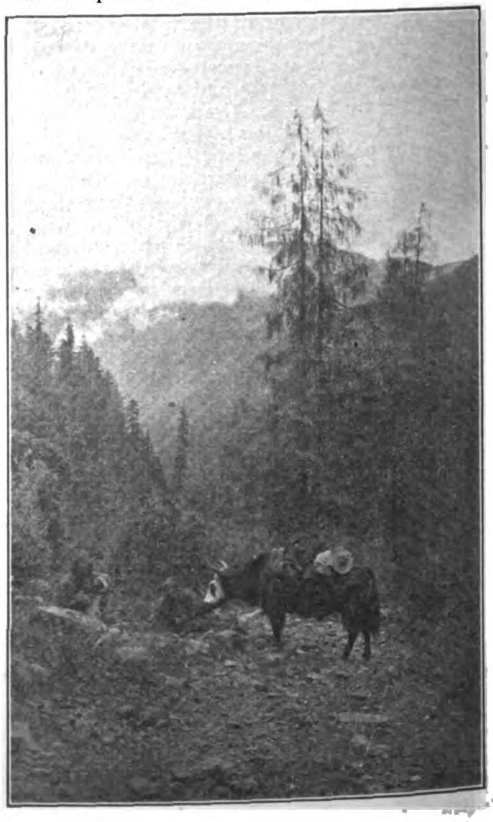


MOUNTAINEERS' HOUSE



ON THE ROAD TO TIBET

A LAMASERY



PACK YAK

THE DALAI LAMA OF TIBET (From THE SPHERE.)

The first photograph ever taken of the Dalai Lama of Tibet in his state robes. He is here seated on his throne with the sacred umbrella over his head, in the attitude as for blessing pilgrims. Behind the Lama are the sacred Tibetan pictures painted on silk. This photograph was taken at Darjeeling at the special request of the Dalai Lama.

to it through centuries of incarnations, and it shows no signs or indications of willingness to relinquish it according to the traditions of its office. Naturally he is a very improper, ungrateful, unruly and highly insubordinate pontiff, to those who have regulated the transmigrations in the past. And as he is at present beyond their reach, and under the protection of the Indian Government, it is difficult to see how he can be coerced into separating himself from a soul that is very much needed just now at Lhasa without striking at the root of his religion. The Regent at Peking has stripped him of his rank, but he still retains possession of the soul, which in the eyes of his co-religionists is the main requisite to his high office. China has never accepted the Tibetan Buddhists theory of the transmigration of the soul of the Dalai Lama, which had become perpetually reincarnate on earth in order to preside over its Church and at the same time rule the "Roof of the World" The migrations were invariably of undue duration, while the soul of the deceased pontiff was seeking a new habitat, in the body of a newly born male infant. Every lama in Tibet discovered miraculous signs in his own offspring. Rival factions fought over their respective nominees and on several occasions disastrous civil wars occurred before the vanquished could be led to recognize the necessary holy signs in the choice of the victors. These constantly recurring menaces to the peace of the State influenced China in supervising the "rebirth" of the Dalai Lama. Over two centuries ago the wandering soul was officially notified to discontinue its promiscuous knocking at lamasery doors and confine itself to where it was ordered by Imperial Edict.

The names of the competing children were placed in a golden lottery urn, and in the presence of the Chinese Amban at Lhasa, under proper and impressive ceremonies in front of the Emperor's tablet, a lama thrust his arm, selected a piece of paper, and the name thus brought to light was that of the future home of the soul. But before the new Dalai Lama was officially declared to be the true reincarnation, his name was sent overland to Peking and the Throne memorialized in his favour. If the Emperor approved the choice, the appointment was ratified, if not, the poor soul wandered around in the astral regions and its reincarnation had to await a year or so pending the return of the mission from Peking and the ordeal of another lottery drawing. It seems quite clear that if the Emperor of China can designate the abode of the soul on earth, by the same token his authority to command its transfer is unquestionable. And so when A-wang lo-pu-tsang-tu-pu-tan-Chiao-Cho-Chi-Chai-wang-Chu-Chio-le-lang-chieh, the present official abode of the Government's property grew unruly and mixed with affairs of state, he was promptly divested of his rank. Long before the Chinese troops entered Lhasa, the Dalai Lama, through his followers on the frontier, knew of the impending storm, and feeling insecure in his temporal power and with a foreboding of rapid dissolution and release of his soul he addressed letters to the various foreign ministers at Peking, requesting aid to resist China. But a few days after the lama dispatch bearer arrived in Peking, Chao Ehr-feng's troops entered the Potala Palace at Lhasa as the Dalai Lama was making a hurried exit at the opposite end, not halting till he reached the safe precincts of the adjoining Empire, only a few miles ahead of his pursuers.

An enterprising Grand Councillor at Peking obtained news of the Dalai's appeal to the Powers and a special meeting of the Council was called. One wise old official took a pessimistic view of the matter, saying that China might lose Tibet, as Britain might think it necessary to restore him to power. That would mean, he continued, a force of British troops being sent to Lhasa to restore order—perhaps to remain there. For the second time in his life the Regent took the bull by the horns, for in a manner almost identical with the dismissal of Yuan Shih-kai, he sprang to his feet, and seizing "the vermilion pencil" wrote out the Dalai's dismissal. "That will end it," he said. "Now he is no longer Dalai Lama." The Imperial Edict of February 25, 1910, is a masterpiece of its kind, and shows the Dalai Lama in his true setting according to Chinese ideas.

The Edict reads:—

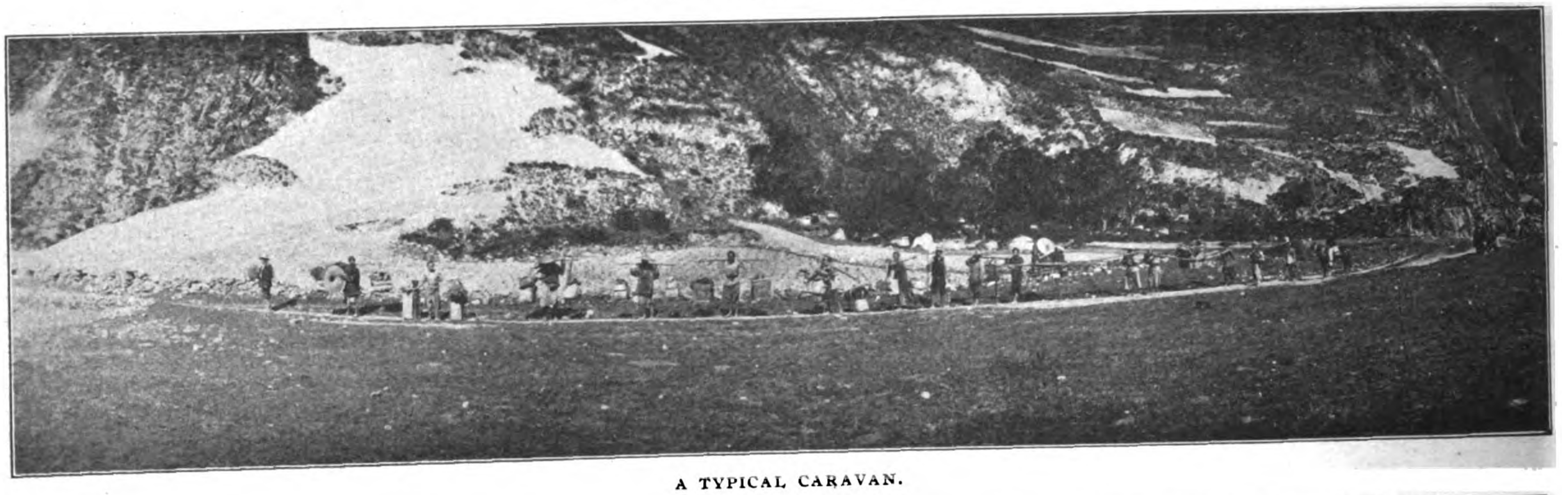
"The Dalai Lama A-wang lo-pu tsang-tu-pu-tan-chia-cho-chi-chai-wang-chu-chio-le-lang-chieh has been indebted for the most cordial bounties and favours from the preceding Reign; and as he must possess a conscience, how much should he have applied himself solely to his canons and tenets, and reverently conformed to former precepts, with a view to propagating the yellow religion? But since he assumed charge of the Treasury and secular government, he has been proud, extravagant, licentious, violent and refractory, to a degree before unknown. He is further unruly and improper in action and takes upon himself to disobey our commands. He maltreats the Tibetan multitude and lightly provokes troubles."

"In the 6th moon; in the 30th year of Kuang Hsu, he escaped quietly, in the course of a rising, and as he incurred notoriety, the Imperial Residents in Lhasa denounced him with truth. An Edict was issued temporarily divesting him of his title. When he arrived at Urga and turned back to Hsining, the Throne, in consideration of his long travel and with the hope that he would reform and make amends, commanded the local officials to show him attentions. When he came to the capital for Imperial audiences, in the year before last, his title was advanced and many gifts were conferred upon him. When he started on his return to Tibet, deputies were appointed to escort him, and though all along the way the Dalai delayed and made vexatious exactions, his action was, in all cases, considerately and indulgently tolerated. It was hoped by overlooking the past to provide for the future and this intention is indeed kind and far-sighted."

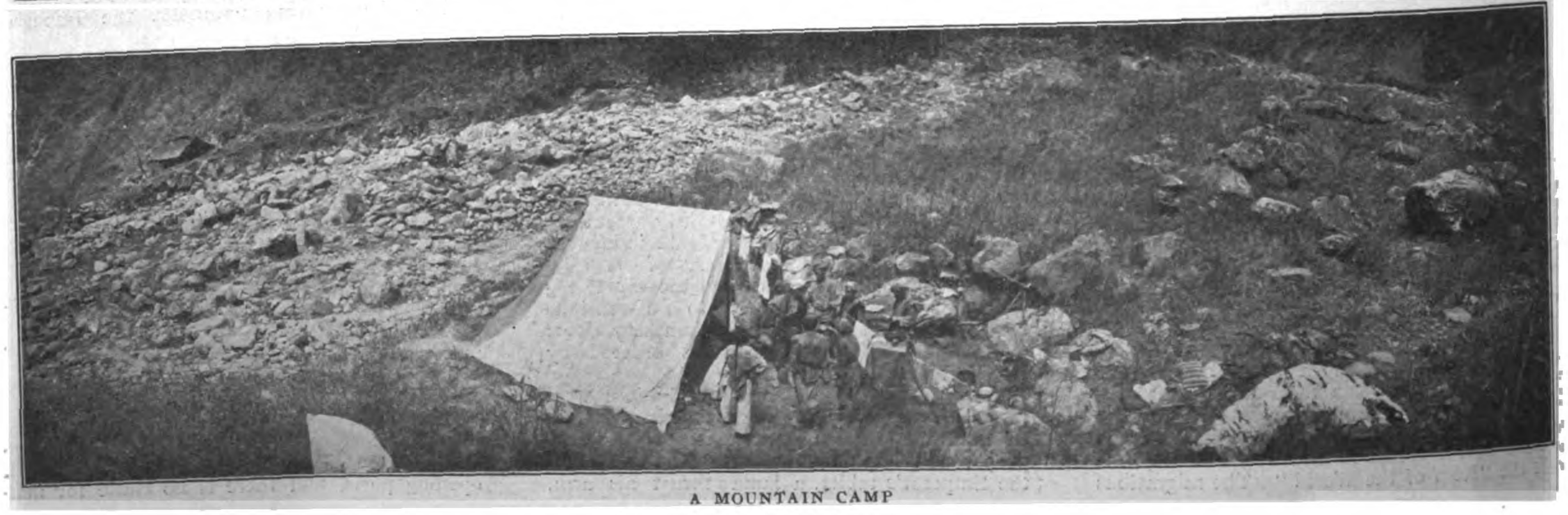
"The present entry of the Szechuen troops into Tibet is particularly intended for the maintenance of order, as well as protection in opening ports, and there is no cause for mis-

ON THE ROAD

THE ROAD BEYOND TATSIENLU

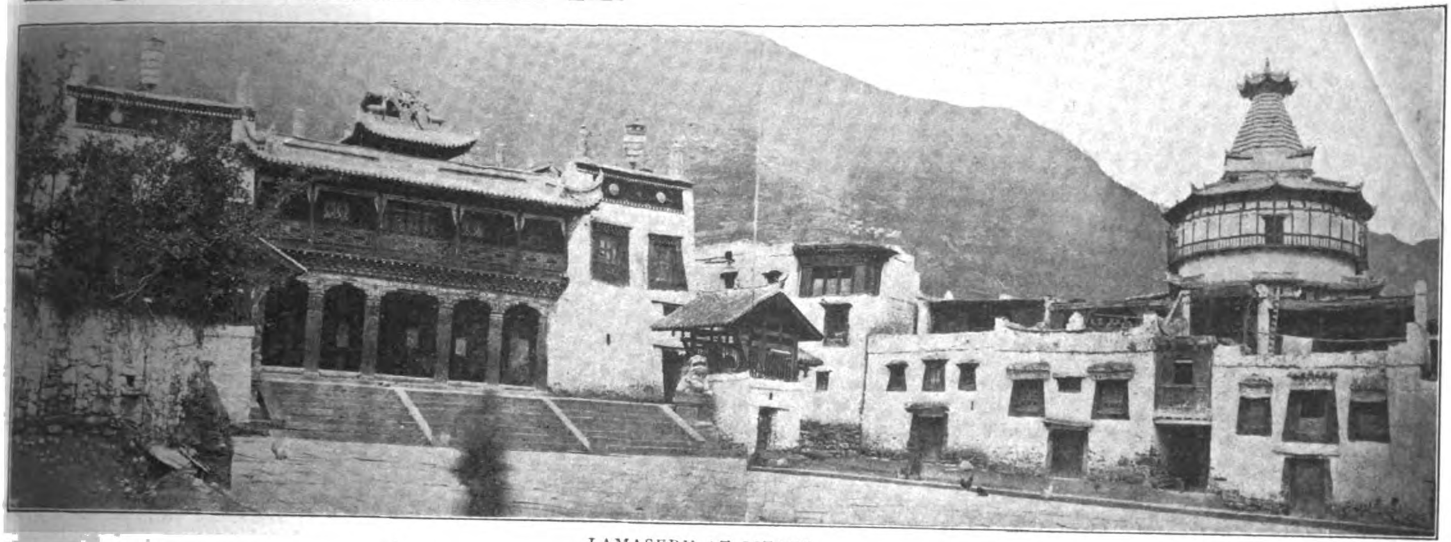


A TYPICAL CARAVAN.

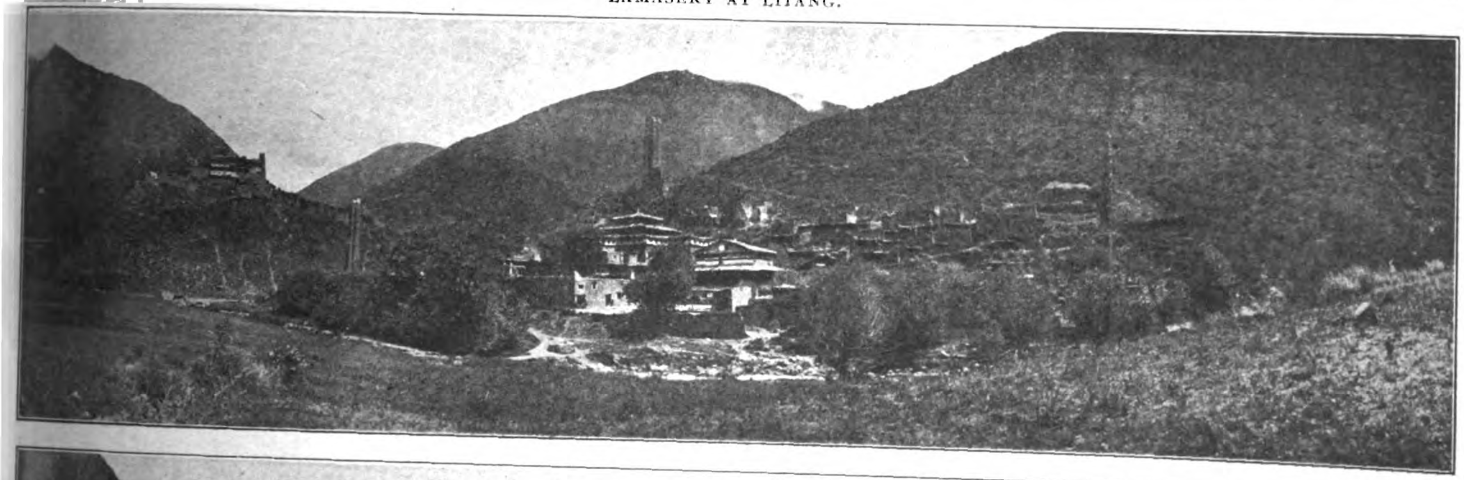


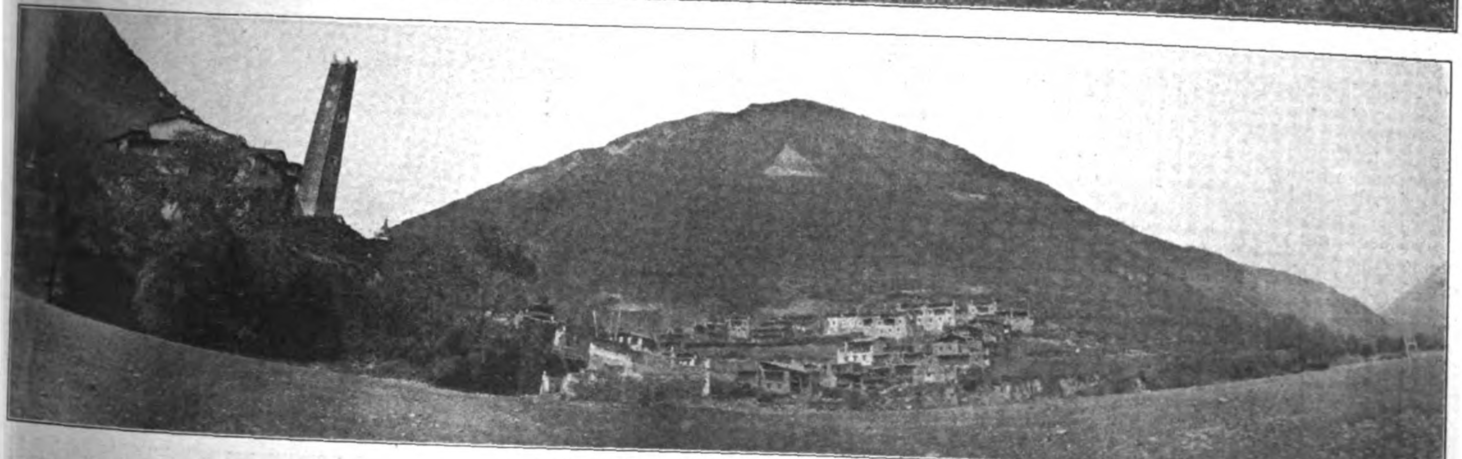
A MOUNTAIN CAMP

TO TIBET

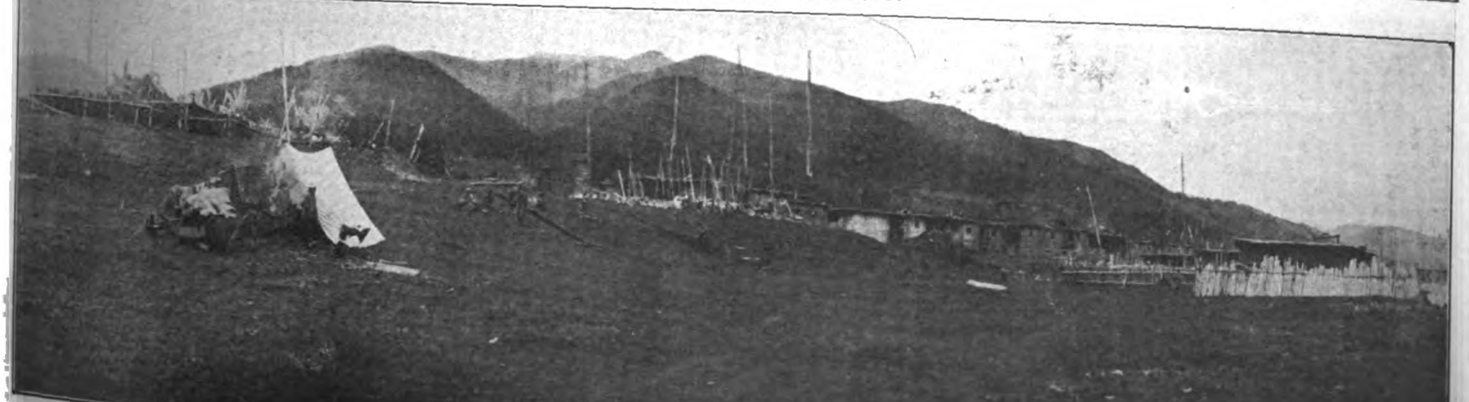


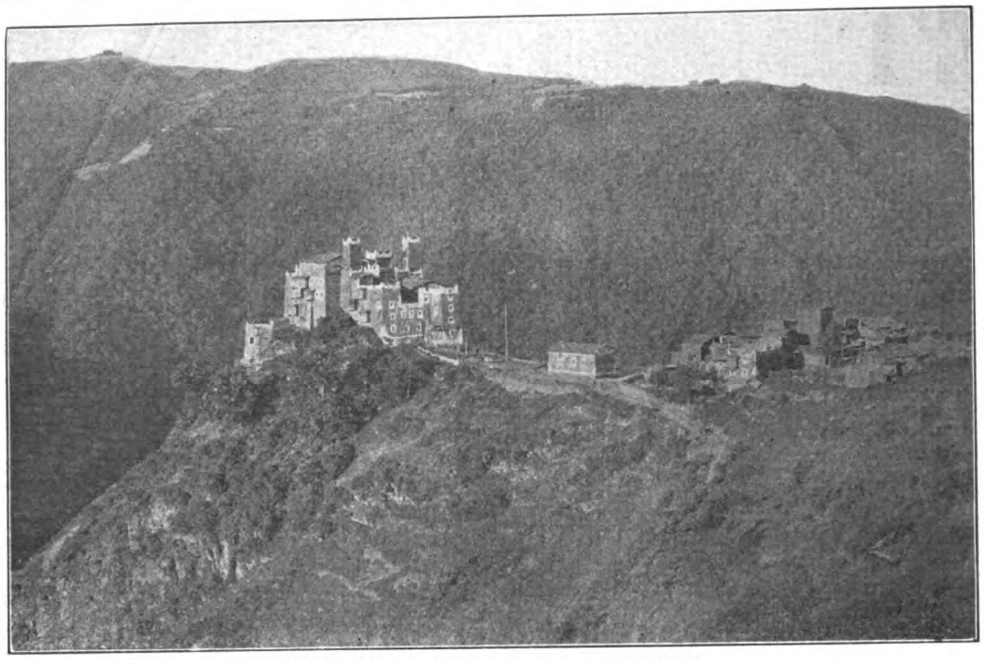
LAMASERY AT LITANG.





A TIBETAN TOWN AND LAMASERY.





A MOUNTAIN LAMASERY AND FORTRESS

givings to the Tibetans. Who would expect that since the Dalai's return, he should spread false rumours, oppose measures on various pleas, vilify the residents and suspend supplies? In spite of repeated and earnest exhortations, he has paid no heed. We were in receipt of a telegram from Lien Yu and others, reporting that immediately on arrival of the Szechuen troops in Lhasa the Dalai, without reporting, left quietly on the night of February 12, for an unknown destination. We commanded the residents to try to bring him back and make proper arrangements for his provision. No trace has been heard of him. As he is in charge of religious affairs, how could he thus depart repeatedly without authority? We further find that the Dalai is fickle, crafty, deceitful, and alienates his allegiance. This is really an injustice to the bounties of the State and disappoints the hopes of the public. He is ill fitted to be the leader of the Hut'ukhtu, or Saints."

"A-wang-lo-pu-tsang-tu-pu-tan-chia-cho-chi-chai-wang-chu-chio-le-lang-chieh is hereby commanded to be divested of his title of Dalai Lama, in order to show penalty. Wherever he may escape and whether he returns to Tibet or otherwise, he shall be regarded henceforth not otherwise than as one of the common people. The residents are commanded speedily to seek among children born with miraculous signs and draw their names by lot from the 'golden urn', according to former practice. The name drawn shall be created the real hubil'han (re-incarnation) of the preceding Dalai Lamas and application shall be made to Us for bestowal of a proper title and favours, so that the propagation of the canons may be perpetuated and due importance may be attached to religious affairs."

"The Throne is impartial in eulogizing good deeds and penalizing evils. All the priests and laymen in Tibet are our children, and, after issue of this Edict, they are desired to abide by the laws and preserve the peace and good order of the dependency, in order not to outrage our sincere wish to preserve frontier peace and protect the yellow religion."

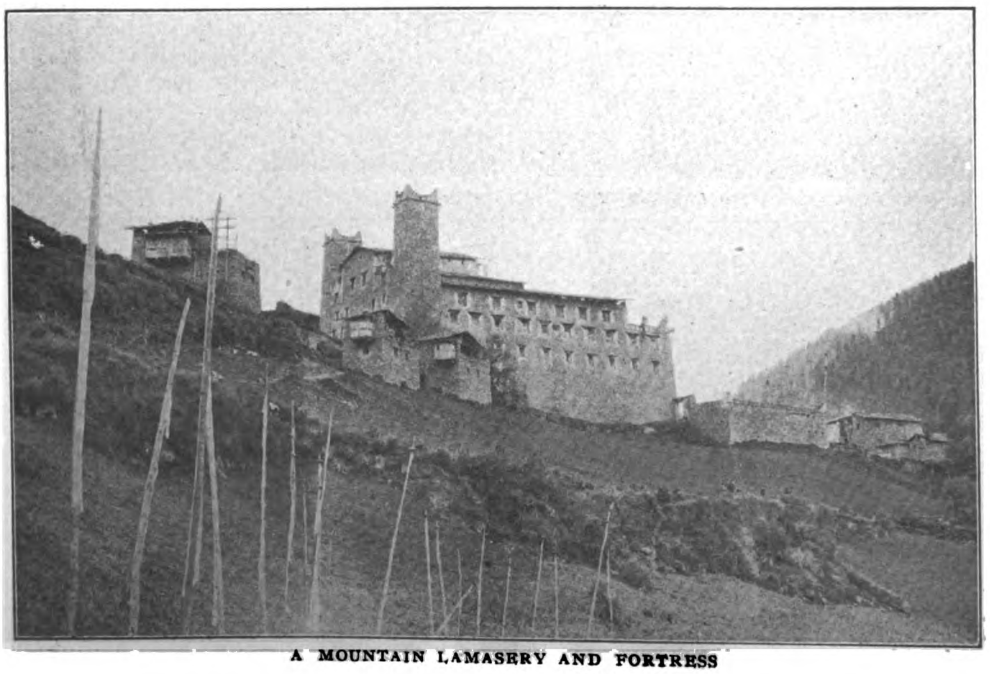
It will be noted that the Regent employed the word escaped as though speaking of a criminal or conspirator and after divesting him of his rank authorizes a new reincarnation for his soul. But the neighbouring powers who have many Lamaist subjects, and are interested in the abstract matter of Buddhism profess to feel that China's action may result in some disturbance amongst their subjects who recognize the Dalai Lama as their spiritual leader. British opinion is particularly incensed because China failed to consult with the British government before taking such drastic action, and China's hand has been stayed in regulating the further disposition of its wandering official soul.

SUSPENSION BRIGDE

In the meanwhile A-wang lo-pu------chieh is quietly sojourning in Darjeeling, receiving deputations of pilgrims from all points of the Indian Empire, and latest advices are to the effect that he will shortly visit England, and carry with him the stage settings of his office. Weighty diplomatic questions arising out of all these events are still unsettled, and a certain section of the British press is strong in its denouncement of the government's policy in refusing to "restore order" in Tibet, while an equally strong opinion prevails in other quarters that China has rightfully exercised her undoubted powers over her own subjects, and that the Dalai only received his just deserts.

Politics and religion never mix, and apparently China should have taken her cue from Great Britain and refrained from interference with the religion of her subjects. But China has been officially regulating this particular religion for over two centuries, imposing her selection of a Buddhist Pontiff long before Great Britain entered the arena of Asiatic politics, or Russia became politically interested in Tibet.

The real point at issue is one that Gilbert and Sullivan or George Ade might handle to better advantage than the diplomats. The



A MOUNTAIN LAMASERY AND FORTRESS

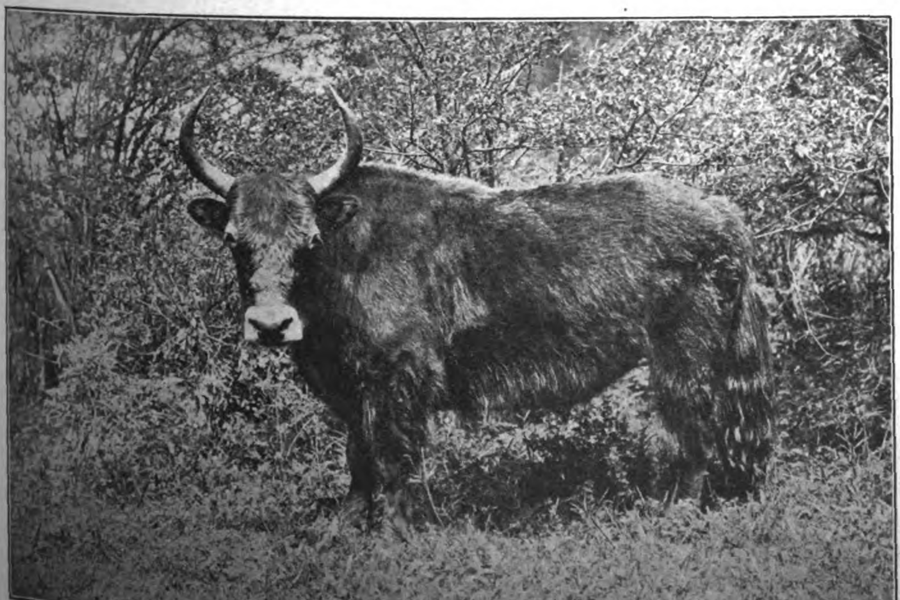
THE TAOTAI OF THE MANTZE MARCHES, KAO TSENG-CHUEH, TAOTAI OF YACHOWFU

H. E. CHO-HA-PU, TARTAR GENERAL AT CHENGTU, SZECHUAN

Chinese Government is the possessor or at least for all practical purposes controls a "soul" used as a part of the stage setting in its government of Tibet. For over two centuries it has bestowed or ordered this soul to take up a duly spectfied residence in the body of some lama's newliy born male child, selected by lottery and approved by Edict. The hocus pocus or "play pidgen" once over, all the lamas and Tibetan Buddhists bow down and worship the "miraculous reincarnation" until he arrives at the age of discretion, when he is gently assisted to peacefully give up the ghost, and the spirit is again officially transmigrated to the next successful winner of the lottery. Twelve Dalai Lamas have come and gone, faithfully playing the game ordered by Peking, shuffling off this mortal coil and leaving the stage property behind for use in the next performance. But the thirteenth (lucky number) winner of the prize, living in this age of enlightenment, and coached by his disciples from Russian and Indian territory, refused to end his days at the prescribed time, and has clung tenaciously to the joys of life, and upset all the traditions of his office, by marrying and taking unto himself many concubines and begetting children and generally conducting himsef in an unholy manner. The owners of the stage soul therefore dispatched the police to capture the evil doer, and compel payment of "the long deferred penalty of office, and the return of their property.

But the culprit ran fast and escaped with the stage settings and is now safe from pursuit. The question arises, has he a right to retain the official soul ordered to abide in him by Imperial Edict? For two centuries the Chinese Emperor has held undisputed authority over this soul in its astral wanderings and designated its abode on earth. But once a soul enters into its incarnation can an Imperial Edict compel it to evacuate the premises until it is released by natural death? If the Dalai Lama had remained in Tibet, this perplexing question would never have arisen, but now, it is different, as the official holder of the soul is safe on British territory. Balked in releasing its property by natural methods, China says that another Dalai Lama will be created and the soul transmigrated without awaiting dissolution, and the Indian Buddhists resent this unheard of interference with the prerogatives of a soul.

A-wang lo-pu may still be the Dalai Lama in the eyes of his many followers, but before the Chinese law he is an escaped official bearing with him the seals of office belonging to the State. But the world will sympathize with his troubles, as it is impossible to return the property without paying the traditional forfeit, or violating the principal tenet of his faith.



A TIBETAN YAK

H. E. WEN TSUNG-YAO,
THE RECENT JUNIOR AMBAN OF TIBET.

The Frontier Region of Tibet or the Marches of the Monntze

H. E. Wen Tsung-yao, the former Junior Amban of Tibet, is now residing in Shanghai and has given several very interesting interviews to the local press on the conditions existing at Lhasa and about the wonderful transformation that has been wrought in frontier region under control of the energetic Chao-Ehr-feng. In a lengthy interview published in the SHANGHAI TIMES, H. E. Wen, who had just returned from the overland trip from Lhasa, through the country ruled by Chao, spoke in the highest terms of the ability of this official.

"The term 'frontier' as used in relation to this particular part of the boundary of China, implies not merely a narrow dividing line—in which sense it is usually interpreted—but a stretch of country a thousand miles long and 250 miles wide, approximately, between Tachienlu and Chiamdo, separating the jurisdiction of the Viceroy of Szechuen from that of the Amban of Thibet. Over all this extensive region the High Commissioner of Frontier Affairs holds undisputed sway, responsible to no one for his actions save his Imperial Master in Peking, and in a minor degree, his brother in Chengtu, H. E. Chao Erhhsun, the enlightened Viceroy of Szechuen. The High Commissioner of Frontier Affairs and the Amban of Thibet, H. E. Lien Yu, act in complete independence of each other, but both are answerable for their administration to the Viceroy of Szechuen and the Government in Peking. The country over which the High Commissioner rules, is an elevated table-land ranging in height from 8,000 feet at Batang, where H. E. Chao Ehr-fung has his yamen, to 15,000 feet at Litang, while Tachienlu, 'the gateway of Thibet' as it is termed, is 9,000 feet above the sea-level. The country, which is only now beginning to be developed, was quite wild and desolate when Chao Ehr-fung assumed office. There were no roads, no telegraphs, no communications of any kind, and no crops, save a little roughly cultivated wheat.

"The people, about one million in number, were in a condition of the lowest moral degradation and material misery. Polyandry was generally practised. What women had husbands at all had five or six, brothers as a rule; but vast numbers of women remained unmarried, becoming either inmates of nunneries or menial servants in the households of their more prosperous neighbours. Under these circumstances the population showed every sign of becoming extinct before the lapse of many years, and the few visitors who penetrated the country were invariably impressed by the apparent hopelessness of its prospects. The only satisfactory feature about the people's condition was their fine physique and their agreeable, cheery dispositions under the most depressing conditions. Their superior stature and build are accounted for partly by the fact that the day after children are born their mothers carry them to the nearest stream and plunge them into the water, even in the depth of winter when the temperature is after down to 15 or 20 degrees below zero. Infants which survive this heroic ordeal are then smeared thickly all over with grease and exposed for several hours every day of their young lives in the open air, so that they may grow up strong and hardy and fit to defy all weathers, which the majority of them are certainly well able to do. They are very good-tempered and mild mannered and as their language is the same throughout the entire region and easy for foreigners to acquire—the written language is Sanscrit—they make a very favourable impression upon all foreign travellers that visit the country.

"Prior to the arrival of H. E. Chao Erh-fung to take over the administration of the country on behalf of the Chinese Government, these amiable but ignorant people lived under a system of two-fold oppression. They were oppressed and taxed by the 'native rulers,'—petty local tyrants who were supposed to be answerable in some loose, undefined way to the Government of Lhasa, but who, in practice, were held to account by nobody or nothing but their own sweet will—and they were oppressed by the inmates of the monasteries, which were by far the most numerous and flourishing institutions in the country. Government in the proper sense of the word there was none. Crime went unpunished and unheeded; no attempt was made to develop the country, or to institute public works and the people were utterly neglected, except when the time came round for them to satisfy the exactions of their oppressors. But these seasons came frequently enough in all conscience. Not only had the downtrodden folk to pay taxes to the native rulers on the one hand and the monasteries on the other, but they had to render manual service to both whenever called upon to do so, to provide ponies, mules and yaks for their masters whenever the latter chose to move from one part of the land to another, and to find quarters for the military escorts by which their native rulers were invariably attended upon their travels, all free of charge.

"But the providential advent of H. E. Chao Erh-fung completely changed all this. About five years ago the Junior Amban of Thibet, Feng Chuan, was murdered by Thibetans near Batang and H. E. Hsi Liang (now Viceroy of Manchuria) who at that time occupied the Viceregal seat at Chengtu, acting under instructions from the Government at Peking, selected Chao Erh-fung, who was then the Taotai of Yachowfu in Szechuen, to lead a punitive expedition to the scene of the murder. H. E. Chao displayed such energy and ability in the conduct of this mission, that he was appointed High Commissioner of Frontier Affairs and entrusted with the duty of introducing civil order all along the lawless marches between Szechuen and Thibet. That is the region over which he has ever since exercised a wise, enlightened rule, over which in fact, he has reigned a veritable Lord of the Marches. He found it a howling wilderness and he has transformed it if not quite into a paradise, at least into a very tolerable place of residence for the million odd people who constitute its population.

"It would be difficult to describe in a few columns of a news paper a fraction even of the changes for the better which have been effected during H. E. Chao's administration. The most striking and important perhaps are those which belong to the department of communications. When he arrived there were no roads in the country. There is now a regular network of excellent highways throughout the entire region, carefully levelled, well constructed they zigzag up along the mountain sides, adown the slopes and straight across the wide flat stretches comparing favourably in every detail with the best roads that the British have made on the Indian side of the frontier. The only particular in which they are not quite up to the British standard is this, that whereas the British roads running along the Himalayan precipices are all protected with stout iron railings on the open sides, Chao Erh-fung's highways have not yet been provided with safeguards of this description. But the provision of this additional improvement is a matter of only a little more time. The bridges, which are very numerous, are all substantial, up-to-date structures, of wood and stone, built, to all appearance, to last for centuries. These roads and bridges show evidence of the highest engineering skill and reflect the greatest credit on their designers, Chinese engineer officers, and the Chinese soldiers who carried out the actual work of construction. The chief of these highways is that from Chiamdo to Ta-

FAR EASTERN TRADE SITUATIONS

(Continued from page 353)

able increase in comparison with those of the previous year. Owing to the failure of the rice crop in some districts, caused by the heavy floods of last summer, large imports of rice have been contracted for, but full crops of other kinds have been harvested. Throughout the year the silk market was active and, though producers had to accept rather lower prices, the number of bales of raw silk exported during 1910 was by far the highest on record. Money still remains cheap in Japan, commercial discounts ruling as low as 4 per cent. p. a. during the greater part of the year.

"So far as Hongkong and South China are concerned the slow but gradual improvement in trade was maintained and the Chinese New Year settlement passed off quietly both here and in Shanghai. Prospects for the present year look promising and I am glad to say that there is a better feeling in the shipping world, though at the moment the plague in the North casts an element of uncertainty over the immediate future. We all sympathise with China in this trouble that has come upon her in the North and which is causing not only serious loss in revenue and trade but also in the lives of her people. Energetic measures are being taken to stamp out the disease and advices indicate that its spread is being arrested. Let us hope that with the advent of warmer weather the scourge may disappear and conditions in Manchuria assume a normal state.

"In August last I referred to the crisis in the native money market in Shanghai and the consequent restriction of facilities by the native banks. I am glad to be able to tell you that trade conditions at that port now show some improvement, although native dealers still experience difficulty in financing purchases. Crops, however, have been good all round, so we may expect to see easier conditions ruling in the near future. The heavy stocks of piece goods, which for so long burdened the markets in Shanghai and in the North, have been moved off; figures are greatly reduced, some of the principal lines to a point lower than has been seen for the last 8 years. Orders, tempered to some extent by the high level of manufacturers' prices, are going forward, and we think we have good reason for anticipating a much healthier trade than we have seen for a long time. This improved state of affairs has, to a certain extent, been lost sight of by the public at large as it was overshadowed by the financial crisis which followed the collapse of the rubber boom in the Shanghai market. This crisis undoubtedly retarded the general recovery which was beginning to take place, but by the prompt aad broad-minded manner in which the situation was dealt with, its effects were fortunately minimized and trade was enabled to be carried on comparatively unhampered."

The Chairman's comment on the railway development problem of China and especially his reference to the elimination of spheres of influence in dealing with foreign loans was most gratifying to those who have been following the course of events during the year. He said:

"In the course of his remarks to you at this time last year, your Chairman referred to the state of railway development in China, to its importance bearing upon the material progress of the country of those economic interests which so closely affect this Bank, and to the present tendency of foreign governments and foreign financiers to lay aside their political rivalries and selfish doctrine of spheres of influence for the more enlightened policy which aims of friendly combination in the pursuit of interests which are common to all.

"A review of the past year suggests nothing which calls for a modification of those views; indeed they have received striking confirmation in the recent accession of a powerful American financial group to the international combination, in which British, French and German interests have for some time past worked harmoniously together. The aims of this combination, which are to assist China in reform along sound financial lines, free from political or territorial designs for any sort, receive added strength and support from the known views of the American Government; and we may feel sure that the Chinese Government will presently realise that the solution of the difficult financial problems by which it is now confronted can best be secured by co-operation with those aims."

THE FRONTIER REGION OF TIBET OR THE MARCHES OF THE MONNTZE

(Continued from page 360.)

chienlu. As there were no roads in the country prior to the advent of H. E. Chao Erh-fung, neither naturally were there any resthouses, but these the energetic High Commissioner has also now provided. Comfortable buildings, on the lines, to some extent, of the famous Indian *dak* bungalows, are now to be found at short intervals all along the highways. They are free to the use of all travellers without charge, save the price of fuel and the small *cumshaw* which is expected by the caretakers, and which, we need hardly say, is invariably forthcoming although its payment is by no means compulsory.

Another important improvement introduced by H. E. Chao Erh-fung, is the telegraph. Prior to his arrival there was no telegraph in the country, but now, thanks again to the vigour of his administration, telegraphic communication may be had from all the larger centres, expeditiously and easily with all parts of the world.

Education and the encouragement of industry are also matters which have deeply, engaged His Excellency's attention. After what has already been written we need scarcely refer to the utter absence of schools along the frontier prior to the advent of the High Commissioner. There are now 75 institutions of this character flourishing in the region which he administers—including a proportion attended only by girls. In the industrial department he has opened woolen mills and tanneries, and engaged experts to teach the people weaving and tanning, which in a country so rich in flocks and herds as the Tibetan frontier, are industries with the rosiest possible future before them. He is also using every effort for the promotion and improvement of agriculture. Before he arrived the only crop cultivated was wheat, in few, sparse patches. The Tibetans ate absolutely no vegetables. But now, His Excellency has introduced the cultivation of rice, which besides proving a great boon to the Chinese soldiers and settlers in the country, is also being gladly welcomed by the Tibetans as providing a most welcome addition to their former meagre diet of badly baked wheaten cakes.

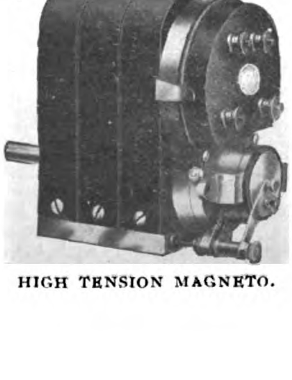
One of H. E. Chao's first proceedings in the country was to abolish the regime of the "native rulers." These predatory gentry he treated with scant ceremony, sending them packing with small pensions, and replacing them with specially selected Chinese officials under whom the people now acknowledge that they are better off and happier than ever they were before in the whole course of history. He also sternly forbade the monks to levy any more taxes and gave the people to understand that they were no longer under any obligation to render free service to monks or native rulers or anybody else. In place of the taxes which they formerly paid to a multitude of oppressors they are now called upon to pay their new masters only one small tax (collected "in kind") on arable land and a fee of one rupee for every pony or mule they possess, and half a rupee for every yak or cow. The "commandeering" of these animals, which was formerly freely practised, is no longer permitted, the Chinese authorities paying half-a-rupee per day for every beast hired from the people for transport purposes.

The practice of polyandry is being firmly discouraged. Every couple about to marry must now appear before a Chinese official and register the contract, otherwise they will receive no help or protection in case trouble should arise between them after marriage. Everybody also is now given a Chinese surname in addition to his original Tibetan name and unions between people of the same surname or belonging to the same clan are strictly prohibited. The people are taking very kindly to the new institutions—to the list of which we may add the practice of vaccination, which has been introduced with the very best results, although it was only after His Excellency had bared his own shoulder and shown them that he himself had undergone the operation that the people would consent to submit to the process—so that in a few years the indications are they will be as well-ordered, well-contented and prosperous a population as any to be found within the confines of the Chinese Empire.

The author of this remarkable transformation is the younger of a famous pair of brothers, the elder of whom occupies the exalted office of Viceroy of Szechuen. The High Commissioner is now 65 years of age, a tall, hale, strong and energetic man with nothing in his appearance to indicate that he has passed the prime of life, except his hair and moustache which the labours and anxieties of the past five years have completely whitened. He is a native of Peking, a man of the most progressive convictions, and one from whom,—great though his services to his country have been already,—even greater things are confidently looked for in the future."

Ferro Machine & Foundry Co. Increases Its Facilities

We are showing on this page an illustration of the Ferro Company's enlarged plant at Cleveland. In the foreground is the fine new office building that is to house the office force which looks after the largest marine engine business in the world. The big three-gabled-roof building in the background is one of the additions made to the foundry during the past year, an addition made necessary by the rapid growth of the Ferro business. Just behind the water tower is the new core room, generally conceded to be the finest of its kind. Many engineers and foundry men have visited the Ferro plant especially to examine it.



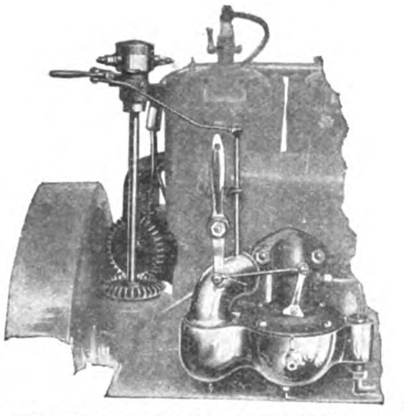
HIGH TENSION MAGNETO.

Until last month the administration offices of the Ferro Company were located in the down-town section of Cleveland. The factory is in another part particularly adapted for such an industry, where it is nearer the raw material market and the shipping facilities are such as to cut down expenses and enable the Ferro Company to put more value into its engine. Heretofore this arrangement worked very well but the rapidly growing business with its attendant increase in the number of details to be looked after made a change absolutely necessary. This month the downtown force will move bag and baggage out to the factory.

The new building is a large two-storied one of 15,000 square feet. A careful study of some of the largest offices in the country was made and the Ferro office laid out so as to facilitate in every way the rapid handling of the business. The most modern improvements and equipment are installed throughout.

Another addition during the past year—that of 30,000 square feet of foundry space is indeed a boon to the Ferro people. With a larger foundry and the finest and most complete core room in the world, it is now possible to give the other departments more "elbow room," so that there is plenty of lee-way in case orders should pile up faster than expected. With this enlarged factory and the building of motors for stock begun several months earlier this year the Ferro people can promise immediate delivery on all orders for 1911 motors.

The Ferro factory with these additional 70,000 square feet, now covers an area which makes it by far the largest plant in the world devoted to the manufacture of marine engines. It gives employment to over one thousand two hundred people. All the machinery, a large percentage of it of special design for the building of Ferro engines, is electrically driven



FERRO TIMER—CARBURETOR CONTROL

Many visitors to Cleveland make it a point to visit the plant. An experienced man shows them through the factory and explains the careful construction of Ferros from blue print to finished motor in one plant.

The Ferro Motors for 1911.—The Ferro engine for 1911 embodies some important new principles and refinements. They have been thoroughly tried out and are sure to be of utmost interest to the motor boating fraternity. These improvements, while they go a great way towards increasing the efficiency and reliability of the engine, take away none of that simplicity for which the Ferro has always been noted. Space does not permit us to go into detail regarding them, but the brief accounts of the two that follow will give one a fairly good idea of what is being built.

The Timer-Carburetor Control—A New Idea.—In the 1911 Ferro timer-carburetor control the makers of the Ferro engine seem to have a solution of the carburetor problem. An ingenious butterfly valve arrangement working in perfect unison with the timer not only overcomes the drawbacks and annoyances commonly encountered with other carburetors, but increases the efficiency of the engine and makes this the most perfect control ever devised for a gasoline motor.

The simple butterfly valve is contained in an elbow attached to the auxiliary air valve of extra large diameter and is automatically operated by a rod from the timer. As the spark is advanced or retarded, this valve is so adjusted as to allow just the proper amount of air to enter the mixing chamber of the carburetor and form a mixture of gasoline vapor and air of the proper proportions to meet the requirements of the motor. The extra large auxiliary air valve means a quick acting carburetor which in turn gives a quick responding motor.

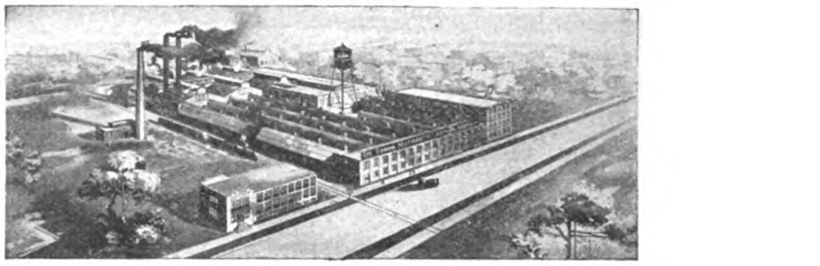
The timer-carburetor control is positive and aside from permitting of a motor of extreme flexibility, one that is easy to start, has a number of distinct advantages. Backfiring, such a big annoyance and drawback, is absolutely eliminated. Ferro motors have been run at high speed, throttle "wide open," instantly changed to slow speed and run that way without a semblance of a sputter.

This control has been applied to all the systems of ignition employed on Ferro motors. The same good results are obtained with the high tension magneto as with the battery and make and break ignitions. The Ferro is the only motor today that has this remarkable feature.

Ferro Applies High Tension Magneto.—System to Two-Cycle Marine Engines.—The motorboatist has often envied the man in the automobile because the latter enjoyed the advantages of high tension ignition. This no longer need be the case. The Ferro Company has made another departure from the regular order of things and applied the high tension magneto system to its product, the first time that high tension ignition has been generally applied to a two-cycle marine engine, and furnished as regular equipment insulated, are run through brass tubing up to the spark plugs, themselves protected by porcelain covers.

The advantages of the positive hot dynamic spark of the high tension magneto, such as increase in the power of the engine and economy of fuel consumption, are too well known to be dwelt upon to any extent here. Carrying batteries, which always deteriorate, is made unnecessary, for it was found that with this magneto the engine can be started on the first turn of the crank.

High tension ignition can be obtained on Ferro motors at a small cost over batteries and coil and their ultimate cost will be lower. Deducting the cost of batteries, coils, etc., of the regular ignition equipment and the cost of



BIRD'S-EYE VIEW FERRO MACHINE & FOUNDRY CO.'S PLANT, CLEVELAND, O , U. S. A.

Both the magneto and what little wiring there is, together with other parts of the ignition system, such as spark plugs, etc., are so well protected that they are absolutely waterproof and short-circuit proof. A special waterproof covering of thick rubber protects the magneto. The wires, aside from being heavily constant replacement, and after adding to the result, cost of the magneto system, it will be found that high tension ignition necessitates but a very small additional outlay. This will be more than offset and forgotten when the after-saving and increased enjoyment are taken into account.

CONTRACTING NEWS

DEPARTMENT OF FINANCE, BANGKOK, SIAM.—For purchase of 360 tons of demonetized bronze coins of Siam chiefly atts and two-att pieces, 85 grains and 173 grains respectively. Also comprises proportion of half att and four att pieces. All coins approximately 95% copper, 4% tin and 1% zinc. Proposal must be expressed in pounds sterling and guarantee that coins must be defaced, cut, chipped or melted by successful bidder. Bids must be addressed Minister of Finance, Bangkok, and marked "Tenders for purchase of old bronze coins" and submitted on or before April 18, 1911.

Sealed proposals in triplicate, subject to the usual conditions, will be received at the office of the Chief Supply Officer, Bureau of Constabulary, Old Oriente Building, Manila, until ten a. m., April 10, 1911, and then opened in the presence of attending bidders, for furnishing the Bureau of Constabulary

35,000 pairs of cotton socks.

Blank proposals may be obtained at the office of the Property Officer, Bureau of Constabulary, Old Oriente Building, Manila.

PROPOSALS FOR FROZEN FRESH BEEF AND MUTTON.—Headquarters Philippines Division Office Chief Commissary, Manila, P. I. December 31, 1910.—Sealed proposals, in triplicate, subject to usual conditions, will be received at this office until 11 o'clock a. m. April 5, 1911, at which time and place they will be opened in the presence of attending bidders, for furnishing and delivering about six million six hundred thousand (6,600,000) pounds of frozen fresh beef and two hundred thousand (200,000) pounds of frozen fiesh mutton to the Subsistence Department, U. S. Army, at Manila, P. I., during year ending June 30, 1912. The contractor will be required to pay all customs duties. The United States reserves the right to decrease the amount advertised for, upon reasonable notice to the contractor, or to increase the amount with his consent. Each proposal must be accompanied with a bidder's guaranty in the amount of $20,000 or with certified check for that sum on a bank of approved standing in Manila. The bidder to whom the contract is awarded will be required to give bond. Blanks and full information furnished on application to this office or to nearest United States Consul. Envelopes containing proposals must be marked: "Proposals for frozen fresh beef and mutton for fiscal year 1912, to be opened April 5, 1911," and addressed to the undersigned.—D. L. BRAINARD. Lieut. Col., D. C. G., U. S. Army, Chief Commissary.

BUREAU OF CONSTABULARY.—Office of the Chief Supply Officer. Sealed proposals in triplicate, subject to the usual conditions, will be received at the office of the Chief Supply Officer, Bureau of Constabulary, Old Oriente Building, Manila, until ten a. m., May 15, 1911, and then opened in the presence of attending bidders, for furnishing the Bureau of Constabulary

2,000 woolen blankets.

Blank proposals and information as to size and weight of blanket may be obtained at the office of the Property Officer, Bureau of Constabulary, Old Oriente Building, Manila.

PROPOSALS FOR COAL.—Headquarters Philippines Division, Office of Chief Quartermaster, Manila, P. I., January 7, 1911. Sealed proposals, in triplicate, subject to the usual conditions, for furnishing approximately 65,000 tons of coal to the Quartermaster's Department, U. S. Army, during the Fiscal Year 1912, will be received here until 11:00 A. M. May 8, 1911, and then opened. Information and blank forms furnished upon application. F. G. HODGSON, Assistant Quartermaster General, U. S. Army, Chief Quartermaster.

PROPOSALS FOR PUMPING MACHINERY.—Headquarters Philippines Division, Office of Chief Quartermaster, Manila, P. I., March 7th, 1911. Sealed proposals, in triplicate, subject to the usual conditions, for furnishing Pumping

FAR EASTERN RAILWAY NEWS

INDO-CHINA-SIAM CONNECTIONS.—The construction of the Saigon-Baltambang Railway and its extension to the Siamese frontier where it will ultimately connect with an extension from Petriew is the subject of much favorable comment in the Siamese press. The cost of the Indo-Chine project will be covered out of the loan of 100,000,000 francs projected by Governor General Klobukowski for public works. With the completion of the Indo-Chine and systems together with the Peninsular Railway all Malaysia will be put in touch with China by rail.

THE MEKLONG RAILWAY CO. LTD.—The report of the directors for the year 1910 gives little information beyond the actual results in profits for the year. The gross income was Ticals 310,760.75 and the expenditure Ticals 109,846.89 showing a very low percentage of cost for operating. After allowing Ticals 63,660 for interest concession redemption and depreciation, Ticals 137,254.44 represented the net profit for the year. Including Ticals 10,382.45 forward from previous account there were Ticals 147,636.89 available and the following distribution was made:

The Directors propose to deal with this amount as follows:

(1) To pay a dividend of 5%: Tcs.	111,500.00
(2) To pay Directors' fees:	5,000.00
(3) To pay Manager's bonus:	5 575 00
(4) To place to Contingencies Fund:	9,000 00
(5) To place to Statutory Reserve	6,333.97
(6) To carry forward to next year:	10,227.92
Tcs.	147,636.89

SUPPLY OF INDIAN RAILWAY MATERIAL.—Messrs. Geo. Cooper and Sons, Limited, England, have a large order for the supply of "French" screw spikes for permanent-way to the South Indian Railway. Messrs. Jas. Reid and Co., Ld , are supplying the same railway company with a quantity of fishbolts with nuts and washers for the construction of the Dharmapuri-Hosur extension. The Stanton Iron Works Company, Limited, had a contract for the supply of cast iron pipes and cocks to the South Indian Railway; and Messrs. Blakeborough and Sons, Limited, for pillar water cranes for the D. H. E. The materials required for the second track on the Delhi-Jumna Bridge and Allahabad-Jumna Bridge have all been ordered from England by the East Indian Railway. Messrs. Pope's Electric Lamp Company, Limited, England, have supplied the East Indian Railway with three thousand of their incandescent electric lamps. The General Electric Company, Limited, have also supplied the electric department of this railway with a quantity of their lamps, globes and shades. The Oilbath Axle-box Fittings and Engineering Company, Limited, England, had an order, from the Bengal-Nagpur Railway Company, for the supply of 100 of their axle-boxes and 2,000 axle-box covers. Messrs. John Spencer and Sons, Limited, are supplying the same railway with four crank axles for locomotive engines. Messrs. Geo. Cooper and Sons, Limited, have an order from this railway for the supply of 22 tons of fishbolts with nuts and washers, and 88¼ half tons of "French" coach screws. The East Indian Railway Company have placed a large order with the Consolidated Brake and Engineering Company, Limited, London, for the supply of a number of vacuum-brake fittings.—*Railways and Shipping.*

Machinery to the Quartermaster's Department, will be received here until 11:00 a. m. March 24th, 1911, and then publicly opened. Information and blank forms furnished upon application. F. G. Hodgson. Assistant Quartermaster General, U. S. Army, Chief Quartermaster.

CHINKIANG MUNICIPAL COUNCIL.—(a) Erection of a Water Works plant for the purpose of providing the Concession and immediate suburbs with an adequate supply of water.

(b) Erection of a Water and Electric Light plant combined for the purpose of providing the Concession and immediate suburbs with an adequate supply of water and light.

Sealed tenders will be received by the undersigned not later than 4 o'clock p. m. on Thursday, March 30, 1911, and should be marked "Tender for 'Water Works' and or 'Water Works and Light Plant.'"

The Council does not bind itself to accept the lowest or any tender, or to pay any expenses which the contractor may incur in tendering. The contractor whose tender is eventually accepted will be required to give satisfactory security for the due performance of the contract.

PROPOSALS FOR HANDLING GOVERNMENT CARGO.—Headquarters Philippines Division, Officer of Chief Quartermaster, Manila, P. I., February 20, 1911. Sealed proposals, in triplicate, subject to the usual conditions for furnishing all Stevedores, Laborers, etc., necessary for handling Government Cargo offered by this department at Manila, P. I., during the fiscal year 1912, will be received here until 11:00 A. M., March 20, 1911, and then publicly opened. Blank forms and information furnished upon application. F. G. Hodgson. Assistant Quartermaster General, U. S. Army, Chief Quartermaster.

THE ANTUNG-MUKDEN RAILWAY.—The *Japan Mail* states that this railway has made progress some twenty per cent. in excess of what was estimated as feasible in the past year, so that it is expected to be running through by the end of this year, about six months before the completion originally contemplated. More than two-thirds of the great tunnelling work through the Fuchinlin Range has already been completed, a total of 1600 yards, leaving another 600 odd yards to finish the tunnel, which the Japanese have been drilling at the rate of four yards a day. Another tunnel, exceeding 1000 yards in length has progressed with equal rapidity and only a few hundred yards remain to complete it.

THE SUNNING RAILWAY.—Writing from Hongkong, Consul General Anderson calls attention to the prospect of the early completion of the extensions of this line to Yeunkong on the west, Kongmoon on the east and to Fatshan and says:

"I am informed by the president of the company, Mr. Chin Kee Hee, who was for 43 years engaged in railway construction work in the Pacific Northwest of the United States and had much to do with successful construction of some of the Northern Pacific Railway, that practically all the capital for the extension has been secured, largely from Chinese in the United States, and that the construction of the extensions will be pushed as heretofore. Incidentally it may be stated that orders for railway cars and materials have recently been placed by him in the United States.

"In some respects the Sunning Railway is the most promising line in all China. It was capitalized, planned, engineered, and constructed by Chinese, without any foreign help whatever. If it has technical faults and is not run altogether in accordance with foreign ideas, it is nevertheless an effective line, prosperous and well managed, so far as results can show, and is a standing example of what Chinese effort and Chinese talent will accomplish in China in the near future."

PAKNAM RAILWAY CO., LTD.—The following report with recommendations of the directors for the half year ended December 31, 1910, was adopted at the regular meeting of the company:

	Ticals
Gross Receipts	73,970.31
Expenses	0,501.70
Leaving a profit for the half-year of	43,477.52
Added to the Contingencies Fund	100.00
	43,377.52
Balance from half-year ended 30th June 1910	2,666.47
Available for distribution	46,043.99

This amount your Directors recommend should be apportioned as follows:—

	Ticals
By paying a dividend of 6% absorbing	30,000.00
,, Depreciation	6,000.00
,, paying Directors' Fees	4,500.00
,, Compensation Acting Manager	1,750.00
,, paying Auditor's Fee	400.00
,, paying Manager's Bonus	500.00
,, paying Staff Bonus	500.00
,, carrying forward to next half year	2,393.59
	46,043.99

The total dividend rate for the year on new capital was 15% and on old capital 18.75%.

JAPAN'S STATE RAILWAYS.—From the last year 1904-05 previous to Nationalization, to 1909-1910 the total receipts have increased from 53,578,000 yen to 80,665,000 yen and the ratio of expense to receipts increased from 42.8% to 50%.

PLAGUE AND RAILWAY TRAFFIC.—The South Manchuria Railway has issued the following circular:

Since the outburst of the plague, necessary changes for the prevention of the epidemic have been adopted on our service.

The following is the actual state of the passenger traffic for the present on our line and also on the connecting lines:

3 Class Chinese Passengers.—3rd class Chinese passenger traffic has been totally suspended for the time being for both the North and South bound trains.

1ST AND 2ND CLASS CHINESE PASSENGERS. No Chinese passengers are allowed to travel on our Express trains excepting such 1st class passengers as specially granted by the Traffic Manager. 1st class Chinese passengers travelling through from Europe are dealt with the same as those specially granted by the Traffic Manager and are allowed to take our connecting Express trains on other trains than Expresses. 1st and 2nd class Chinese passengers may travel but on separate cars and only when they obtain special permission of the Station Master concerned.

Mukden Antung Line.—1st class Chinese passengers are carried, should they be allowed by the Station Master.

Korea Railway.—All passengers from China are subjected to five days' detention at New Wiju.

Imperial Railways of N. C.—Passenger traffic from Mukden to Peking has been totally suspended, the traffic for the opposite direction remaining as usual.

Chinese Eastern Railway.—The Russian Railway has suspended 3rd and 4th class passenger traffic.

PHILIPPINE MINING NEWS

CONSOLIDATION OF PARACALE INTERESTS.—Negotiations leading to the consolidation of the mining interests of Paracale, with a view to more general economic development is reported to be progressing favorably. So far as can be learned all the different mine owners with the exception of the Paracale Extension have consented to the consolidation proposal and the promoters are sanguine that this valuable property will also be secured. The Paracale Extension, however, has been in the hands of different parties under option previously, but for one reason or another the deals fell through. Three favorable reports have been made on the ground and the lowest average placed the values at 30 cents gold per cubic yard approximately. The claims cover about 230 acres and at least 190 have been proved up.

As previously reported in these columns, a specially designed dredge with a capacity of 60,000 cubic yards a month was recently designed by Engineer Payne for an option holding company. The dredge was ordered, a deposit made and work of construction begun at Dunedin, N. Z., but the option was abandoned.

It is understood that Mr. Payne's design was approved by Mr. Hanlon, the American expert who last tested the ground, but he added some recommendations with respect to special gold saving devices adapted to conditions which would result in higher percentages being secured.

The recognition by American experts that the New Zealand dredge is mechanically as good as any other and that with the provision for gold saving devices adapted to the natural conditions it will give satisfactory results has been received with much gratification by those interested in Philippine mining.

It is now acknowledged that had expert advice been followed in respect to gold saving devices when the installations of New Zealand Dredges were made in Paracale that instead of the unsatisfactory results in loss of values, delays occasioned by poor equipment, etc., large dividends would have been realized almost from the beginning.

It is known that the promoters of the movement for the consolidation of Paracale interests propose benefiting from the experience of the pioneer operators and will take the pains to guard against repeating their errors.

THE PHILIPPINE DREDGE.—The news from the Malaguit River for the month has been most encouraging. Those who have followed the fortunes of the Risdon dredge in the Paracale District where an attempt was made to utilize it on ground to which it was far from being adapted, will be glad to learn that during January and February over 200 ounces a month were saved and a net revenue realized of $2,000 gold each month. This gives renewed courage to the owners of the ground and especially to Judge Ingersoll whose personal sacrifices and tenacity of purpose when things looked their blackest, made this outcome possible. When it is remembered that the Risdon dredge is not suitably equipped with the proper saving devices and that a large percentage is lost, her record for the last two months is remarkable and confirms our confidence in the values in the Malaguit claims. As more effective methods and better administration feature the direction of gold dredging in Paracale and Malaguit, all doubt as to the future of those districts with respect to placer mining will have been dispelled.

THE SAN MAURICIO MARE'S NEST.—The Philippine shareholders in this company are not satisfied with the excuse given by Manager Bridgeman for closing down this property and, according to information from a most reliable source, Philippine capital is prepared to purchase a control and expend a sufficient amount to demonstrate that the ore is there in sufficient quantity and of satisfactory values to warrant further development and operation of the plant.

The charge is made that the administration of this property was not of a character that would make a success of a much richer property. The flooded state of the mine makes it impossible at the present time for those having faith in the property to make the necessary investigation, but that it will be made if the Philippine shareholders secure control is certain, and if they cannot secure control the matter will be taken to the courts for adjudication. This latter course will be followed, only, when every other means are exhausted to straighten out the present tangle, and behind it all is a remarkable expression of confidence in the property under proper direction. The majority of the shares are held in New York City and we understand that negotiations are under way to make the purchase.

THE GUAMAS GROUP.—It will be remembered that an option on this property was secured by the Philippine Exploration Co. The company put up ₱50,000 for it and it now appears that no definite date was named in the agreement for the option to become forfeit. With the closing down of the San Mauricio we understand that the Exploration Company decided to abandon their purpose to instal the dredge on these claims for the time being. Lately we learn that Shanghai promoters have circulated a private prospectus with the purpose in view of taking over the option on this property and proceeding to instal this dredge. We have not learned with what success this flotation has been attended.

MASBATE COAL.—The deposits owned by the Masbate Exploration & Development Co. have been receiving some attention of late. Recent analyses are reported to have been very satisfactory. The owners claim that it will rival the Australian product. An effort is being made to interest American capital.

MILL FOR NALASVETAN MINES.—The owners of property at Nalasvetan, Camarines, have purchased a small stamp mill which will soon be installed. Development work on this property has been in progress for over two years.

PROMINENT MINING ENGINEER VISITS PHILIPPINES.—Mr. F. G. Cole, who has been associated with leading mining interests in Siberia, China, Saghalien, Sumatra and Malaysia, has been enjoying a vacation with relatives in Manila and incidentally looking over the field.

FAR EASTERN ENGINEERING, CONSTRUCTION, COMMERCIAL AND FINANCIAL NEWS

RAILWAYS, ELECTRIC LIGHT, POWER, TELEGRAPH, TELEPHONES, AUTOMOBILES, AEROPLANES, ETC.

AVIATION IN THE FAR EAST.—During the month of February there was unusual activity in aviation circles. An aviation week at Bangkok early in the month under the direction of the Société d'Aviation d'Extreme Orient at which Mr. Van den Born, the wellknown aviatior, made several flights daily in his Farman biplane reported in the Siamese papers to have been most successful. His Majesty, the King, and suite were in daily attendance and a number of passengers were taken on short flights daily. Among these were Mrs. Hamilton Price, H. R. H. Prince of Nakon Chaisee, H. R. H. Princess of Nakon Chaisee and H. R. H. Prince Adisorn.

Mr. Van den Born had but one machine and refrained from making any record. The altitude made varied from 100 to 500 feet. In January Mr. Van den Born participated in an aviation meet in Saigon.

According to latest advices negotiations were under way to have an aviation week at Singapore under the auspices of the Société d'Aviation d'Extreme Orient and another at Hongkong is being arranged.

At Shanghai M. Vallon made several flights at the Kiangwan race course making an altitude of 250 feet in a Sumner biplane.

At Manila Bud Mars made eight flights making an altitude of 5,700 feet in a Schriver machine very similar to the Curtiss biplane.

Bud Mars was booked to make exhibition flights in Tokyo, March 15.

BAGUIO ELECTRIC LIGHT.—This plant has been leased from the government by O. M. Shuman for the year. He contracts to supply 16 c. p. lights at ₱2.50 per month.

GERMANS SECURE JAPANESE CONTRACTS.—The contract for the supply of electric apparatus for the Tokyo Electric Light Co. has been awarded a German firm. Germans have also secured the order for machinery for the Kinugawa hydro-electric plant.

MULTIPLEX TELEPHONY.—Major Squires of the U. S. Signal Corps has perfected an invention whereby several conversations may be carried on simultaneously over one telephone wire. The invention is the property of the government and will be introduced in the Signal Corps service.

MOTOR CARS IN CHINA.—The automobile has invaded Peking and promises to become very popular. Consul General Knabenshune reports from Tientsin that there are over a dozen or more cars in Tientsin and half a dozen in Peking. He believes that a good business could be done with wealthy Chinese in closed motors designed along the lines of the sedan chairs now in use.

JAPANESE LIGHT RAILWAYS.—According to the Japan *Times* charters for two light railways were granted by the Railway Board. They are the Achigo Light Railway and the Banshu Light Railway. The charter for the former was applied for by Mr. Kihachiro Okura and others, the projected line covering a total length of forty-nine miles fifty chains between Kashiwazaki and Niigata. Its capital is four million yen. The latter, the Banshu Light Railway, was promoted by Mr. Yoshiro Shiba and forty odd local businessmen with an aggregate capital of 1,800,000 yen. The line is to be divided into a main line covering twenty-four miles ten chains between Takasago and Nishiwaki, Hyogo prefecture, and three branch lines, one between Kokubu and Mitsugi, covering four miles fifteen chains, one between Agata and Hojo covering eight miles forty-five chains and the last between Awadzu and Kakogawa, covering only fifty chains, making a total mileage of thirty-seven miles forty-five chains.

RUSSIAN AEROPLANE INVENTION.—A photographic apparatus to be used for scouting with aeroplanes so that the plates may be dropped without injury is the invention of a military aviator.

CHEMULPO ELECTRIC RAILWAY.—A company has been organized to instal an electric railway in this city.

WIRELESS TELEGRAPHY IN LOWER CHINA.—According to Consul General Anderson a wireless telegraphy plant at Hongkong for commercial purposes, recently announced as arranged, is delayed for a short time. There is some difference of opinion as to the plan for the commercial uses of a plant and its relations to naval and military establishments. It is promised, however, that the plant will be an effective one.

In the meanwhile there is considerable activity along the lower Asiatic coast in wireless-plant construction, and there will soon be communication by wireless telegraphy between Hongkong and Hanoi, in French China. Wireless service projected and more or less in course of construction in Indo-China includes one between Saigon and Hanoi of about 1,000 miles and costing about $19,000; one from Hanoi to Quang-chung-wan; another from Hanoi to Lang Biang; another from Lang Biang to Saigon; another from Lang Biang to Vientaine; and others from Saigon to Pnompenh and Battambang.

The Chinese Government also is constructing systems in Yunnan toward Tibet and in Tibet proper, which it is expected will be within reach of the lower coast of French and English systems. Indications are that within six months there will be a fairly complete system along the lower coast of Asia and one connecting with it in the interior which will form a supplementary service for the present land lines.

PUBLIC WORKS, DOCKS, WHARVES, BUILDINGS, ETC.

WORK SUSPENDED IN SINGAPORE HARBOR.—Messrs. John Aird & Co. have relinquished their contract for the construction of the wet dock and the reconstruction of the main wharf of the Tanjong Pagar. According to the *Penang Gazette* a different strata from that anticipated had been found by the contractors resulting in the sinking of foundations of the end walls at the lagoon dock and that following negotiations, the contractors had filed suit against the Tanjong Pagar Dock Board in the High Courts.

The administration report for the half year ended June 30, 1910, contains the following comment:

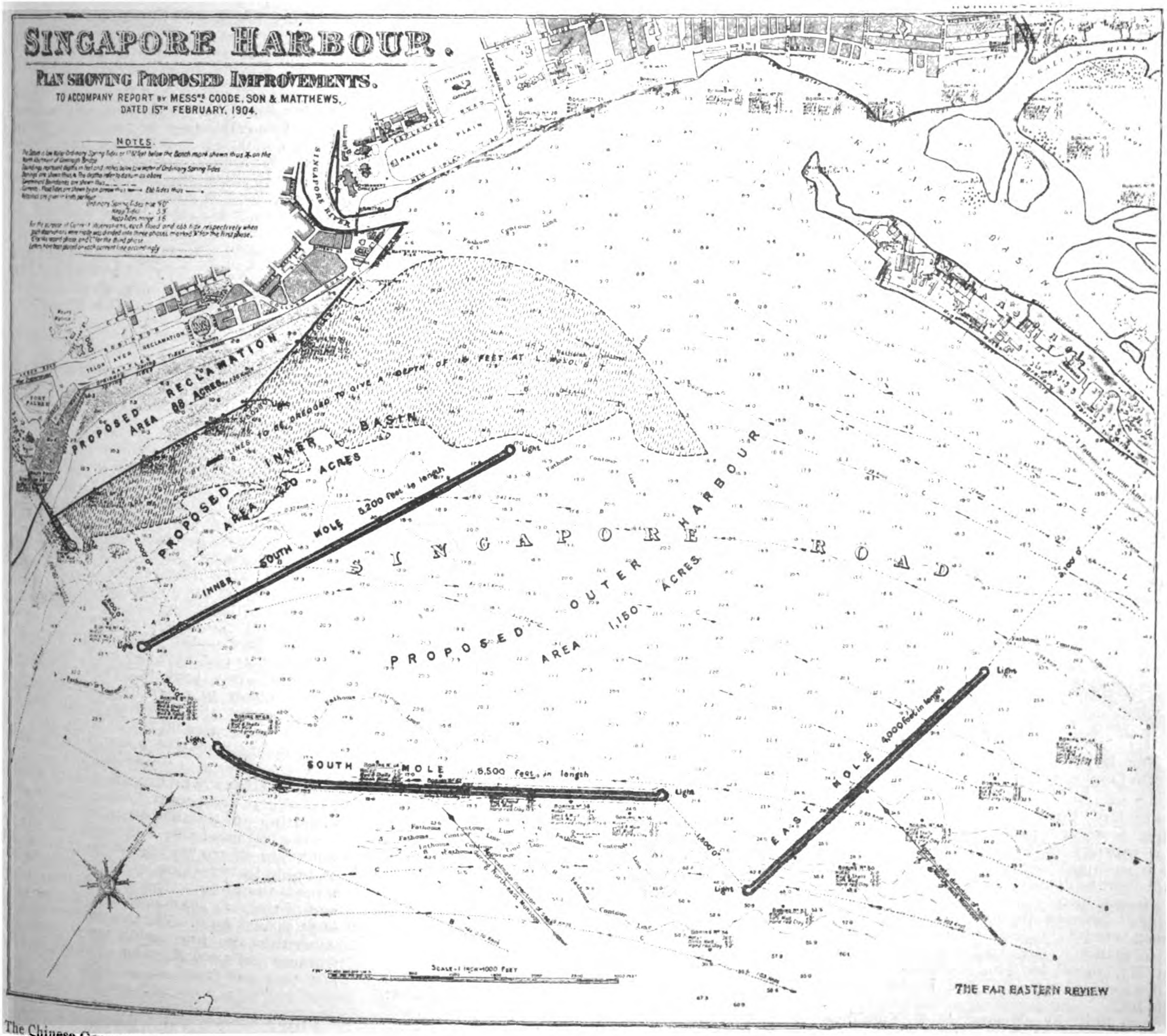
"It is to be regretted that the general progress of the new works, under execution by Messrs. John Aird and Co., has not been in any way commensurate with the reasonable anticipations of the contract. Certain difficulties which have arisen in respect of the foundations for the end walls of the lagoon dock are now under consideration by the engineers and the contractors, in London.

The progress of the main wharf has, too, been retarded, the first section of 500 ft. of new wharf at the western end only being handed over for the Board's use and occupation in April, being some 3½ months later than had been anticipated—since then two godowns have been erected by the Board and are now in regular operation. The cylinder construction on the adjacent length of wharf (some 700 feet to the western entrance to the lagoon dock has proceeded slowly, the necessary rate of progress to comply with the contract conditions not having been maintained, to the serious impediment of the Board's facilities for berthage accommodation, and consequent congestion of the traffic at the wharves, especially in calling operations.

It was in October 15, 1907, that the Dock Board accepted the tender of Messrs. John Aird and Company for the construction of the dock and the reconstruction of the main wharf, all in accordance with the conditions and specifications of the consulting engineers, Messrs. Cood, Son and Matthews, dated June 1907, at a cost of £998,700, the time of completion being five years.

The area of the wet dock is 24½ acres, and provides 3,837 feet of quay wall, also 900 feet of pitched slope. The depth of water at low water, over sill top, is put at 30 feet. The main wharf reconstruction covers a total length of wharf of 4,575½ feet of which 3,144 feet will be in concrete blockwork wall, and 1,431½ feet wrought iron cylinder construction, with a minimum depth alongside at lower water of 38 feet.

Further information taken from a late report to the Crown Agents by Messrs. Coode, Son & Matthews who were responsible for the



original report on sea bed conditions upon which the contract was based, indicates that a grave mistake was made in the original estimates. We find that Messrs. Coode, Son and Matthews arranged for a new series of borings between the northern and southern terminations of the wall with the result that, instead of the clay being found at a depth of 34 ft. 9 in. below low water level as was anticipated, it was not met with until a depth of 95 ft. had been reached, which is 60 ft. below the level shown on the contract drawings. Similarly, where it was anticipated that the clay would be found at 45 ft. 7 in. below low water, it was not found till a depth of 78 ft. below low water was reached, or 32 ft. 6 in. below the level on the contract drawings.

THE WHANGPOO CONSERVANCY. The report for the quarter ended December 31 shows an expenditure of Tls. 6,125,384.21, leaving a balance forward of Tls. 131,614.09

MANDALAY WATERWORKS.—The *Mandalay Herald* states that the municipal committee is preparing an extensive scheme to secure a water supply from Kinwun Lake, distant sixteen miles.

IMPROVEMENTS OF MANILA PORT.—The Bureau of Supply is erecting warehouses at Pier five to cost ₱450,000 and plans have been completed for two new piers each 850 feet long and 160 feet wide at a cost of ₱750,000. These will be equipped with the most modern freight handling equipment.

During the year 1909 two large piers, one with a deck space of 46,865 square feet, 28,500 square feet being under roof, the other with a deck space of 79,530 feet of which 54,500 square feet is under roof, were finished and placed in commission. They are in every respect modern and up to date, and cost the Government nearly ₱1,250,000.

PHILIPPINE ROADS.—Allotments for highway construction for roads and bridges to the amount of ₱250,000 have been made. Of this ₱25,000 will be expended in the construction of a bridge near Atimonan, Tayabas.

HANKOW WATERWORKS.—A limited Chinese company is being formed for the purpose of installing a water supply.

YOKOHAMA HARBOR IMPROVEMENTS.—It is proposed to secure the approval by the Department of Finance covering the division of the harbor into two sections, one to be dredged a depth of 30 feet and the other 36 feet.

TOKYO SEWERAGE SYSTEM.—It is proposed to expend 33,660,000 yen covering a period of five years for the purpose of installing a modern sewage system and it is expected that the Imperial authorities will undertake half the expense.

HAI HO CONSERVANCY.—The Holland dredge now in operation on these works has a capacity of 500 cubic meters an hour and is equipped with 1,000 feet of pipe line 20 inches in diameter. The following are her dimensions:

Length between perpendiculars 157 feet 6 inches; breadth, 36 feet 9 inches, depth 11 feet 6 inches. The dredging depth of the Hsin Ho, when dredging by suction or by the bucket chain, with the ladder at 45° is 26 feet.

It was built by Messrs. A. F. Smulders, Scheedam, Holland.

SHIPBUILDING, MERCHANT MARINE, AND FISHERIES.

SIAM STEAM NAVIGATION CO.—The net profit for the half year ended December 31 amounted to Ticals 172,460 and after allowing 5% for depreciation of steamers, 10% depreciation on small craft, there remained Ticals 114,135 for distribution as follows: 5 per cent for the half year to the shareholders, Ticals. 100,000; Remuneration to Directors' Ticals, 1,192; Reserve Fund Ticals, 10,000; Carried forward, Ticals 2,943.

NEW JAPANESE BATTLESHIPS.—An order each is reported to have been placed with the Mitsubishi Company and the Kawasaki Company for the construction of 22,000 ton battleship. Experts have proceeded to England to study the design of the new armored cruiser ordered from Vickers, Maxim & Co.

NEW GRAVING DOCK AT SASEBO.—The new dock at this point expected completed in the fall will be the largest dock in the Orient. It will be 286 feet longer than the Kure dock and 229 feet longer than the dock at Yokosuka and its width is greater than those docks by 21 and 19 feet respectively. Heretofore Dock No. 3 of the Mitsubishi was considered the largest.

EAST ASIATIC CO.'S ENTERPRISE.—A new boat for the Bangkok to be provided with motor engines and of 3,000 h. p. capacity has been ordered from Messrs. Burmeister & Wain, Denmark, for the Bangkok-Europe line of this company. A new vessel ordered by the Siam Steam Navigation Co. to have 600 h. p. motors for coast trade has also been ordered.

THE HONGKONG & WHAMPOA DOCK CO. LTD.—The report for the half year, ended December 31, shows most satisfactory results. The net profit for the half year amounted to $50,851.88 and this with $148,940.06 forward from the previous term made $199,940.06 available for distribution. A 2.5% dividend was declared for the six months and $137,291.94 was carried forward. During the half year besides the general activity that featured the construction and repair work in the yards, the general engineering, boiler and foundry departments have been unusually busy. Among the special contracts that have engaged wide attention are the machinery for the pulp works plant of Indo-Chine, an extension to ice works at East Point, the new Star Ferry Wharf at Hongkong, the woodwork and assembling of the cars for both sections of the Kowloon Canton Railway and the prospect for a marked extension in railway orders as the Chinese lines in South China extend. Manager Dyer came in for a well deserved compliment at the annual meeting when Mr. A. Forbes, who seconded the adoption of the report, expressed great satisfaction at the marked expansion of the operations of the company and said:

"The shareholders are largely indebted to the Chief Manager, Mr. Dyer, who has been indefatigable in promoting the interests of the company and maintaining the reputation of the dock for good work done".

LAUNCHING OF THE SHINYO-MARU.—This vessel, constructed for the Toyo Kisen Kaisha, which was launched last month from the Mitsubishi yards, differs from her sister ships the Tenyo and Chiyo in that her gross tonnage is 13,700 instead of 13,500 and her h. p. increased from 16,850 to 20,000 with the speed increased from 19 to 21 knots. She will also have what is termed a "garden" on the boat deck for officers' quarters and wireless telegraphy. Her description follows:

Length, between perpendiculars	550 feet.
Breadth	63 ,,
Depth	38.6 ,,
Full draught	31.8 ,,
Tonnage, gross	13,700
,, capacity	21,650
Speed	21 knots.
Horse-power	20,000
Engines—Parson's triple-shaft turbines.	
Number of boilers	13
Passenger accommodation:—	
First class	200
Second Class	40
Third ,,	774
Special first class	2

She has been built under Lloyds' survey and will be classed 100 A1.

THE KOCHIEN TRANSPORTATION AND TOWBOAT CO. LTD.—This company paid a dividend of 5% for the half year.

SIAM STEAM PACKET CO.—The total profit for the year was Ticals 22,046.25, out of which a dividend of 7% was paid and Ticals 679.37 carried forward.

PROPOSED NEW DOCK FOR SHANGHAI.—In order to provide a permanent repair base for the Navy, H. E. Sheng Hsuan-huai, President of the Board of Communications, has proposed that dock and shipbuilding yards be established in Shanghai at a cost of five million taels.

TANKO S. S. CO.—The profit for the half year was yen 400,000 which covered losses for previous years and other extraordinary expenses leaving 40,000 to carry forward.

THE TOYO KISEN KAISHA.—Mr. A. B. Renner, formerly purser of the Pacific Mail, has been appointed San Francisco Agent of this company; Messrs. Erlanger & Galinger, agents in Manila, and the American Trading Co. at Shanghai. The American Maru was the first vessel to cross the Pacific under the new arrangement with the Western Pacific.

FLOUR RATE WAR.—Portland and Puget Sound vessels have inaugurated a rate war that has cut freights to $3 to Shanghai and $2 to Hongkong.

MINES, MINERALS, THE METAL TRADE, MACHINERY, ETC.

SIBERIAN PLACER MINING.—The Orsk Goldfields Co. is installing an electrically driven bucket dredge having a capacity of 7,500 cubic yards per diem of 24 hours on the Kolchan mines. This dredge will be operated and a 750 h. p. plant, 6,600 volts, with a 3-phase, 60 cycle transmission line 10 miles in length. The dredge was supplied by the New York Engineering Co. The motors for the dredge are 3-phase, 60 cycle, 440 volts and were supplied by the Westinghouse Manufacturing Co., and the generators by the General Electric Co. The dredge itself is 90 feet long, 45 feet wide and has a draft of nine feet with sixty buckets. These mines are situated about 50 miles from Nikolievsk and inland about 18 miles from the Okhotsk Sea and cover an area of 16,000 acres. They are reached by steamer by a branch of the Amur.

THE ORIENTAL CONSOLIDATED MINING CO.—This prosperous American company operating in Unsan district, Chosen, reports for the last fiscal year a net profit of $623,676 gold. In all 320,707 tons of quartz was milled and gold to the value of $1,749,468 gold obtained therefrom. The ore reserves at the end of the year aggregated 838,250 tons valued at $3 948,475 gold. The Company employs 60 Americans and Europeans, 150 Japanese, 500 Chinese and 5,000 Koreans. The dividend for last year was 11.5%.

CHINA'S COAL OUTPUT.—The total output of coal computed for 1909 places the figures at approximately 3,500,000 tons, of which the Chinese Engineering & Mining Company's share was 1,365,000 tons bituminous; Shantung Mining Co., 272,000 tons bituminous; the Han-Yeh-ping Iron & Coal Co. Ltd., 520,000 tons; Peking Syndicate 245,000 tons anthracite; Belgian mines, Chihli, 200,000 tons; Pachsin Mines 100,000 tons anthracite; and the Fushun Coal of the South Manchuria Railway Co., 730,000 tons.

THE RENONG DREDGING CO. LTD.—The report for the year shows that the returns of tin per cubic yard of ground amounted to 1307 ounces as against 12,325 ounces estimated. As the dredge has only been working since March and the operations mostly preliminary, the results have been sufficiently satisfactory to encourage the shareholders to look forward to a substantial dividend next year.

HANYANG IRON WORKS.—The Government Steel Works at Wakamatsu has placed a contract with the Hanyang Iron Works, Hankow, for the delivery of 10,000 tons of ore and 10,000 tons of pig iron annually for twenty years.

THE SIBERIAN SYNDICATE LTD.—At the annual meeting of this company special reference was made to an expert report on the Atbasar Copper Fields in which the syndicate has large interests, to the effect that the prospecting developed about 20,000 tons of 12% copper ore.

THE AMUR GOLD INDUSTRY.—Reviewing the situation the *Mining Journal* says:

The area of the 560 gold placers in this eastern part of Siberia makes about 158,000 acres, of which 208 placers, occupying 58,000 acres, are being worked now. The total quantity of gold sand washed is 310,000 tons, and the result in pure gold was 159,229 ozs. with an average content of about half-an-ounce per ton of sand. In the neighbouring province of Yakutsk seventeen placers are being worked, and 300 tons of auriferous sand washed, yielding 44 000 ozs., average content 146 ozs. per ton of sand. The production in the Amur province has been registered since 1868 by the Government, and from that year up till November 1, 1910, the total production according to official sources has been about 7,000,000 ozs. This figure cannot be called exact for much of the gold escapes registration amounting to no less than 70 to 90 per cent. of the annual quantity officially declared. Of recent years small gold industries have grown up on the ground, which, with the introduction of the free circulation of gold on March 1, 1902, have grown considerably. Last year gold poaching was particularly rife, as many as 1,500 thieves having appeared on the River Pimpon on the Upper Amur Gold Company's placers, and removed about 25,000 ozs. of gold from the sands, and these robbers were only shifted with the assistance of a posse of soldiers from Blagoveshchensk.

SIAMESE SECRET OF BRONZE CASTING IN SIAM.—Vice Consul General Carl C. Hansen of Bangkok gives the following formula discovered by Major Cerini in an old Siamese manuscript belonging to the late King as translated by that officer with his comment:

"Take 12 ticals (1 tical equal to one-half ounce avoirdupois) weight of pure tin, melt it at a slow fire, avoiding bringing it to red heat. Pour 2 ticals' weight of quicksilver, stir until the latter has become thoroughly absorbed and amalgamated; then cast the mixture in a mold, forming it into a bar. Take one catty in weight (80 ticals) of refined copper and melt it. Then gradually incorporate with it the amalgam, keeping in the meantime the fused mass well stirred.

When this has been done, throw into the crucible a sufficient quantity of ashes obtained from the stems of the bua-bok (terrestrial lotus) creeper, so as to cover the molten metal. Remove the dross with an iron ladle; the metal remaining is samrit bronze. According to this recipe the proportion of the ingredients employed in the manufacture of the alloy in question thus proves to be: 85.11 copper, 12 76 tin, and 2.13 quicksilver. A late qualitative analysis shows that this alloy also contains traces of gold, silver, and iron."

TIN MINING IN SIAM.—According to the report of the British Consular service there are 14 principal mines being worked in the province of Senggora and 12 in the province of Nakon Sritamarat, but besides these a large number of persons hold licenses and work tin on a small scale. There is still only one concession held by a European—a Danish subject—situated in the district of Chana. All the other mines are worked either by Siamese or Chinese. The greater part of the Monthon has never been properly prospected.

COMMERCIAL, FINANCIAL AND MISCELLANEOUS

THE HONGKONG ROPE MANUFACTURING CO. LTD.—A final dividend of $1, making a total of $2 a share for the year, was paid, $3,000 placed in reserve and $13,321.25 forward.

THE HONGKONG & SHANGHAI BANKING CORPORATION.—The report for the half year ended December 31 shows net profits including $2,029,390 83 brought forward from previous term of $5,243,906.46 of which $250,000 was placed to the credit of silver reserve fund making it $16,250,000. After deducting directors' remuneration a dividend of £2 sterling and a bonus of five shillings a share were paid absorbing $2,945,454.55 and leaving a balance forward of $2,039,151.91.

HUMPHREY'S ESTATE AND FINANCE CO. LTD.—The net profits for the year including $5,471 from last account amounted to $75,705, out of which a dividend of 4.05% was paid and $1,181.65 carried forward.

CHINA FIRE INSURANCE CO. LTD.—A dividend of $7 and a bonus of $2 a share were declared for the year.

CHINA SUGAR REFINING CO. LTD.—A final dividend of $5 per share making 10% for the year was declared, $80,000 carried to Equalization of Dividend Fund, and $22,730 30 forward.

PHILIPPINE CARNIVAL ASSOCIATION.—Mr. C. M. Cotterman, Director of Posts, has been elected president and Mr. Jerry Manning, Assistant Insular Treasurer, treasurer; Lieut. Adams, secretary; and Mr. M. L. Stewart, director-general of the 1911 Carnival, and Judge D. R. Williams, directors; Governor General Forbes, honorary president; and Speaker Sergio Osmeña, Major General J. Franklin Bell, Admiral Hubbard, Brigadier General F. R. Funston, Brigadier General J. J. Pershing, and Brigadier General Daniel R. Brush honorary vice-presidents; Secretary C. B. Elliott, president, and Felix M. Roxas, first vice-president, Sr. Joaquin Elizalde 2nd vice-president.

CHARTERED BANK.—At the approaching annual general meeting of shareholders, the directors will recommend that a dividend be declared for the past half year at the rate of 15 per cent per annum free of income tax, that £25,000 be added to the reserve fund, that £10,000 be added to the officers' superannuation fund, that £25,000 be written off premises account, and that £126,363 be carried forward.

HONGKONG HOTEL CO.—The net profit for the year was $64,129 out of which dividends of $3 a share on old and $1.50 on new shares absorbing $48,000 were paid.

CEYLON'S GRAPHITE EXPORT.—The export to the United States for the year 1910 were valued at $1,800,000.

JAPAN'S SAVINGS BANKS.—Up to the end of October the total of deposits was 158,387,000 yen, an increase of 35,000,000 for the eight months.

PEACE SOCIETY OF AMERICANS IN JAPAN.—This organization is proposed for the promotion of better relations between the two countries. Over a hundred applications for membership were presented at the first meeting at which Mr. D. H. Blake of the American Trading Co. was chairman.

HONGKONG ROPE MANUFACTURING CO., LTD.—The following is an excerpt from the directors' report for 1910:

The balance at credit of profit and loss account is $76,321.25 which it is proposed to appropriate as follows:—

To place to Reserve Fund .... $ 3,000.00
To pay a Dividend of $1.00 per share $60,000.00
To carry forward to the credit of next year's account $13,321.25

Consulting Committee:—In accordance with the Articles of Association, Messrs. H. P. White, D. W. Craddock and Dr. J. W. Noble retire, but offer themselves for re-election.

THE MANILA HOTEL.—The palatial block of buildings now in course of construction on the Luneta extension for the Manila Hotel Company, and rapidly approaching completion, will be opened early in December. The management of the new Hotel has been placed in the experienced hands of Mr. D. R. Reynolds formerly manager of the Hotel Bristol, New York, who is due to arrive in Manila in August. Mr. S. W. Thompson has been appointed Assistant Manager.

NEGROS PHILIPPINE LUMBER CO.—The S. S. "Tacoma Maru", last voyage, brought over a complete rolling stock equipment for the above company, which has been forwarded to the cuttings. The new plant will be used on a six-mile logging railroad, and will be in operation within the course of a few weeks.

* LONDON METAL MARKET

The following are to-night's (February 2) prices of metals:—

	£ s. d.		£ s. d.
COPPER.			
*Tough cake and ingot	59 10 0	..	60 0 0
*Best selected	59 10 0	..	60 0 0
*Electrolytic	60 10 0	..	61 0 0
*Sheets and sheathing	70 0 0	..	—
*Flat bottoms	73 0 0	..	—
STANDARD †Cash	55 3 9	..	—
STANDARD †Three months	56 0 0	..	—
*Copper tubes, seamless per lb.	0 0 8½	..	—
*Lake	61 0 0	..	62 0 0
* Less 3½ per cent. † Net.			
ALLOYS.			
Brass: Wire	0 0 6¼	..	—
,, Tubes (solid drawn)	0 0 6¾	..	—
,, Sheets	0 0 7	..	—
TIN.			
English ingots, f. o. b.	192 0 0	..	193 0 0
,, bars	193 0 0	..	194 0 0
,, refined	194 0 0	..	195 0 0
Straits... Cash	191 15 0	..	—
Straits... Three months	192 0 0	..	—
Australian spot	—	..	—
Banka (in Holland) Cash / Three months	192 5 0	..	—
LEAD.			
Spanish or soft foreign	£12 18 9	..	13 0 0
English pig, common	13 3 9	..	13 5 0
,, L. B.	18 12 6	..	—
,, sheet and bar lead	14 15 0	..	—
,, pipe	15 5 0	..	—
,, red	15 17 6	..	—
,, white	18 15 0	..	—
,, patent shot	16 2 6	..	—
SPELTER.			
Silesian ordinary brands	23 5 0	..	23 7 6
,, special brands	23 15 0	..	23 17 6
English Swansea	—	..	—
Sheet zinc	28 10 0	..	—
ANTIMONY.			
Antimony	27 0 0	..	29 0 0
,, Crude	12 0 0	..	13 10 0
,, Ore (basis 50%)	7 0 0	..	8 0 0
QUICKSILVER.			
Flasks, 75 lbs. warrants	8 0 0	..	—
ALUMINIUM.	Per ton.		Per ton.
98-99 per cent.	68 0 0	..	70 0 0
NICKEL.	Per ton.		Per ton.
98-99 per cent. guaranteed	167 10 0	..	171 0 0

PLATINUM.

Per oz. Troy, 160s.; nominal and subject to negotiation.

* Mining Journal.

FAR EASTERN STOCKS AND QUOTATIONS

Courtesy of Messrs. Kadoorie & Co., Hongkong, March 3, 1911.

STOCK.	WHEN ESTABLISHED	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	AT WORKING ACCOUNT	DATE	LAST DIVIDEND.	Approximate Yield per cent per annum at Present Quotation	CLOSING QUOTATIONS
BANKS.											
Hongkong & Shanghai Banking Corporation	1865	$15,000,000	120,000	$125	$125	g £1,500,000 s $16,000,000 i $250,000	$2,029,390	31-6-10	£2. for first half year ending 30-6-10, @ ex 1/9⅜ — $22.456	5%	$880 buyers £88
National Bank of China, Ld.	1891	£699,475	10) 99,925	£7	£6	e £4,099 $400,000	$34,167	31-12-09	$2 (London 3/6) for 1903	....	$80 buyers
MARINE INSURANCES.											
Canton Insurance Office, Ld.	1881	$2,500,000	10,000	$250	$50	$1,600,000 j $268,696 u $305,181	Nil.	31-12-08	$15 for 1909	8½%	$172½ buyers
North China Insurance Co., Ld.	1903	£150,000	10,000	£15	£5	g £125,000 s Tls. 225,000 u Tls. 368,644 f Tls. 137,308	Tls. 205,719	30-6-10	Final dividend of 7½% for 1909 making 15% in all....	5%	Tls. 152½ sales
Union Ins. Society of Canton, Ld.	1867	$3,100,000	12,400	$250	$100	s $3,000,000 g £90,000 f $287,984 j $1,449,735 u $713,985	2,552,545	31-12-09	Final of $20 per share, making in all $50 per share for 1908, and an int. div. of $30 per share for 1909	6%	$83 sales
Yangtsze Ins. Association, Ld.	1889	$1,200,000	12,000	$100	$60	$1,000,000 j $371,802 £169,861	$797,602	31-12-09	$12 for year ending 31-12-08 and interim of $3 on account of 1909	6%	$205 sales
FIRE INSURANCES.											
China Fire Ins. Co., Ld.	1870	$2,000,000	20,000	$100	$20	$1,000,000 x $665,924 f $61,168	$465,144	31-12-09	$6 and bonus $2 for 1908	6½%	$123 buyers
Hongkong Fire Ins. Co., Ld.	1868	$2,000,000	8,000	$250	$50	$1,460,000 j 91,687	$426,218	31-12-09	$27 for 1908	7½%	$365 sellers
SHIPPING.											
China & Manila Steamship Co., Ld.	1882	$750,000	1) 30,000	$25	$25	i $57,734	Dr. $3,777	31-12-09	$4% for 1906	....	$10
Douglas Steamship Co., Ld.	1883	$1,000,000	20,000	$50	$50	$230,000 i $100,589	Nil.	30-6-10	$2½ for year ending 30-6-1908	....	$19 buyers
Hongkong, Canton & Macao Steamboat Co., Ld.	1865	$1,200,000	80,000	$15	$15	e $250,000 d. i. $630,000 f $ 34,267 $ 8,233	$18,026	30-6-10	Dividend of $1½ for half year ending 31.12.1910	8½%	$30 sellers
Indo-China Steam Navigation Co., Ld. (Preferred) Do. Do. (Deferred)	1882 m	£600,000	2) 60,000 2) 60,000	£5	£5	i £138,100	£15,162	31-12-08	3% = 3/- on Preferred shares only for 1910	2½%	$60
"Shell" Transport & Trading Co. Ld.	1898	£ 2,000,000	2,000,000	£1	£1	£120,000 i £1,000,000	£205,868	31-12-09	Final div. of 2/6 per share (coupon 14) making in all 4/6 per share for 1909, and an int. div. of 1s. per share on % for 1910	5%	90/- £11 buyers
"Star" Ferry Co., Ld.	1898 1900	$200,000	10,000 10,000	$10 $10	$10 $5	$6,500 i $55,830	$1,159	30-4-10	A dividend of 7% and bonus of 5% making 12% for year ending 30.4.1910	5% 6%	$23 $12
REFINERIES.											
China Sugar Refining Co., Ld.	1878	$2,000,000	20,000	$100	$100	e $520,000 r $83,620	Dr. $8,090	31-12-09	$5 for half year ending 30-6-1910.	10%	$110
Luzon Sugar Refining Co., Ld.	1882	$700,000	7,000	$100	$100	none	Dr. $101,851	31-12-09	$3 for 1897	—	$18
MINING.											
Chinese Engineering & Mining Co., Ld.	1901	£1,000,000	1,000,000	£1	£1	d £215,000 h £12,289	....	..	Final div. of 1/6 for the year 1910 making 15% (coupon 15)	9%	Tls. 13 sellers
Headwaters Mining Co.	1908	₱600,000	28) 600,000	₱10	₱10				First year		₱10
Raub Australian Gold Mining Co., Ld	1892	£200,000	200,000	£1	£1	£4,873	Dr. $6,583	13-4-10	1/2 per share, 13th div.	..	$3
Oriental Consolidated Mining Co. Ld.	....	g $5,000,000	500,000	g $10	$10	none	?	..	Final of gold $0.65 for 1909 in all g. $1.15	..	33/-
DOCKS, WHARVES AND GODOWNS											
Fenwick (Geo.), & Co., Ld.	1889	$450,000	z 18,000	$25	$25	$25,275	Dr. $8,460	31-12-09	$1¾ for year ending 31-12-06	....	$5
Hongkong & Kowloon Wharf & Godown Co., Ld.	1886	$3,000,000	60,000	$50	$50	$500,000 i $31,993 s $40,000	$4,848	31-12-09	$6% for year ended 31-12-1910	6%	$54 buyers
Hongkong & Whampoa Dock Co., Ld.	1866	$2,500,000	50,000	$50	$50	i $88,214 v $200,000	$148,940	30-6-10	2½% for half year ended 31-12-10	..	$55 sellers
Shanghai Dock & Engin'g Co., Ld.	1906	Tls. 5,570,000	13) 55,700	Tls. 100	Tls. 100	Tls. 1,000,000	....	..	Final of Tls. 3½ making Tls. 6 in all for year 30-4-1910....	9%	Tls. 66
Shanghai & Hongkew Wharf Co., Ld.	1902	Tls. 3,600,000	36,000	Tls. 100	Tls. 100	b Tls. 697,257 r Tls. 50,000 e Tls. 125,000	....	..	Interim of Tls. 3 for 1910	7	Tls. 98
LANDS, HOTELS AND BUILDINGS.											
Anglo-French Land Investment Co., Ld.	1906	Tls. 2,500,000	3) 25,000	Tls. 100	Tls. 100	Tls. 35,000	Tls. 4,314	29-2-09	Tls. 6 for year ending 29-2-10	5¾	Tls. 95 sellers
Central Stores, Ld.	—	$751,845	16) 50,123	$15	$15	n. $1,000	$1,000	31-12-08	8% for 1909	....	$11 sellers
Hongkong Hotel Co., Ld.	1866	$600,000 $400,000	12,000 8,000	$50 $50	$50 $25	$648,975 r $20,000	$21,477	30-6-10	$3 on old shares, $1.50 on new shares, for half year ending 30-6-10	5¾%	$102 buyers $63 do. ex.div
Hongkong Land Investment & Agency Co., Ld.	1889	$5,000,000	50,000	$100	$100	e $250,000	$24,679	31-12-10	Final Dividend of $3.50 per share for 1910	7%	$94 buyers
Humphreys' Estate & Finance Co., Ld.	1887	$1,500,000	150,000	$10	$10	i $231,266 20) $24,695	$5,471	31-12-09	45 cents for 1909	5¾%	$6¾
Kowloon Land & Bldg. Co., Ld.	1889	$300,000	6,000	$50	$30	none	$269	31-12-09	$2½ for 1909	8%	$34 buyers
Shanghai Land Investment Co., Ld.	1888	Tls. 3,900,000	78,000	Tls. 50	Tls. 50	Tls. 1,523,045 e Tls. 300,000	Tls. 63,969	31-12-09	Interim of Tls. 3 for 1910	6¾	Tls. 97
West Point Bldg. Co., Ld.	1889	$625,000	12,500	$50	$50	none	$2,801	31-12-10	Final Dividend of $2.20 per share making $4 in all for year 1910	8¾	$46 sales
COTTON MILLS.											
Ewo Cotton Spinning & Weaving Co., Ld.	1895	Tls. 1,000,000	5) 20,000	Tls. 50	Tls. 50	Tls. 250,000	Tls. 10,991	31-10-10	Tls. 4 for year ended 31-10-10	13%	Tls. 85
Hongkong Cotton Spinning, Weaving & Dyeing Co., Ld.	1901	$1,250,000	125,000	$10	$10	e 20,000	$26,297	30-7-09	50 cents for year ending 31-7-08	—	$5 buyers

FAR EASTERN STOCKS AND QUOTATIONS—(Continued.)

Stock.	When established	Capital.	No. of shares.	Value	Paid up.	Reserve	At working account.	Date.	Last dividend.	Approximate Yield per cent. per annum at Present Quotation.	Closing quotations
International Cotton Manufacturing Co., Ld.	1895	Tls. 750,000	6) 10,000	Tls. 75	Tls. 75	Tls. 175,000	Tls. 8,372	30-9-09	Tls. 7½ for year end. 30-9-09 (10%)	10%	Tls. 50
Laou-kung-mow Cotton Spinning & Weaving Co., Ld.	1895	Tls. 800,000	8,000	Tls. 100	Tls. 100	none	Tls. 4,829	31-12-08	Tls. 6 for 1909	10%	Tls. 63
Soy Chee Cotton Spinning Co., Ld	1895	Tls. 1,000,000	2,000	Tls. 500	Tls. 500	f Tls. 31,173	Tls. 31,173		Tls. 35 for 1909	17%	Tls. 23
MISCELLANEOUS											
Hall's Asbestos Eastern Agency, Ld.	1895	£5,377.10s.	11) 8,604	12/6	12/6	£1,500	£797	31-12-09	15% for 1909		$8 sales
China-Borneo Co., Ld.	1903	$720,000	8) 60,000	$12	$12	$40,000	Nil.	31-12-08	5% for 1909	6%	$9
China Light & Power Co., Ld. / Do. do. Special Shares	1901 / 1907	$300,000	50,000 / 17) 50,000	$5 / $1	$5 / $1	none	$50,242	31-7-10	60 cents for year ending 28-2-06		$1 sales
China Provident Loan & Mortgage Co., Ld.	1898	a $1,250,000	7) 125,000	$10	$10	$81,000	$450	31-12-09	80 cents for 1910	11%	$7½
Dairy Farm Co., Ld.	1896	$300,000	40,000	$7½	$6	l $10,000 / $10,000	$1,850	31-7-09	$1.20 for year ending 31-7-09	6%	$19¼
Green Island Cement Co., Ld.	1897	$4,000,000	400,000	$10	$10	$14,000	$4,290	31-12-09	Interim of 15 cts. per share for 1910	15	$3½ buyers
H. Price & Co., Ld.	1907	$120,000	19) 15,000	$10	$10	none	$1,923.87	31-12-09	14% viz $1.40 for 1909	12%	$12
Hongkong Electric Co., Ld.	1889	$600,000	60,000	$10	$10	none	$11,798	28-2-10	A dividend of $1.20 per share and a bonus of 10 cts. per share for year end. 28-2-10.	6½	$23
Hongkong Ice Co., Ld.	1881	$125,000	5,000	$25	$25	k $150,000	$12,662	31-12-09	Interim of $2 per share for 1910	....	$157 ex. div.
Hongkong Rope Manufacturing Co., Ld.	1883	$600,000	$60,000	$10	$10	$7,000	$9,176	31-12-09	Interim of $1 per share for 1910	10½%	$18 sellers.
Maatschappij tot Mijn-, Bosch- en Landbouwexploitatie in Langkat	1902	Gs. 2,500,000	250,000	Glds. 10	Glds. 10	21 Tls. 547,500 / Tls. 547,500 / f Tls. 63,914	Tls. 316,682	31-12-08	Final Div. of Tls. 15 making in all Tls. 55 for 1910. A bonus of Tls. 2	6½	Tls. 112
Peak Tramways Co., Ld. / Do. (New)	1907	$750,000	25,000 / 50,000	$10 / $10	$10 / $10	$20,000	$3,014	30-4-10	80 cents on fully paid shares & 8 cents on $1 paid shares for year ending 30-4-10	5½ / 5	$13 / $1½ sales
Philippine Co., Ld.	1904	$750,000	75,000	$10	$10	none	Ps. 2,875	31-12-09	None	....	$8
Robinson Piano Co., Ltd.	1900	$200,000	22) 4,000	$50	$50	$5,000	$61,138	31-8-08	6% for ½ year ending 30.9.07	....	$50
Shanghai-Sumatra Tobacco Co., Ld.	1902	Tls. 600,000	9) 30,000	Tls. 20	Tls. 20	Tls. 24,820 / w Tls. 100,000	Tls. 5,250	31-10-08	No dividend this year	2	Tls. 115 sellers
South China Morning Post, Ld.	1903	$150,000	6,000	$25	$25	none	Dr. $31,096	31-8-09	None	....	$25 sellers
Steam Laundry Co., Ld.	1902	$100,000	20,000	$5	$5	none	$127,86	31-5-10	50 cents for year ending 30-5-10	8	$6½
Union Waterboat Co., Ltd.	1905	$500,000	15) 50,000	$10	$10	w $11,956	$687	31-12-10	5% for year ending 31-12-10	6½	$6¾ buyers
United Asbestos Oriental Agency, Ld.	1896	$100,000	10,000	$10	$4	$46,000	$471	31-5-10	15% per ordinary share for year ended 31-5-10	5	$11½ sellers
Watkins, Ltd.	1899	$100,000	10,000	$10	$10	none	$19,41	31-12-09	3½ for 1909	....	$3 sellers
Watson (A. S.) & Co., Ld.	1886	$900,000	90,000	$10	$10	e) $300,000 / $25,000	$1,776	31-12-09	3% for 1909	5%	$6¾ sales
Weismann Limited	1904	$30,000	3,000	$10	$10	$15,250	$67	31-7-10	10 per cent for year endg. 31.7.10.	8½%	$12 buyers
William Powell, Ld.	1901	$105,000	15,000	$7	$7	none	$782	30-6-09	30 cents making 80 cents for year ending June 30th 1906	....	$2½ buyers
Societe des Pulpes et Papeteries du Tonkin		660,000	13,200	50 Haiphong	35 Currency	....		....	First year	....	$36 (Hk.Cy.) sel.

Loans and Debentures.	Agents for the Loan.	Amount of Loan.	Par Value.	Outstanding Bonds.	When Payable.	Closing Quotations.
China Government, 7 per cent. Silver Loan 1886 E.	Hongkong & Shanghai Banking Corporation.	Tls. 767,200	Tls. 250	1914	Mar. 31st and Sept. 30th each year until Mar. 31st, 1917	par. (Plus interest)
Hongkong Hotel Company, Ltd., 6 per cent. Mortgage Debentures of 1899 ‡	Hongkong & Shanghai Banking Corporation.	$750,000	$500	§ all	Half yearly, June 30th and December 31st	par
Shanghai & Hongkew Wharf Company, Ltd., 6 per cent. Debentures of 1902	Hongkong & Shanghai Banking Corporation.	Tls. 543,900	Tls. 100	....	Half yearly, June 30th and December 31st	Tls. 103½
Astor House Hotel Company, Ltd., 8 per cent. Debentures of 1903	Hongkong & Shanghai Banking Corporation.	Tls. 500,000	Tls. 100	....	Half yearly, January 1st and July 1st	102½
Chinese Engineering & Mining Co., Ltd., 6 per cent. Debentures of 1903 †	---------	£500,000	¶	£431,960	Half yearly, June 30th and December 31st	par.
International Cotton Manufacturing Co., Ltd. 7% Debentures of 1901	Russo Chinese Bank	Tls. 500,000	Tls. 100	‖	Half yearly, March 31st and Sept. 30th	Tls. 97½.

a Authorised capital $2,000,000.
b Building Reserve Account.
c Capital Reserve Fund.
d Depreciation Fund.
e Equalisation of Dividend Fund.
f Exchange and Investment Fluctuation Account.
g Gold Reserve Fund
h Exchange and Reserve Account.
i Insurance Fund.
j Reinsurance Fund.
k Contingencies Account.
l Legal Reserve Fund.
m Authorised Capital
n Sinking Fund.
o Raw Sugar Reserve Account
p Premium on New Issue.
q Boiler Repairs and Renewals Account
r Repairs and Renewals Account.
s Silver Reserve Fund.
t Depreciation and Repair Account
u Underwriting Suspense Account.
v Special account
w Special Works Fund.
x Extra Reserve Fund.
y 72,560 owned by the Company.
z 7,200 shares unissued.
1 4,000 shares unissued.
2 First issue of 60,000, of which 10,411 unallotted.
3 5,000 shares unissued.
4 4,480 shares unissued.
5 5,000 shares unallotted.
6 1,616 shares unallotted.
7 75,000 shares unissued.
8 14,000 shares unissued.
9 17,000 shares unissued.
10 40,453 shares actually issued.
11 7,688 shares actually issued.
12 4,200 shares unissued.
13 500 shares unissued.
14 399 shares unissued.
15 22,277 shares unissued.
16 10,000 shares unissued.
17 Special shares are entitled to half of the profits.
18 Capital contributed by Chinese Government-Kuping Tls. 50,000.00.
19 12,000 issued only.
20 Typhoon and Floods Insurance Fund.
21 Special Cash Reserve.
22 1000 shares unissued.
23 10,000 shares unissued.
24 4595 part paid shares.
25 7,500 shares unissued.
26 10,000 shares unissued.
27 2,350 shares unissued.
28 25,000 shares unissued.
29 10,000 shares unissued.
30) 3,700 fully paid vendor shares and an option of 5,000 shares at par for 5 years granted to option holders.
* Based on last year's dividend.
** Based on present dividend.
§ 216 held by the Company.
‖ Only Tls. 134,000 taken up.
¶ In certificates of £20 and £100.
‡ Redeemable in 10 years, or at option of Comp. the Company giving 6 months notice.
† Redeemable at par at rate of £10,000 per annum from 31st December 1903 to 31st December 95.
*** Redeemable at par on 30th June, 1915.
Dr. Deficit.
†† Singapore dollars.
‡‡ 4,880 shares unissued.
X 16,756 shares unissued.
§§ 25,000 shares unissued.
4140 shares unissued.

ADDITIONAL SHANGHAI SHARE QUOTATIONS

March 3, 1911

STOCK	CLOSING QUOTATIONS	HIGHEST AND LOWEST PRICES DURING THE WEEK	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	LAST DIVIDEND	WHEN PAID
Vulcan Iron Works, Limited	Tls. 10		Tls. 500,000	1,000	Tls. 500	Tls. 500	—	Tls. 50 for year ended 31.8.06	Nov. 1, 1906
Yangtsze Wharf & Godown Co. Limited	Tls. 195		Tls. 250,000	2,500	Tls. 100	Tls. 100	Tls. 50,000	Tls. 15 for 1909	April 1, 1910
Wei-hai-wei Land & Building Co, Limited	Tls. 8 nominal		Tls. 91,850	3,674	Tls. 25	Tls. 25	—	Interim of $2.00 for 1909	Aug. 8, 1909
Anglo-German Brewing Co., Limited	$80 sellers		$100,000	4,000	$100	$100	none	5% for 1909	Mar. 12, 1910
Butler Tile Works, Limited	Tls. 23		Tls. 60,000	1,200	Tls. 50	Tls. 50	—	Tls. 3 for year ending 31.3.09	June 8, 1909
Major Bros., Limited	Tls. 40		Tls. 300,000	6,000	Tls. 50	Tls. 50	—		—
Oriental Ice Company, Limited	Tls. 25		Tls. 130,000	2,600	Tls. 50	Tls. 50	—	First year	—
Scharffs Oil and Bone Mills, Ltd	Tls. 40		Tls. 200,000	4,000	Tls. 50	Tls. 50	—	First year	—
Shanghai Ice Company, Limited	Tls. 13		Tls. 200,000	8,000	Tls. 25		—	6 for 1909	Mar. 14, 1910
Dunning & Company, Limited	$33 sales		$100,000	2,000	$50	$50	—	$5 year ending 28.2.08	Apr. 15, 1908
J. Llewellyn & Co, Limited	$60 nominal		$72,000	1,200	$60	$60	—	7.20 for 1909	May 1, 1910
Lane, Crawford & Company	$120		$250,000	2,500	$100	$100	—	10% for year 1909	Apr. 28, 1910
S. Moutrie & Company, Limited	$20		$250,000	5,000	$50	$50	—	$2 for year ended March 31, 1909	June 18, 1909
Weeks & Company, Limited	$23		$400,000	20,000	$20	$20	$40,000	Final of 6% making 10% for 1909	June 1, 1910
Dominion Rubber Co., Limited	Tls. 30		Tls. 225,000	22,500	Tls. 10	Tls. 4	—	First year	—
Senawang Rubber Estates Company, Limited	Tls. 50		Tls. 250,000	2,500	Tls. 100 Tls. 100	Tls. 100 Tls. 75	—	20% for year ending May 31 1910	May 9, 1910
Tebong Rubber and Tapioca Estates, Limited	Tls. 20		£76,000	76,000	£1	£1	—	50 cents for 1909	Sept. 2, 1910
Shanghai Mercury, Limited	Tls. 55		Tls. 105,500	2,100	Tls. 50	Tls. 50	—	Final of 6% making 16% year 1909	June 22, 1910
Shanghai Mutual Telephone Co., Limited	Tls. 64		Tls. 675,000	13,500	Tls. 50	Tls. 50	—	Tls. 3 for 1907	June 28, 1909
China Export, Import & Lumber Company, Limited	Tls. 75 sales		Tls. 350,000	500	Tls. 100	Tls. 50	—	5 p. c. for 1909	May 1, 1910
China Printing Co., Limited	Tls. 50		Tls. 750,000	1,500	Tls. 50	Tls. 50	—	7% 1908	Apr. 18, 1909
Hirano Mineral Water Co., Ltd.	Y. 10		Y. 125,000	5,000	Y. 25	Y. 25	—	10%=yen 2½ for year ending 30th Sept. 08 Y. 1.20 for year ended Feb. 29	Apr. 26, 1909
Shanghai Electric & Asbestos Company, Limited	$21 sellers		$125,000	5,000	$25	$25	—	8% for year ended Feb. 28, 09	June 21, 1909
Shanghai Electric Construction Company, Limited	£6[5	£11	£320,000	32,000	£10	£10	—	First year	—

DEBENTURES

LOANS		PRICE—PLUS ACCRUED INTEREST	AMOUNT OF LOAN	OUTSTANDING	NOMINAL VALUE	RATE OF INTEREST	WHEN PAYABLE
Shanghai Municipal Debentures	1892	Tls. 97	Tls. 45,400	Tls. 45,400	Tls. 100	5 %	June & Dec.
do	1893	,, 100	,, 46,200	" 32,000	" 100	5½ ,,	Do
do	1894	,, 106	,, 60,000	" 60,000	" 100	6 ,,	Do
do	1895	,, 97	,, 107,600	" 32,600	" 100	5 ,,	Do
do	1896	,, 97	,, 117,800	" 181,800	" 100	5 ,,	Do
do	1897	,, 97	,, 268,400	" 268,400	" 100	5 ,,	Do
do	1898	,, 106	,, 60,000	" 60,000	" 100	6 ,,	Do
do	1900	,, 100	,, 81,700	" 31,700	" 100	5½ ,,	Do
do	1901	,, 106	,, 77,000	" 200,000	" 100	6 ,,	Do
do	1902	,, 106	,, 145,000	" 150,000	" 100	6 ,,	Do
do	1903	,, 106	,, 430,500	" 490,500	" 100	6 ,,	Do
do	1904	,, 106	,, 164,500	" 214,500	" 100	6 ,,	Do
do	1905	,, 106	,, 285,900	" 820,000	" 100	6 ,,	Do
do	1907	,, 106	,, 500,000	" 250,000	" 100	6 ,,	Do
do	1908	,, 250 scarce	,, 650,000	" 354,400	" 250	6 ,,	Do
do	1909	,, 97½	,, 300,000	" 250,000	" 100	6 ,,	Do
Chinese Imperial Government Loan	1886 E	,, 102½	,, 354,400	"	" 100	7 ,,	Mar. & Sept
Shanghai Land Investment Co., Debentures	1892	,, 95	,, 250,000	" 250,000	" 100	6 ,,	May & Nov.
do	1894	,, 104	,, 250,000	" 250,000	" 130	6 ,,	Mar. & Sept.
do	1896	,, 104	,, 250,000	" 250,000	" 100	5 ,,	June & Dec.
do	1900	,, 95	,, 250,000	" 250,000	" 100	6 ,,	April & Oct.
do	1901	,, 104	,, 250,000	" 100,000	" 100	6 ,,	June & Dec.
do	1901	,, 104	,, 100,000	" 400,000	" 100	5 ,,	May & Nov.
do	1902	,, 104	,, 400,000	" 250,000	" 100	6 ,,	June & Dec.
do	1905	,, 104	,, 250,000	" 815,900	" 100	6 ,,	Do
Shanghai Waterworks Co., Debentures	1909	,, 104	,, 865,900	"	" 100	6 ,,	April & Oct.
Shanghai Gas Co., Debentures	1909	,, 106	,, 775,000	" 800,000	" 100	6 ,,	Do
Shanghai and Hongkew Wharf Co., Debentures	1902	,, 105 scarce	,, 1,000,000	" 799,800	" 100	5 ,,	June & Dec.
Astor House Co., Debentures	1905	,, 100	,, 750,000	" 500,000	" 100	6 ,,	Do
British Municipal Council, Hankow	1901	Sh. ,, 100	H'kow Tls 100,000	H'kow Tls 100,000	" 100	7 ,,	June & Dec.
Shanghai Club Debentures	1907	,, 100	Tls. 170,000	Tls. 170,000	" 100	7 ,,	Do
Country Club Debentures		,, 102½	,, 139,000	" 139,000	" 100	6 ,,	Do
do	1907	,, 102	,, 92,000	" 92,000	" 100	6 ,,	Do
Lane Crawford & Co., Debentures	1907	,, 105	,, 110,000	" 110,000	" 100	6 ,,	Mar. & Sept.
Anglo-French Land Debentures	1908	,, 102	,, 250,000	" 250,000	" 100	7 ,,	June & Dec.
Central Stores Ltd. Debentures	1908	,, 102½	,, 250,000	" 250,000	" 100	6 ,,	Do
Shanghai Mutual Tel. Co. Debentures	1909	,, 102½	,, 200,000	" 200,000	" 100	8 ,,	Do
						6 ,,	Do

SINGAPORE SHARE QUOTATIONS

(Courtesy Messrs. Fraser & Co., Brokers, Singapore, March 1st, 1911)

Date of Formation	Capital	Capital paid up	No. of Shares Issued	Issue Value	Paid up	Reserve	Last Dividend	Name	Buyers	Sellers.
								MINING		
1903	$300,000	300,000	30,000	10	10	....	10% interim	Belat Tin Mining Co., Ltd.	5.25	5.40
1907	$300,000	225,000	22,500	10	10	....	....	Bruang Ltd.	5.00	5.50
1901	$600,000	600,000	60,000	10	10	25,000	6% for year ending 30-4-09	Bruseh Hydraulic Tin Mining Co., Ltd.	5.00	6.00
1907	$400,000	375,000	37,500	10	10	....	....	Kanaboi, Ltd.	1.50	1.75
1901	£60,000	60,000	60,000	1	1	....	6/- interim 1910	Kinta Tin Mines, Ltd.	16.00	17.00
1905	$150,000	99,000	9,900	10	10	6,485.68	35% for year ending 31-12-07	Kuantan Tin Mining Co., Ltd.	2.00	3.00
1906	£120,000	120,000	120,000	1	1	....	1/- interim 1909	Lahat Mines Ltd.	8.75	9.25
1906	$450,000	450,000	45,000	10	10	....	....	Malacca Tin Dredging Co., Ltd.	....	1.50
1906	£30.000	30,000	30,000	1	1	....	....	Malaya and Siam Corporation Ltd.	....	7/6
1906	£250.000	179,500	500,000e	5/-	5/-	....	....	Pahang Consolidated Co., Ltd.	4/6	5/3
1907	£100,000	80,000	80,000	1	1	....	....	Pengkalen, Ltd.	3.25	3.50
1904	£100,000	80,000	80,000	1	1	....	6/- interim	Pusing Bahru Tin Mines, Ltd	7.00	7.50
1904	£120,000	100,000	100,000	1	1	6,000	6/- interim	Pusing Lama Tin Mines, Ltd	2.40	2.75
1907	$450,000	300,000	30,000	10	10	....	....	Rahman Hydraulic Tin, Ltd.	11.00	11.25
1905	£40,000	£40,000	40,000	1	1	....	....	Rahman Tin Co., Ltd.	10.00	10.50
1905	£27,000	27,000	27,000	1	1	....	1/- for 1907	Rambutan, Ltd.	....	9.00
1892	£200,000	200,000	200,000	1	1	4,873	1/2 paid April, 1910	Raub Aust. Gold Ming. Co., Ltd.	1.50	2.25
1905	£40,000	40,000	40,000	1	1	....	....	Redhills Tin Mining Co., Ltd.	....	3.50
1900	$110,000	110,000	22,000	5	5	....	3% for year ending 22-1-09	Royal Johore Tin Mining Co., Ltd.	....	1.00
1907	$550,000	500,000	50,000	10	10	....	....	Salak South, Ltd.	....	1.00
1907	£80,000	80,000	80,000	1	1	....	....	Sempam Tin Mines, Ltd.	1.00	1.50
1906	$850,000	850,000	85,000	10	10	25,000	5% interim 1910	Serendah Hydraulic Tin Ming. Co., Ltd.	4.50	5.25
1899	$230,000	230,000	23,000	10	10	....	3% for ½ year ending 31-12-08	Sipiau Tin Co., Ltd.	....	1.50
1909	$200,000	$150,000	15,000	10	10	....	....	Sungei Gau Tin Mining Co., Ltd.	....	3.00
1907	£90,000	70,000	70,000	1	1	....	6/- during 1910	Tekka, Limited.	22.00	23.00
1906	£150,000	150,000	150,000	1	1	....	1/- interim 1909	Tongkah Harbour Tin Dredging Co., Ltd.	13.75	14.25
1902	£160 000	160,000	160,000	1	1	....	7/- during 1910	Tronoh Mines. Ltd.	15.00	15.50

SINGAPORE SHARE QUOTATIONS.—(Continued.)

Date of Formation	Capital	Capital paid up	No. of Shares Issued	Issue Value	Paid up	Reserve	Last Dividend	Name	Buyers	Sellers
								STERLING RUBBER		
1909	£85,000	78,225	782,250	2/-	2/-	....	....	Allagar Rubber Estates, Ltd	5/5	6/-
1905	£150,000	150,000	1,500,000	2/-	2/-	....	75% interim	Anglo-Malay Rub. Co., Ltd.	25/-	1.6.6
1909	£50,000	47,000	470,000	2/-	2/-	....	....	Batang Malaka Rubber Estates, Ltd.	3/-	3/5
1904	£30,000	26,750	26,750	1	1	....	35% interim	Batu Caves Rub. Co., Ltd.	15.10.0	16.10.0
1906	£80,000	67,800	67,800l*	1	1	....	2½% for 1909	Batu Tiga (Selangor) Rubber Co., Ltd.	5.2.6	5.10.0
1909	£100,000	80,000	57,816n*	1	1	....	6½% for 18 months ending 30-6-10	Bukit Kajang Rubber Estates, Ltd	2.17.6	3.0.0
1907	£30,000	25,500	24,000	1	1	....	30% for year ending 30-6-10	Bukit Lintang Rubber Estates, Ltd	4.10.0	5.0.0
			6,000	1	5/-	....	....	" " " part paid	3.10.0	4.0.0p.
1903	£70,000	66,700	66,700	1	1	2,000	25% interim	Bukit Rajah Rubber Co., Ltd.	15.10.0	16.0.0
1906	£35,000	35,000	35,000	1	1	....	....	Castlefield (K.) R. Estate, Ltd.	6.5.0	6.10.0
1909	£225,000	176,086	1,760,860	2/-	2/-	....		Chersonese (F.M.S.) Estates, Ltd	4/2	4/9
1904	£16,000	16,000	100,000	2/-	2/-	....	50% interim	Cicely Rubber Estates Co., Ltd.	2.9.0	3.2.0
			60,000	2/-	2/-	....	54½% interim	" " " " 5% *Pref.*	2.9.0	3.2.0
1905	£75,000	62,007	620,070	2/-	2/-	1,000	50% interim	Consolidated Malay Rub. Estates, Ltd.	1.5.9	1.7.6
1906	£110,000	110,000	110,000	1	1	....	50% interim for 1910	Damansara (Selangor) Rubber Co., Ltd.	7.15.0	8.5.0
1903	£600,000	447,200	447,200a	1	1	....	....	Duff Development Co., Ltd	13/6	14/6
1909	£45,000	42,500	425,000	2/-	2/-	....	15% interim	Edinburgh Rub. Estates, (Selangor) Ld.	11/6	12/6
1907	£80,000	70,000	70,000	1	1	....	25% interim	Golconda Rubber Co., Ltd.	6.5.0	6.17.6
1909	£82,000	£82,000	820,000	2/-	2/-	....	....	Heawood Tin and Rubber Estate, Ltd.	5/-	5/6
1906	£310,000	307,770	307,770	1	1	8,784	30% interim	Highlands & Lowds. Para Rub. Co., Ltd.	5.15.0	6.0.0
1904	£50,000	30,000	30,000	1	1	2,500	100% for year ending 30-6-10	Inch Kenneth Rubber Estates, Ltd	14.0.0	14.15.0
1909	£200,000	143,750	775,000p	2/-	1/-	....	15% for eleven monhts end. 30-6-10	Kam. (P.) R. & T. Co., Ltd. "A" Shares	6/4½	7/- p.
			105,000	1	1	....		" " " " "B" "	7/9	8/3-
1905	£70,000	70,000	70,000	1	1	....	20% interim	Kapar Para Rubber Estates, Co., Ltd	9.7.6	9.15.0
1909	£35,000	£21,125	95,000	2/-	2/-	....	....	Kota Tinggi Johore Rubber Co., Ltd	....	2/6
			155,000	2/-	1/6	....	....	" " " "	1/1	1/6 p.
1906	£180,000	180,000	180,000	1	1	....	75% interim	Kuala Lumpur Rubber Co., Ltd	8.7.6	8.15.0
1907	£100,000	100,000	1,000,000	2/-	2/-	....	30% interim	Labu (F. M. S.) Rub. Co., Ltd	15/3	16/3
1907	£320,000	£269,780	198,930v	1	1	3,000	10% interim	Lanadron Rubber Estates, Ltd	4.17.6	5.2.6
1908	£125,000	85,000	60,000o*	1	1	....	10% interim	Ledbury Rubber Estates Ltd.	3.12.6	3.17.6
			40,000	1	12/6	....	10% interim	" " " part paid	2.0.0	2.5.0 p.
1895	£1 0,000	98,324 8/-	883,244w	2/-	2/-	4,000	150% interim	Linggi Plantations Ltd.	2.12.6	2.15.0
			10,000	1	1	....	7% for 1909	" " " 7% *Pref.*	....	nom.
1907	£160,000	140,000	1,400,000k	2/-	2/-	....	10% interim	London Asiatic R. & Produce Co., Ltd.	14/-	15/-
1909	£220,000	147,500	50,000	1	1	....	....	Lumut Rubber Estates, Ltd.	....	nom.
			150,000	1	13/-	....	....	" " " " part paid	1.0.0	1.5.0 p.
1906	£400,000	300,000	185,000	1	1	....	10% interim for 1909	Malacca Rubber Plants., Ltd	9.12.6	10.0.0
			115,000	1	1	....	" " "	" " " " 7½% *Pref.*	9.7.6	10.0.0
1909	£210,000	181,250	1,812,500	2/-	2/-	....	....	Merlimau Rubber Estates, Ltd	6/-	6/6
1910	£250,000	250,000	250,000	1	1	....	....	Mount Austin (J.) Rubber Estates, Ltd.	1.12.0	1.16.0
1903	£30,000	22,500	225,000	2/-	2/-	....	75% interim	Pataling Rubber Estates Synd. Ltd	3.2.6	3.5.0
1906	£85,000	85,000	850,000	2/-	2/-	....	12½% interim	Perak Rubber Plantations, Ltd	9/-	10/-
1909	£60,000	41,150	15,000s*	1	1	....	....	Rembia Rubber Estates Ltd.	....	nom.
			35,000	1	15/-	....	....	" " " 6% *Cum. Pref.*	10/-	12/6 p.
1904	£25,000	19,092	17,732u	1	1	....	50% for year ending 30-9-10	Sagga Rubber Company, Limited	12.0.0	13.0.0
			2,268	1	12/-					
1905	£100,000	100,000	71,378	1	1	....	....	Sapong Rub. and Tobacco Estates, Ltd.	1.6.3	1.10.0
			28,622 ‡							
1907	£100,000	100,000	100,000	1	1	....	15% interim	Seafield Rubber Co., Ltd	6.15.0	7.5.0
1898	£30,000	30,000	300,000	2/-	2/-	3,000	225% interim	Selangor Rubber Co., Ltd	3.1.3	3.5.0
1909	£50,000	36,000	40,000	1	18/-	....	....	Sendayan (F. M. S.) Rubber Co., Ltd	1.10.0	1.17.6p.
1906	£65,000	65.000	65,000	1	1	....	10% interim	Shelford Rubber Estate, Ltd	3.16.3	4.0.0
1909	£150,000	78,500	14,000i‡	1	1	....	....	Sialang Rubber Estates, Ltd	1.12.6	1.17.6p.
			86,000	1	15/-					
1909	£120,000	100,000	1,100,000	2/-	2/-	....	12½% for year ending 31-6-10	Singapore Para Rubber Estates, Ltd.	6/-	7/-
1906	£200,000	192,500	1,925,000	2/-	2/-	....	17½% for year ending 31-3-10	Straits Settlements (B.) Rub. Co., Ltd	7/10½	8/6
1907	£60,000	50,000	50,000p‡	1	1	....	....	Sungei Choh Rub. Estate, Co. Ltd	5.2.6	5.10.0
1906	£110,000	100,000	1,000,000	2/-	2/-	....	25% interim	Sungei Kapar Rubber Co., Ltd	14/6	15/3
1907	£70,000	60,500	60,500	1	1	....	....	Sungei Salak Rubber Co., Ltd	4.15.0	5.0.0
1904	£60,000	59,500	59,500	1	1	....	12½% interim	Sungei Way (Selangor) Rub. Co., Ltd	6.2.6	6.15.0
1908	£150,000	100,560	100,560	1	1	....	....	Tebrau (Johore) Rubber Co	3.10.0	3.17.6
1907	£200,000	200,000	200,000	1	1	....	5% interim	United Serdang (S.) R. Plantations, Ltd.	5.16.3	6.3.6
1908	£85,000	78,612	786,120	2/-	2/-	....	20% interim	United Sumatra Rubber Estates, Ltd.	10/3	11/3
1904	£60,000	50,600	506,000	2/-	2/-	....	75% interim	Vallambrosa Rubber Co., Ltd.	2.0.3	2.2.0
								DOLLAR		
1909	$120,000	105,000	105,000w*	1	1	....	....	Alor Gajah Rubber Estate, Ltd	1.90	2.00
1909	$750,000	700,000	140,000	5	5	....	....	Ayer Panas Rubber Estates, Ltd.	7.00	7.25
1905	$200,000	151,500	151,200	1	1	5,250	70% interim	Balgownie Rub. Estate, Ltd.	12.00	12.50
1910	$500,000	500,000	50,000	10	10	....	....	Bukit Timah Rubber Estates, Ltd.	12.00	12.50
1910	$750,000	700,000	70,000	10	10	....	....	Changkat Serdang Estates, Ltd.	7.50	8.00
1909	$300,000	300,000	300,000	1	1	....	8% for year ending 31/10/10	Glenealy Plantations, Ltd	1.75	1.90
1910	$200,000	164,285	32,857m‡	5	5	....	....	Haytor Rubber States, Ltd	6.00	7.50
1910	$600,000	210,000	30,000	10	7	....	....	Henrietta Estates, Ltd.	2 dis.	1.00 dis.
1909	$250,000	200,000	20,000	10	10	....	....	Indragiri (S.) R. and Gutta P. Co., Ltd.	9.00	10.00
1910	$350,000	300,000	300,000s‡	1	1	....	....	Jimah Rubber Estates, Ltd	0.55	0.65
1910	$350,000	291,000	11,000	5	5	....	....	Kelemak Rubber Estate, Ltd.	3.00	4.00
			59,000	5	4	....	....	" " " part paid	3.00	2.00 dis.
1907	$300,000	170,000	20,000	10	8.50	....	....	Kombok Rubber Co., Ltd	15.00	p. nom.
1910	$1,000,000	1,000,000	500,000	2	2	....	....	Malakoff Rubber Co., Ltd.	2.20	2.35
1910	$1,250,000	1,250,000	250,000	5	5	....	....	New Singapore Rubber Co., Ltd.	6.00	6.50
1910	$700,000	600,000	600,090q‡	1	1	....	....	Nyalas Rubber Estates	0.45	0.50
1909	$400,000	400,000	80,000	5	5	....	5% interim	Pajam Limited	11.75	12.00
1909	$200,000	200,000	200,000	1	1	....	....	Pantai, Limited	1.20	1.35
1909	$500,000	450,000	45,000	10	10	....	17½% for year ending 31-8-10	Pegoh, Limited	30.50	31.50
1910	$450,000	295,000	45,000f‡	5	5	....	....	Port Dickson Rubber Co., Ltd	8.00	9.00
			35,000	5	2	....	....	" " " part paid	1.50	2.00 p.
1910	$5,000,000	3,675,000	360,000	10	2	....	....	Pulau Bulang Rub. & Produce Co., Ltd.	1.75	1.80
			7,500	10	10	....	....	" " " " "	....	....
1910	$200,000	150,000	50,000	1	1	....	....	Pulo Daat Plantations, Ltd.	0.75	1.00
1904	$100,000	100,000	50,000	2	2	20,000	100% interim	Sandycroft Rubber Co., Ltd	24.00	25.00
1910	$1,500,000	1,500,000	1,500,000	1	1	....	....	Sembawang Rubber Plantations, Ltd.	0.60	0.70
1903	$450,000	417,300	208,650	2	2	....	25% interim	Singapore & Johore Rub. Co., Ltd	13.50	14.00
1909	$250,000	100,000	10,000	10	10	....	....	St. Helena Rubber Coy., Ltd.	....	26.00
1910	$600,000	450,000	225,000n‡	2	2	....	....	Sungei Bagan Rubber Co., Ltd.	1.25	1.40
1909	$200,000	165,000	33,000	5	5	....	....	Teluk Anson Rubber Estate, Ltd.	5.25	5.50
1910	$425,000	371,700	371,700r‡	1	1	....	....	Ulu Pandan (Singapore) Rub. Estates Ltd.	0.70	0.80
1909	$1,000,000	737,500	737,500y*	1	1	....	....	United Singapore Rubber Estates, Ltd.	1.65	1.72½
								GENERAL		
1903	£400,000	400,000	400,000	1	1	....	....	Singapore Electric Tramways, Co., Ltd.	3/3	4/3
1907	$1,500,000	1,065,150	25,000d*	10	10	------	10% for year ending 31/12/08	Eastern Smelting Co. Ltd.	....	10.00 n.
			116,450	10	7	....	10% for year ending 31-12-08	" " " part paid	6.75	7.00
1898	$360,000	360,000	36,000	10	10	170,000	10% interim	Fraser & Neave, Ltd.	36.00	....
1905	$2,400,000	2,400,000	18,000	100	....	75,000	2½% for year ending 31-10-08	Howarth Erskine, Ltd.	....	54.00
			6,000	100	....	....	7% for year ending 31-10-08	" " 7% *Pref*	....	91.00
1896	$1,000,000	1,000,000	6,000	100	100	40,600	12% for year ending 31-12-09	Katz Brothers, Ltd. *Deferred*	....	125.00
			4,000	100	100	....	8% " " " " 09	" " 8% *Cum. Pref*	....	nom.
1901	$34,000	34,000	3,400	10	10	....	20% for year ending 31-10-09	Maynard & Co., Ltd.	24.00	25.00
1899	$875,000	875,000	6,000	100	100	175,000	5% for year ending 31/12/09	Riley, Hargreaves & Co., Ltd	80.00	82.50
			2,750	100	100	....	7% for year ending 31/12/09	" " " " 7% *Pref*	107.50	....
1897	£3,500,000	3,500,000	2,500,000	1	1	1,120,000	22½% for 1909	Shell Transport and Trading Co., Ltd	4.12.6	4.17.6
			100,000	10	10	....	....	" " " " " *Pref.*	11.5.0	12.0.0
1903	$600,000	250,000	25,000n	10	10	....	12½% for year ending 30-6-10	Singapore Cold Storage Co., Ltd	31.00	32.00
1891	$30,000	30,000	600	50	50	23,000	10% for year ending 31-7-09	Singapore Dispensary Ltd.	52.50	55.00
1884	$200,000	200,000	2,000	100	100	75,000	15% interim	Straits Ice Co., Ltd	....	165.00
1890	$1,000,000	623,000	4,980	100	100	760,000-1/7	5% interim	Straits Steam Ship Co., Ltd.	235.00	250.00
			2,500	100	50			" " " " " part paid	95.00	100.00 p.
1887	$3,000,000	3,000,000	300,000	10	10	805,400½ / 1,450,000	10% & 5% bon. for half year ending 30-9-10	Straits Trading Co., Ltd	54.00	54.50

DEBENTURES

Name	Buyers	Sellers
Howarth Erskine, Ltd. 6%........$600,000	....	par.
Riley, Hargreaves & Co., Ltd. 6%.284,000	2½%	3½% p.
Singapore Electric Tramways, Co., Ltd. 5%........£350,000	....	....
Singapore Municipal 5% 1,878,000	....	nom.
" " 4½% of 1907...1,600,000	6%	7% p.
" " 4½% of 1909....1,000,000	7%	8% p.
" " 4% 602,900	....	7% dis

a { 152,800 unissued; 43,949 6% debenture
e { 54,500 £1 Prefs issued; 45,500 £1 " unissued; 100,000 5/- Ord. "
f 3,250 unissued
k £40,000 6% Debentures 200,000 unissued

p 175,000 unisd "A" shares
q Sundry Reserves.
r "
u 5,000 issued £1 prem.
v 50,220 issued
w 16,756 "
b* 221 7½% Debentures
d* 8,550 unissued
o* 25,000 unissued

l* £10,000 Convertible 6% Debentures issued 12,200 shares unissued
n* 20,000 unissued
y* 262,500 "
s* 10,000 "
i‡ 50,000 "
l‡ 6% Deb. Stock Convble.

m‡ 7,143 unissued.
n‡ 75,000 unissued.
o‡ 67,750 "
p‡ 10,000 "
q‡ 100,000 "
r‡ 53,300 "
s‡ 50,000 "
t† 132,000 "

YOKOHAMA SHARE QUOTATIONS

COURTESY A. C. HUTTON POTTS, SHARE AND GENERAL BROKER, YOKOHAMA, FEBRUARY 22, 1911.

STOCKS.	CAPITAL.	NO. OF SHARES.	ISSUE VALUE.	AMOUNT PAID UP.	DATE.	LAST DIVIDEND.	FOR TERM.	CLOSING QUOTATION.
Brett & Co., Ltd.	-Y- 28,000	2,800	-Y- 10	-Y- 10	31-12-09	12½%	for 1 year	15 Sales
Club Hotel, Ltd.	185,000	1,850	100	100	31-3-10	6%	for 1 year	70 Sales
Grand Hotel, Ltd.	500,000	5,000	100	100	31-12-10	3%	for ½ year	90 Sales.
Helm Bros., Ltd.	186,000	3,720	50	50	31-12-10	17½%	for 1 year	95 Sales.
Langfeldt & Co., Ltd.	100,000	2,000	50	50	31-12-10	4%	for ½ year	60 Sellers.
C. Nickel & Co., Ltd. A	1,000,000	40,000	25	25	31-10-10	14%	for 1 year	60 Sellers.
Thwaites, Limited	100,000	2,000	50	50	First Year	—	—	55 Sales.
Yokohama Engine and Iron Works B	500,000	10,000	50	50	31-5-09	—	for 1 year	40 Buyers.
Oriental Hotel, Ltd., Ordinary	250,000 (Ordinary and Preference)	3,000	50	50	31-8-07	12%	for 1 year	50 Nominal.
Oriental Hotel, Ltd., Preference		2,000	50	50		8%	for 1 year	52:50 Nominal.
The Union Estate and Investment Co., Ltd. C	1,000,000	10,000	100	100	30-9-09	7%	for 1 year	100 Nominal.
The Clifford Wilkinson Tansan Mineral Water Co., Ltd. D	500,000	5,000	100	100	31-12-09	7%	for 1 year	100 Buyers.

A 570,000 unissued.
C 475,000 unissued.

B 390,000 issued.
D 375,800 issued.

DEBENTURE LOANS.	AMOUNT OF LOAN.	FACE VALUE OF DEBENTURES.	RATE OF INTEREST.	INTEREST PAYABLE.	CLOSING QUOTATION.
Yokohama United Club	230,000.00	100.00	6%	30 June and 31 Dec.	102 Nominal.
Oriental Hotel, Limited	350,000.00	100.00	8%	1 April and 1 Oct.	103 Sales.
Union Estate and Investment Co., Limited	250,000.00	100.00	6%	30 June and 31 Dec.	100 Sales.

JAPANESE STOCKS.	FACE VALUE.	AMOUNT PAID UP.	LAST DIVIDEND.	DIVIDEND PAYABLE.	14TH JANUARY, 1911.	22ND FEBRUARY, 1911.
Bonds & Debentures.						
Exchequer Bonds 3rd issue	-Y-100	-Y-100	5%	March and Sept.	-Y-101.70	101.70
Railway Bonds (Ko-Gobu)	100	100	5%	June and Dec.	,, 99.70	99.70
4% Imperial Loan Bonds (1st issue)	100	100	4%	June and Dec.	,, 93.60	94.20
4% Imperial Loan Bonds (2nd issue)	100	100	4%	March and Sept.	,, 94.40	94.95
Special 5% Bonds (issued 1906)	100	100	5%	June and Dec.	,, 100.00	100.00
Yokohama Water Works Bonds	100	100	6%	June and Dec.	,, 101.50	102.00
Yokohama City Public Loan Bonds	100	100	6%	March and Sept.	,, 103.80	104.00
Railways & Electric Trams.						
Tokyo Railway Company, Limited	50	50	7%	June and Dec.	,, 72.15	72 60
Yokohama Electric Tramway Company, Limited	50	50	5%	July and Jan.	,, 54.30	54.50
Keihin Electric Tramway Company, Limited	50	50	4%	June and Dec.	,, 42.50	42.50
Cotton Spinnings.						
Kanegafuchi Cotton Spinning Company, Limited	50	50	12%	July and Jan.	,, 106.20	106.95
Fuji Gassed-yarn Company, Limited	50	50	6%	June and Dec.	,, 91.35	91.45
Tokyo Cotton Spinning Company, Limited	50	50	5%	July and Jan.	,, 42.00	43.00
Imperial Hemp Weaving Company, Limited	50	50	10%	July and Jan.	,, 70.00	73.00
Nisshin Boseki Kabushiki Kaisha	50	17½	Nil	June and Dec.	,, 12.00	11.60
Sugar & Beer Cos.						
Dai-nippon Sugar Refinery Company, Limited	50	50	Nil	May and Nov.	,, 47.00	50.00
Ensuiko Sugar Refinery Company, Limited	50	20	20%	June and Dec.	,, 51.50	52.75
Dai-nippon Beer Company, Limited	50	50	12%	July and Jan.	,, 81.00	81.75
Kirin Brewery Company, Limited	50	50	7%	July and Jan.	,, 52.50	52.00
Docks & Steamships.						
Yokohama Dock Company, Limited	50	33	12%	June and Dec.	,, 60.50	60.50
Nippon Yusen Kaisha	50	50	10%	May and Nov.	,, 97.25	102.00
Hokkaido Tanko S. S. Company, Limited	50	50	Nil	July and Jan.	,, 26.70	28.50
Miscellaneous.						
Tokyo Electric Light Company, Limited	50	50	12%	June and Dec.	,, 81.95	81.30
Tokyo Gas Company, Limited	50	50	12%	July and Jan.	,, 81.60	81.65
Yokohama Union Electric Light Company, Limited	50	50	13%	June and Dec.	,, 106.50	107.00
Fuji Paper Mills	50	50	6%	June and Dec.	,, 35.00	36.40
Hoden Petroleum Company, Limited	50	50	12%	April and Oct.	,, 95.95	60.20
Tokyo Rope Manufacturing Company, Limited	50	50	16%	June and Dec.	,, 107.00	107.00
Tokyo Stock Exchange Company	50	50	15.04%	June and Dec.	,, 162.00	165.90

BANGKOK SHARE QUOTATIONS

(COURTESY MESSRS. EDWARDS & CO., BANGKOK, SIAM.) JANUARY 26, 1911.

NAME.	BUYERS.	SELLERS.	LAST SALES.	ESTABLISHED.	CAPITAL.	NO. OF SHARES.	ISSUE VALUE.	AMOUNT PAID UP.	RESERVE FUND	LAST DIVIDEND
Siam Electricity Co., Ltd.	Tcs. 300	Tcs. 325	Tcs. 325	1901	£ 300,000	80,000	£ 10—	£ 300,000	Tcs. 491,338	12% Tcs. 4 bon.
Paknam Railway Co., Ltd.	,, 200	,, —	,, 220	1893	Tcs. 400,000	5,000	Tcs. 80	Tcs. 400,000	,, 37,566	14%
Siam Tramway Co., Ltd.	,, —	,, —	,, 108	1905	,, 1,450,000	6250 Shares 7250 Deb. 1000 P. Shares	,, 100	,, 2,230,000 (with Meklong Railway)	,, 1,875	—
Meklong Railway Co., Ltd.	,, 90	,, 100	,, 90	1907	,, 2,230,000					
Bangkok Manufact. Co., Ltd.	,, —	,, —	,, 132	1898	,, 400,000	22,300	,, 100	,, 223,000	,, 28,000	5%
Bangkok Dock Co., Ltd.	,, —	,, 135	,, 135	1865	,, 1,000,000	4.000	,, 100	,, 400,000	,, 60,000	7% per for 6 months
Siam Steam Packet Co.	,, 80	,, 909	,, 90	1898	,, 190 000	10,000	,, 100	,, 950,000	,, 220,000	
Siam Commercial Bank	,, 1,000	,, 1,500	,, 1,000	1906	,, 3,000,000	8,800	,, 50	,, 190,000	,, 84,000	5%
Menam Motor Boat Co.	,, 75	,, 90	,, 90	1905	,, 200,000	3.000	,, 1,000	,, 3,000.000	,, 338,850	4% for 6 mos.
Transport Co., Motor	,, —	,, 75	,, 100	1906	,, 200,000	2,000	,, 100	,, 200,000	—	none
Jenderata Rubber Co *	,, —	,, 325—Ticals	,, 825 (for six calls)	1906	£ 40,000	2,000	,, 100	,, 200,000	—	—
Bagan Rubber Co.	,, —	,, 100	,, 100	1907	Tcs. 300,000	4,000	£ 10	£ 7.-paid	—	—
Siam Steam Navigation Co., Ltd.	,, 300	,, 325	,, —	1909	,, 2,000,000	3,000	Tcs. 100	Tcs. 40 per share	—	—
Siam Stone Works, Ltd.	,, —	,, —	100	1909	,, 350,000	10,000	,, 200	—	,, 10,000	—
Kombok Rubber Co.	,, 25	,, 85	32	1906	$ 300,000	3,500	,, 100	,, 350,000	—	6% half year
						30,000	$ 100	$7, per Share	—	—

PHLIPPINE SHARE REPORT

COURTESY B. A. GREEN, GENERAL SHARE, BOND AND INVESTMENT BROKER.—*Manila, P. I., March 10, 1911.*

Name	Closing Quot'n	When Incorporated	Authorized Capital	Issue Value of Shares	Number of Shares	Number of Shares Subscribed	Paid up	Reserve Fund	Working Account	Date	Last Dividend
American Drug Store	....	1908	₱ 100,000	₱1,000	100	51	₱1,000	₱5,000	₱ 50,000	June 30, 1910.	....
Antamok Valley Mining Co.	₱0.40	1909	500,000	1	500,000	320,000	1	.....	....	....	....
Banco Español Filipino	₱255.	1851	3,000,000	200	15,000	15,000	200	495,342	....	....	First year
Bayhay Valley Oil Co.	100.	1909	100,000	100	1,000	....	100	.....	....	June 1, 1911.	10% for 1910
Benguet Commercial Co.	85.	1908	200,000	100	2,000	736	100	.....	....	....	First year
Benguet Consolidated Mining Co.	0.50	1903	2,000,000	2	1,000,000	495,000	2	.....	....	....	8% for 1906
Bua Mining Co.											
Common	90.	1905	750,000	100	7,000	3,366	100	.....	....	....	....
Preferred	140.			100	500	500	100				
Cadwallader-Gibson Lumber Co.	....	1908	1,000,000	100	10,000	8,650	100	.....	....	....	....
Camote-Clayton Mining Co.	....	1909	400,000	10	40,000	26,000	10	.....	....	....	....
Compania Maritima	70.00	1894	510,000	100	5,100	5,100	100	.....	....	....	First year
East Batan Coal Mining Co.	33.	1909	3,000,000	50	60,000	40,000	50	.....	....	....	5% for 1910
El Varadero de Manila	86.00	1885	450,000	100	4,500	4,500	100	.....	....	....	First year
Electrical Supply Co.	....	1909	100,000	100	1,000	280	72	291,890	134,715	Aug. 31, 1910.	7% for 1909-10
Export & Import Lumber Co.	....	1908	200,000	200	1,000	1,000	200	.....	....	....	First year
Escolta Press Inc.	100.	1907	50,000	100	500	320	100	.....	....	....	....
Fabrica de Hielo de Manila	58.	1894	350,000	50	7,000	7,000	50	.....	....	....	9% for 1910
Germinal Cigar Factory	500.00	1900	1,500,000	500	3,000	3,000	500	.....	....	....	14% for 1910
H. E. Heacock & Co.	100.	1909	100,000	100	1,000	800	100	.....	....	....	12% for 1910
Headwaters Mining Co.	10.	1908	600,000	10	60,000	59,800	10	.....	....	....	12% for 1910
Insular Lumber Co.	140.	1907	2,000,000	200	10,000	9,000	200	.....	....	....	....
Lepanto Mining Co.	....	1906	1,000,000	100	10,000	8,000	100	.....	....	....	....
Juan Seiboth Co.	....	1908	150,000	20	7,500	500	20	.....	....	....	....
La Concha Button Factory	90.	1905	75,000	100	750	530	100	.....	....	....	....
Los Banos Improvement Co.	150.	1908	100,000	200	500	500	200	.....	....	....	15% for 1909
Lambert, Springer Co.	....	1908	200,000	1,000	200	80	1,000	.....	....	....	16% for 1908
Luzon Stevedoring Co.	25.	1909	250,000	25	10,000	4,200	25	.....	....	....	....
Luzon Sugar Refining Co.	....18.	1882	700,000	100	7,000	7,000	100	.....	....	....	....
Manila Electric Ry. & Light Co.	150.00	1903	12,000,000	200	60,000	....	200	.....	....	....	3% for 1907
Manila Hotel Co.	100.	1909	400,000	100	4,000	3,500	100	.....	....	....	4% for 1910
Metropole Hotel Co. Ltd.	13.	1910	150,000	10	15,000	12,000	10	.....	....	....	Under Construction
Mindanao Herald Publishing Co.	....	1907	15,000	100	150	75	100	2,000	....	Mar. 16, 1910.	15% for 1910
Muyot Mining Co.	3.30	1909	500,000	10	50,000	....	10	.....	....	....	½% for 1908
Paracale Gold Dredging Co.	15.	1907	£10,000	£1	10,000	10,000	£1	.....	....	....	First Year
Paracale Ext. Gold Dredging Co.	10.	1909	₱450,000	₱10	45,000	....	₱10	.....	....	....	£1 for 1908-9
Philippine Publishing Co.	120.	1907	600,000	200	3,000	2,187	200	.....	....	....	First Year
Philippine Co., Ltd.	5.	1904	750,000	10	75,000	75,000	10	.....	....	....	10% for 1910
Philippine Gold Dredging Co.	8.	1907	200,000	10	20,000	20,000	10	.....	....	....	....
Philippine Exploration Co.	....	1908	2,000,000	10	200,000	120,000	10	.....	....	....	....
Port Banga Lumber Co.	....	1908	100,000	100	1,000	934	100	.....	40,000	Oct 1, 1910.	....
Rosenstock Publishing Co.	....	1908	75,000	10	7,500	6,000	10	.....	....	....	....
San Nicolas Iron Works	100.	1901	300,000	500	600	600	500	.....	....	....	15% for 1903
San Mauricio Gold Mining Co.	....	1908	4,000,000	200	20,000	20,000	200	.....	....	....	....
Sanitary Steam Laundry	20.	1908	100,000	20	5,000	3,900	20	.....	....	....	5% for 1910
Tarlac Railway Co.	25.00	1906	150,000	100	1,500	1,500	100	.....	....	....	....
Tumbaga Mining Co.	0.35	1910	2,000,000	2	1,000,000	772,0000	2	.....	....	....	Reorganized 1910
Union Hemp Machine Co.	....	1909	50,000	10	5,000	2,600	10	.....	....	....	First Year
Walter E. Olsen Co.	100.	1909	500,000	100	5,000	2,033	100	.....	....	....	First Year
Zamboanga Cold Storage Co.	125.	1903	40,000	100	400	200	100	.....	....	....	20% for 1909

PHILIPPINE BONDS

	Dated	Authorized	Issued	Outstanding	Par Value	Rate of Int.	When Payable	Last Quotation
Philippine Friar Land Bonds	Feb. 1st, 1904	$7,000,000	$7,000,000	$7,000,000	$ 100	4%	Feb. 1, 1914	101½
Public Works and Permanent Improvement Bonds	March 1, 1905	$5,000,000	$2,500,000	$2,500,000	$ 100	4%	March 1, 1915	101½
Do.	Feb. 1, 1906	....	$1,000,000	$1,000,000	$ 100	4%	Feb. 1, 1916	101½
Do.	Aug. 1, 1909	....	$1,500,000	$1,500,000	$ 100	4%	Aug. 1, 1919	101½
Manila Sewer and Water Works Improvement Bonds	June 1, 1905	$4,000,000	$1,000,000	$1,000,000	$ 100	4%	June 1, 1915	101½
Do.	Jan. 2, 1907	....	$2,000,000	$2,000,000	$ 100	4%	Jan. 2, 1917	101½
Do.	May 17, 1909	....	$1,000,000	$1,000,000	$ 100	4%	May 17, 1919	101½
*Philippine Railway First Mortgage Four per cent Thirty Year Sinking Fund Gold Bonds	July 1, 1907	$15,000,000	$6,439,000	$6,539,000	$1000	4%	July 1, 1937	95
B. P. O. Elks. First Mortgage 7% Five-Fifteen Year Sinking Fund Gold Bonds	July 1, 1908	$75,000	$45,000	$45,000	$ 50	7%	July 1, 1932	50½

*Payment of interest guaranteed until maturity or redemption by the Philippine Government.

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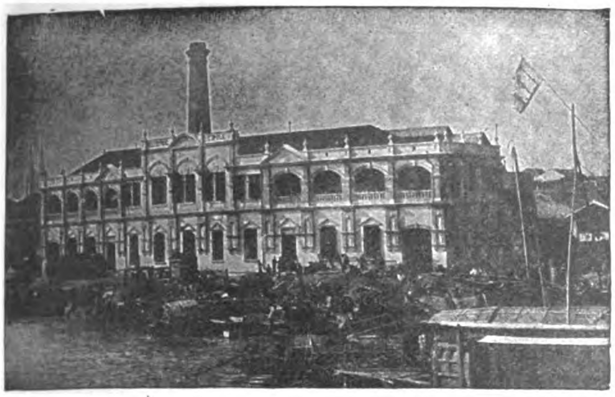

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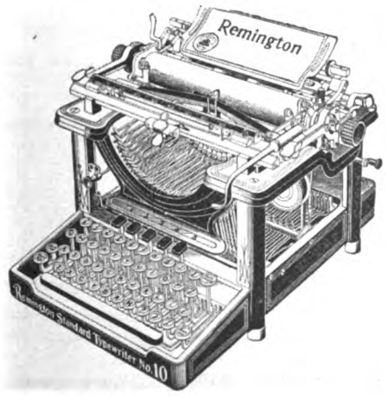

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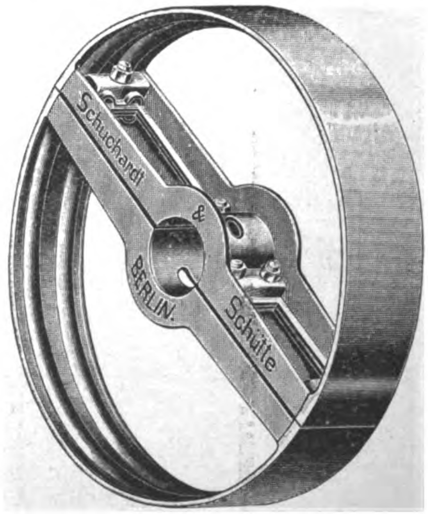

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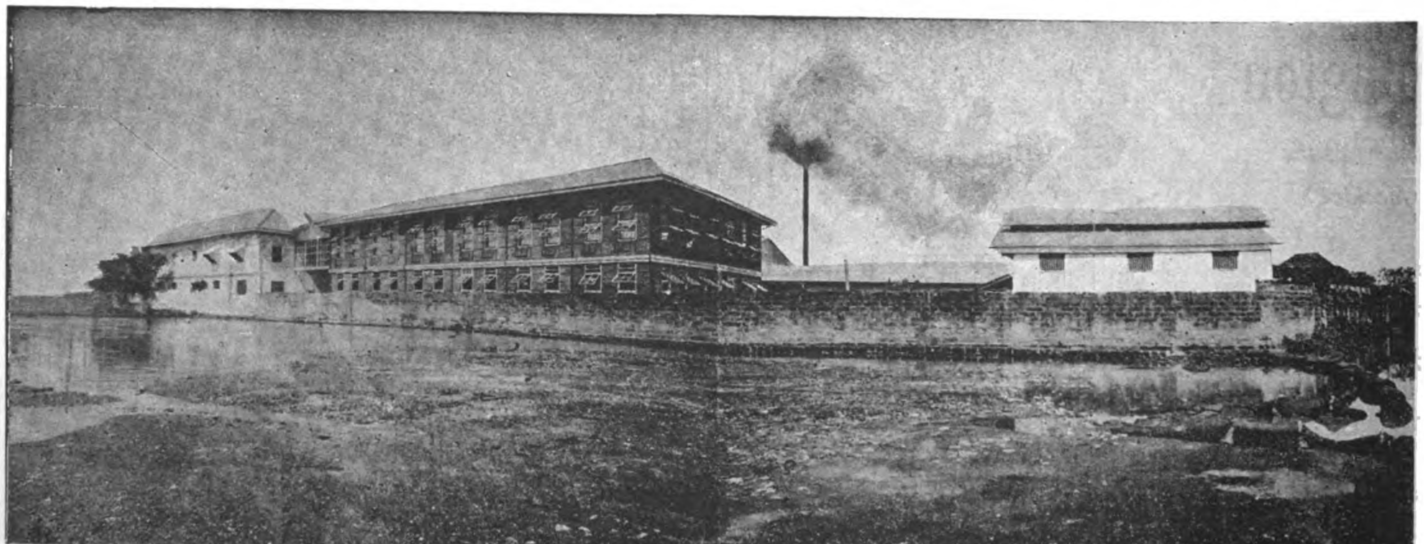

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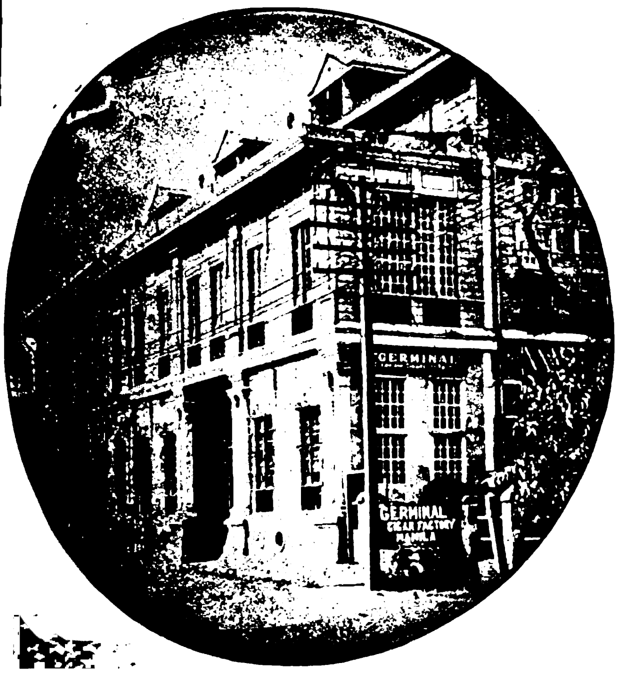

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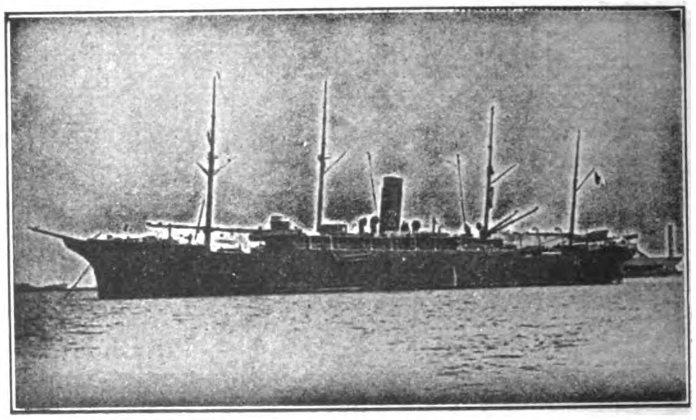

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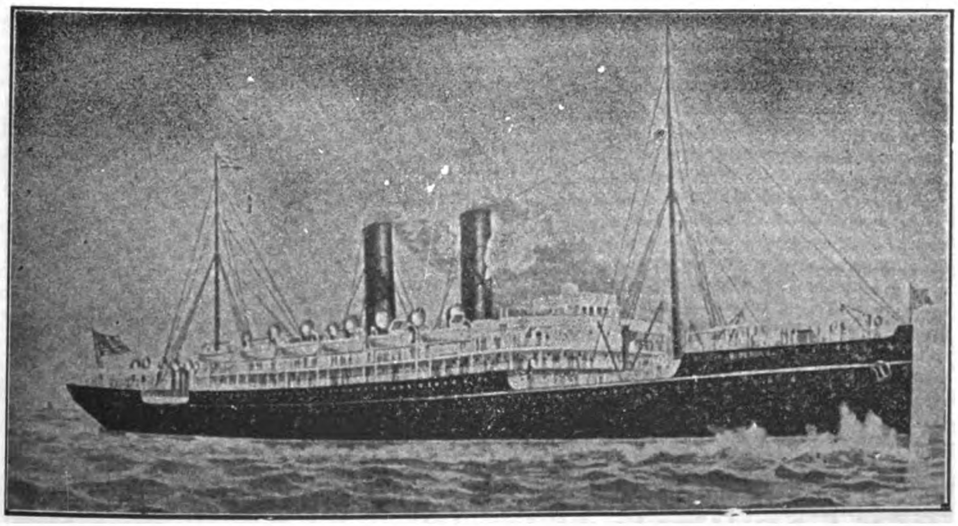

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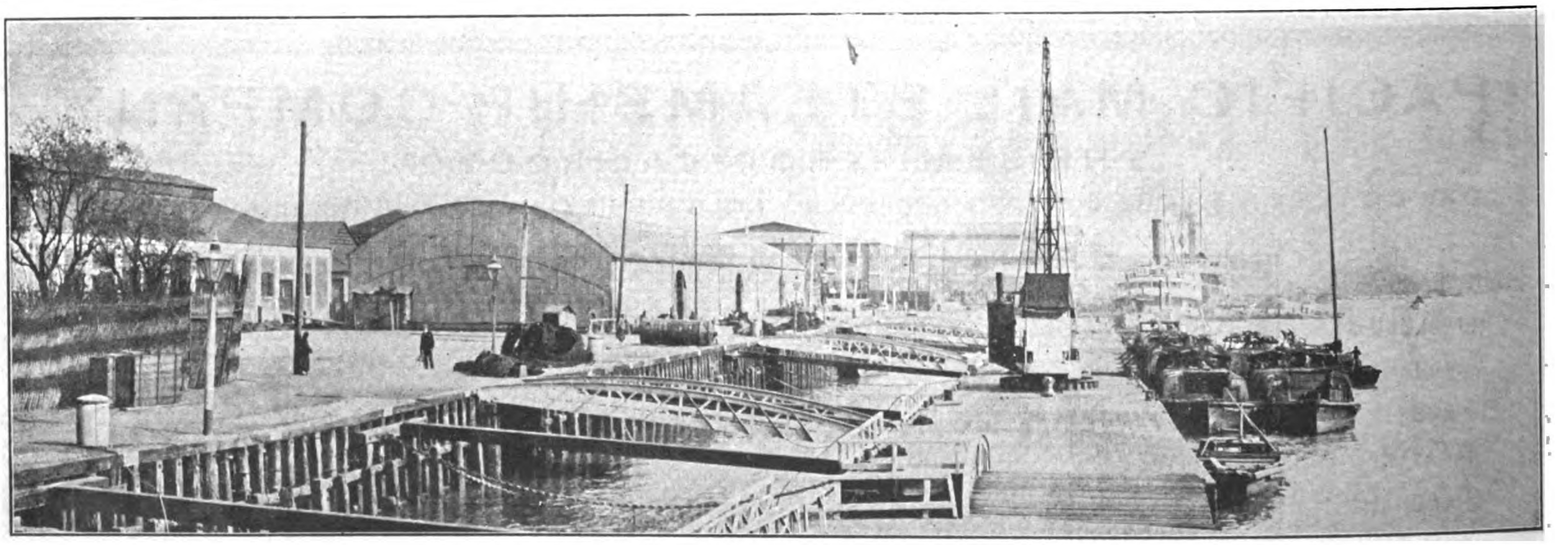

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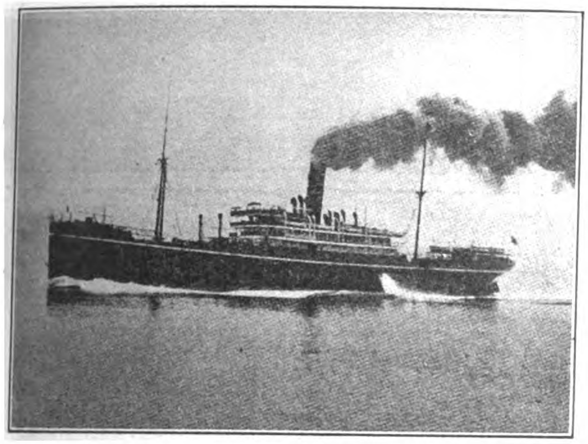

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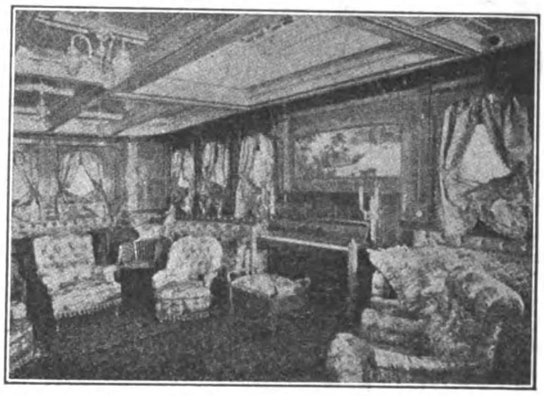

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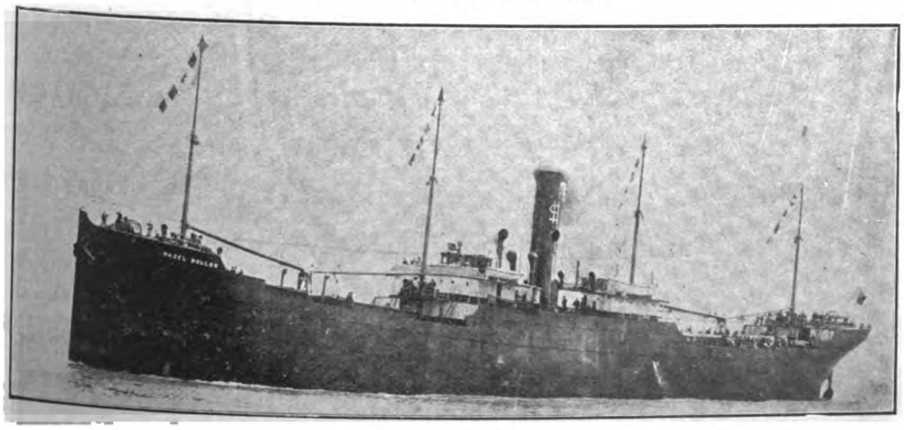

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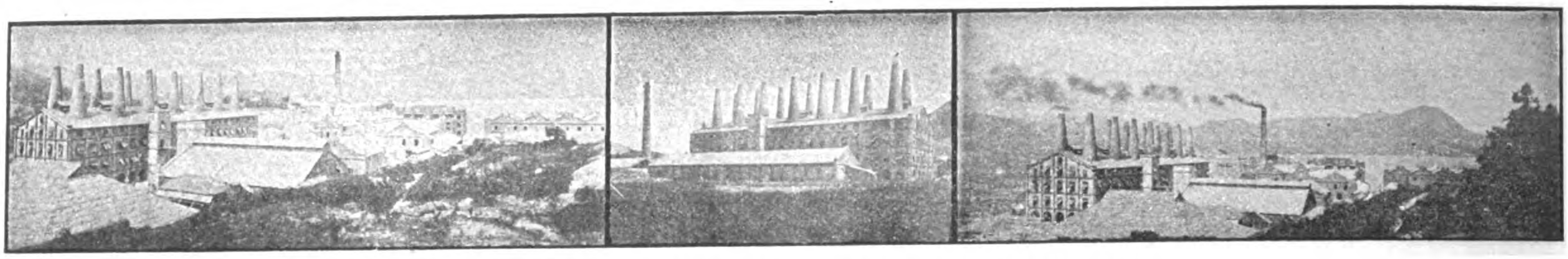

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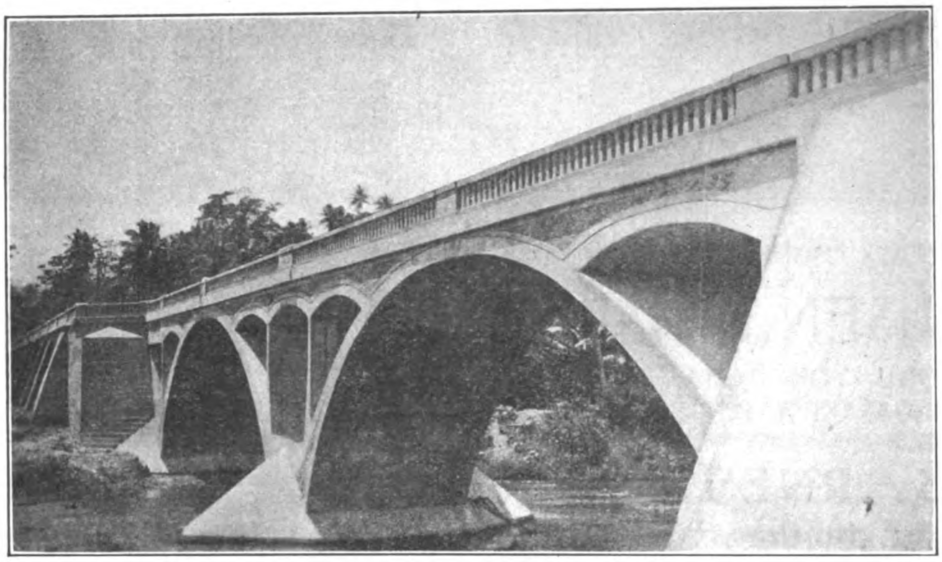

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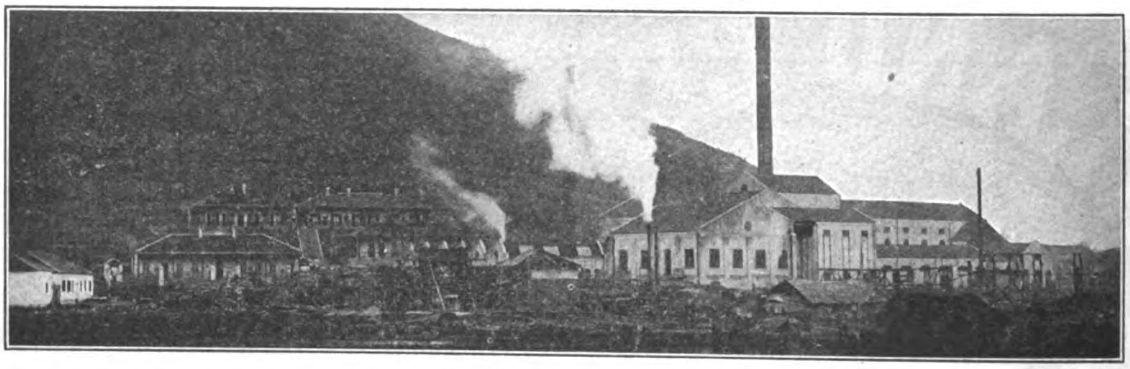

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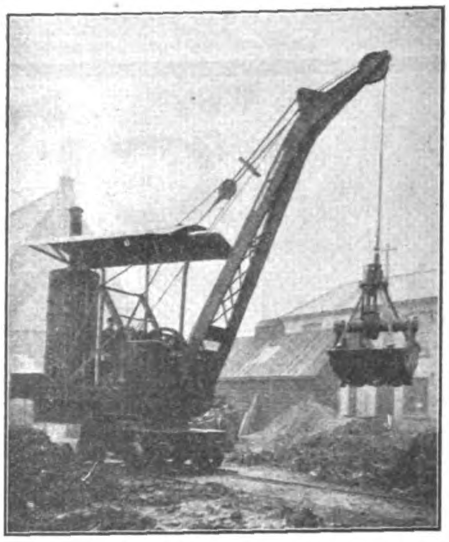

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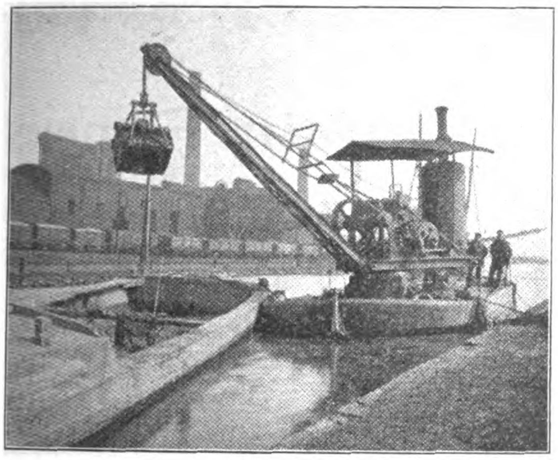

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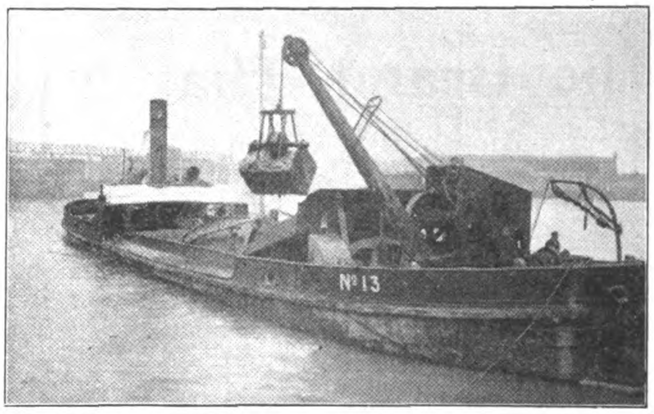

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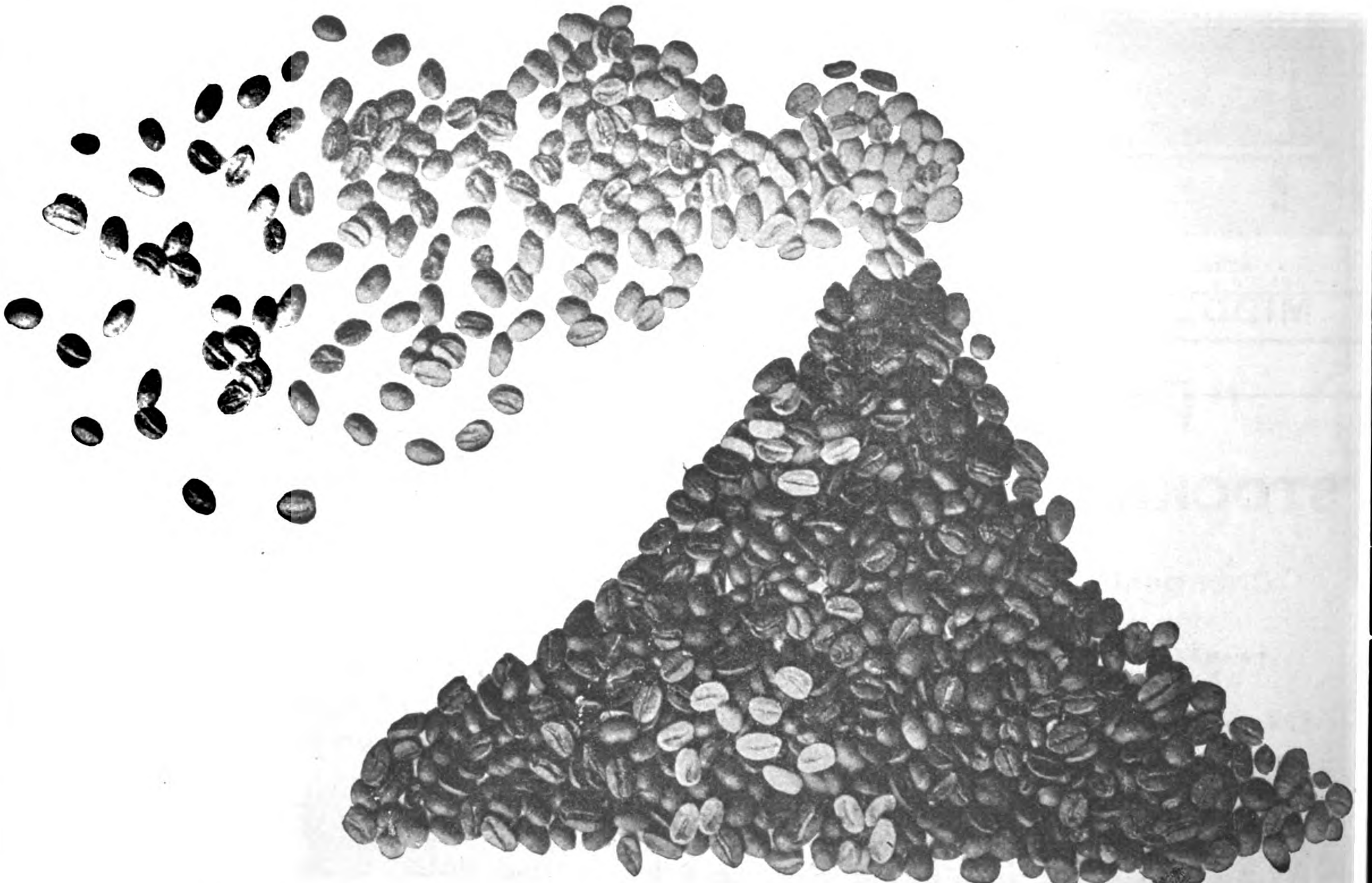

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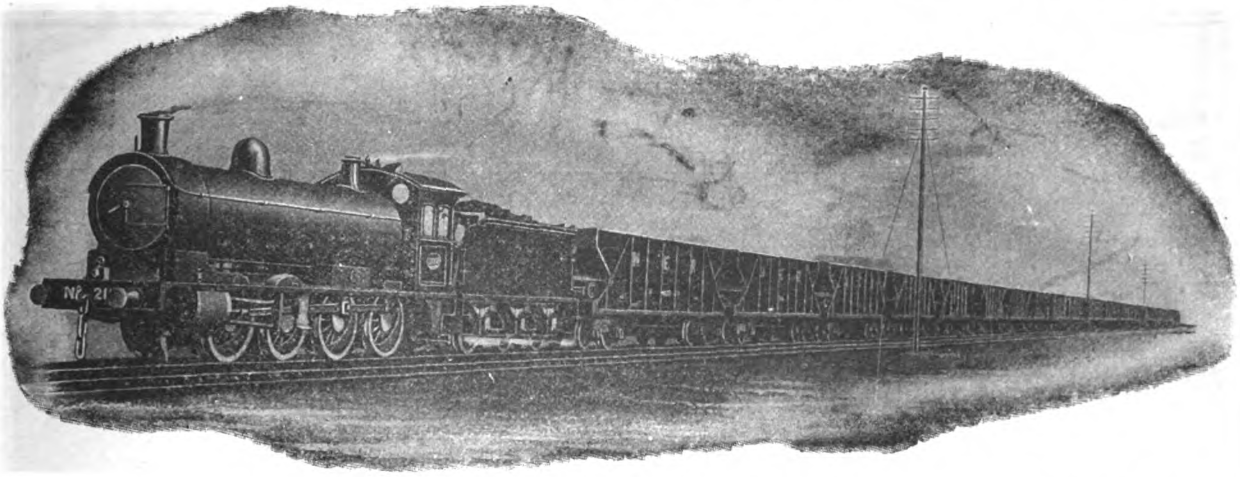

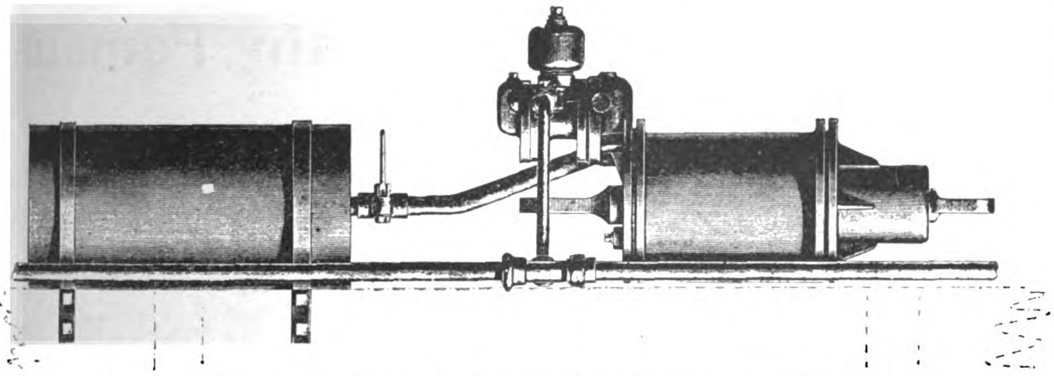

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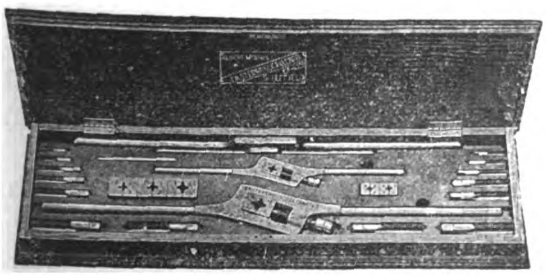

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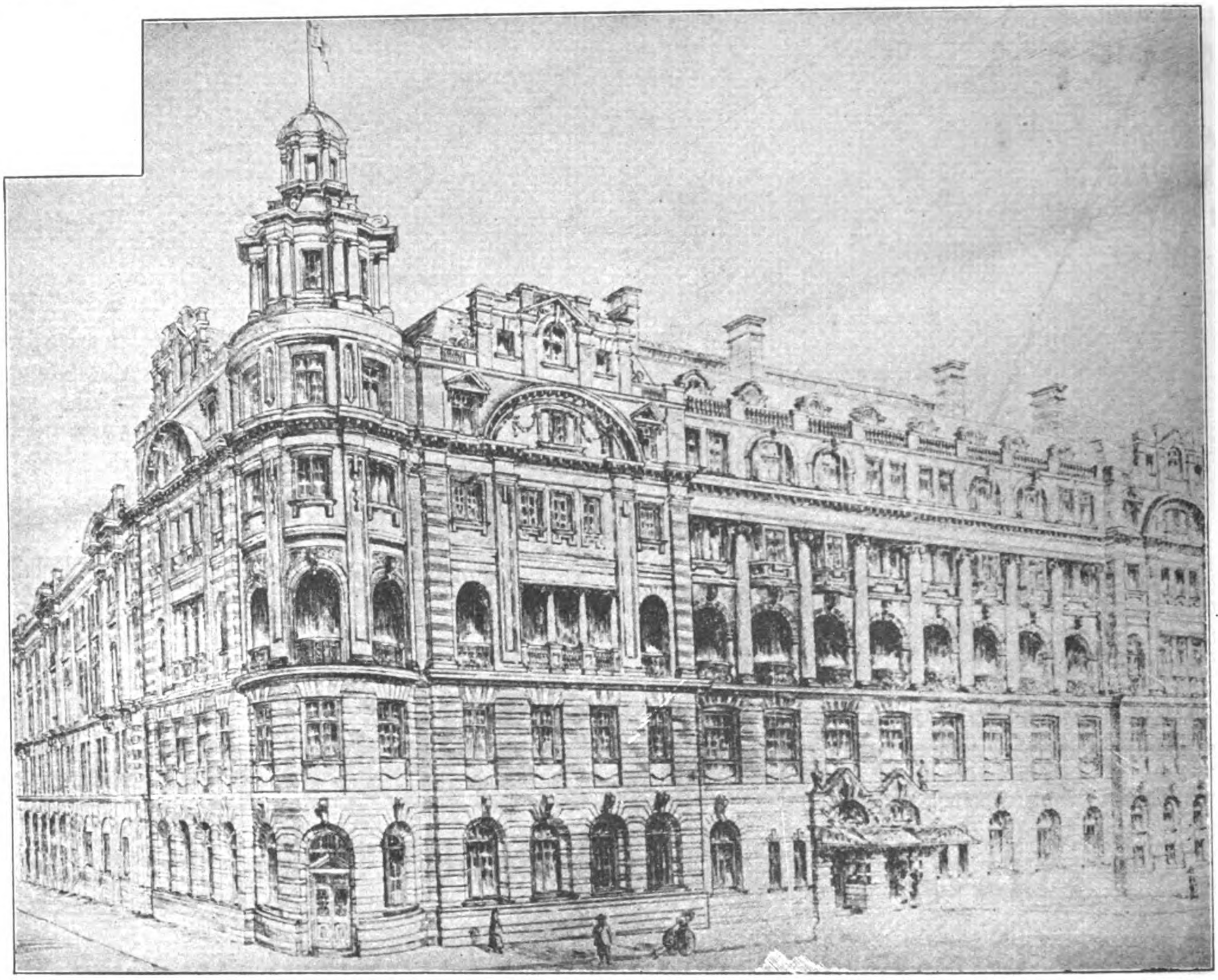

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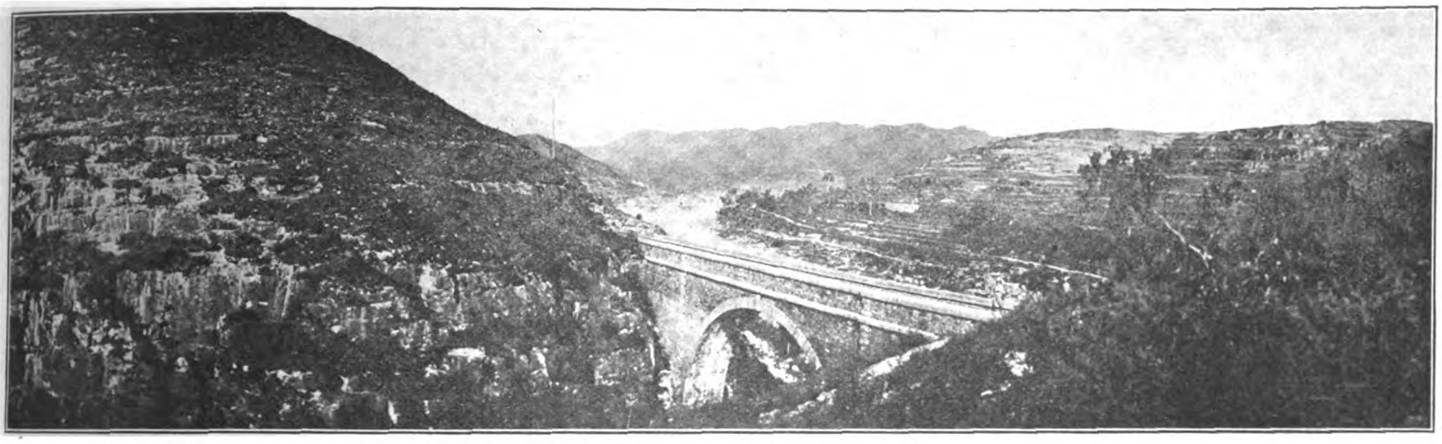

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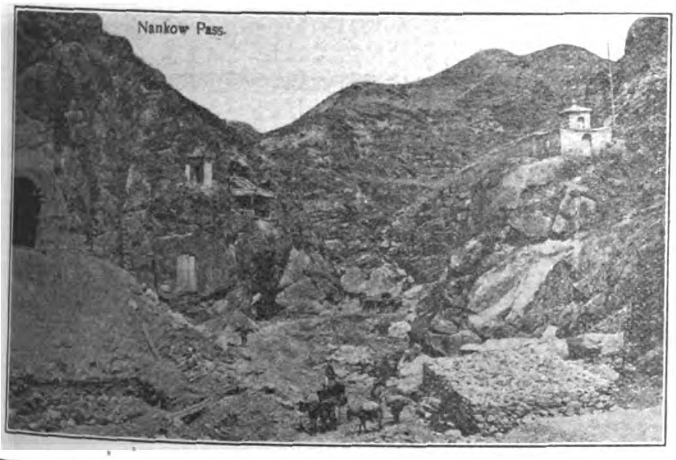
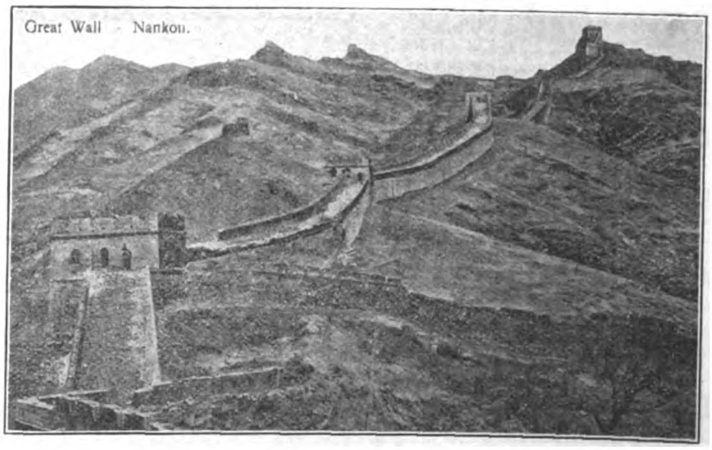
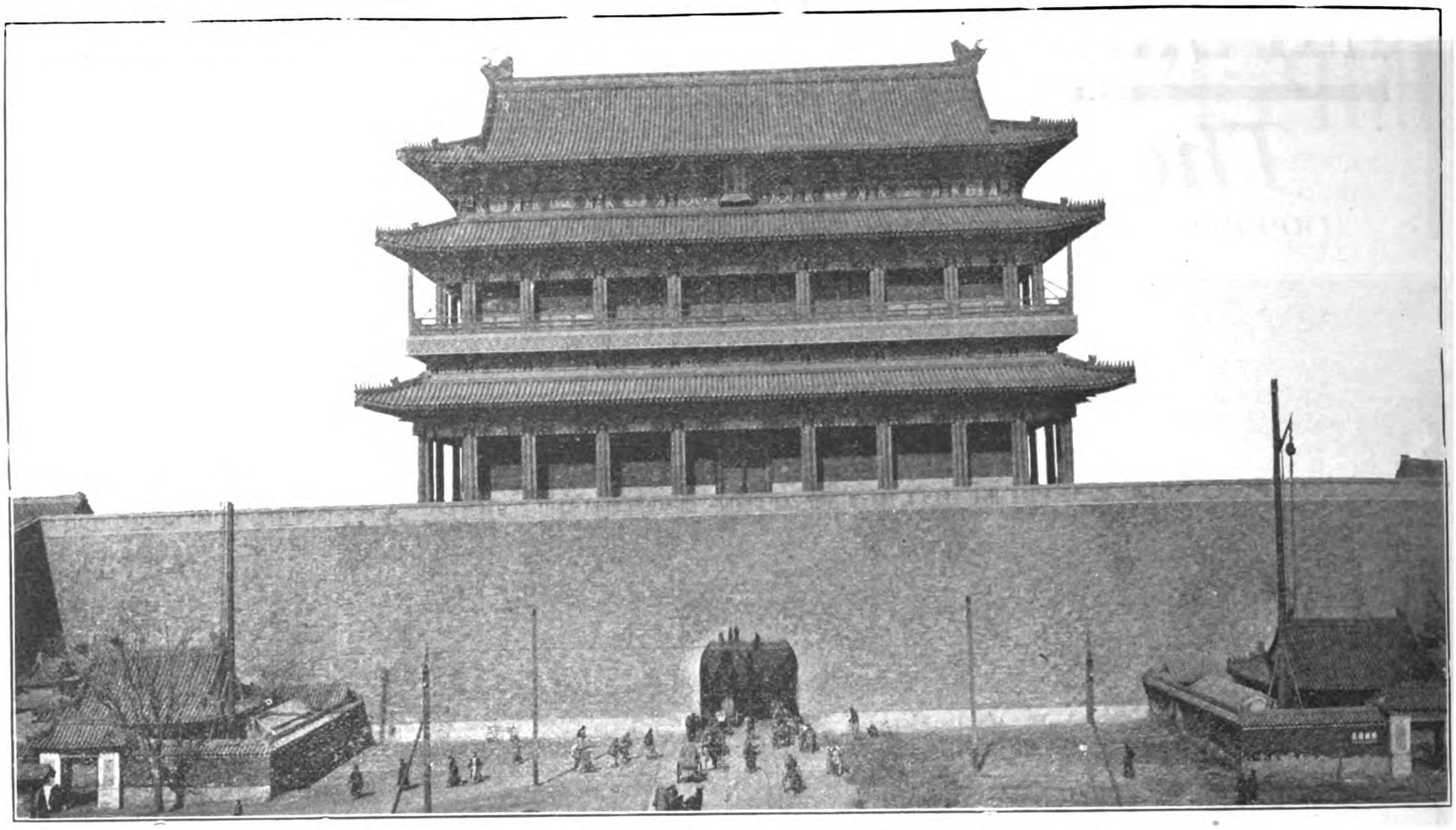




This line follows the ancient caravan route and military highway from Mongolia into China by the way of the historic Nankow Pass. This pass is the Key to Peking, and Kalgan is the gate of the Empire. From here the great camel caravans set out on their long journeys across Mongolia to Siberia and Central Asia. This old frontier mart, retaining its time-honored characteristics, one of the most interesting sights of the Old World, is made accessible by the new railway. The line also carries the passenger in two hours from Peking to Nankow, when the Great Wall of China and the Ming Tombs may be seen. A foreign hotel is operated by the railway authorities at Nankow, where chairs and guides may be secured for the Tombs.

TAOTAI JEME TIEN-YU, Director General



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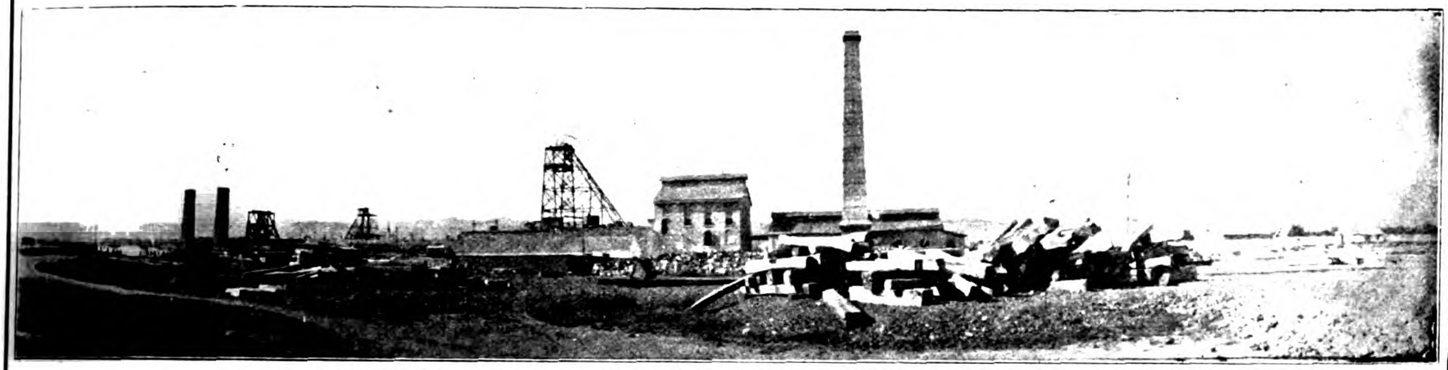

GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

"China's Road of Anthracite"

THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

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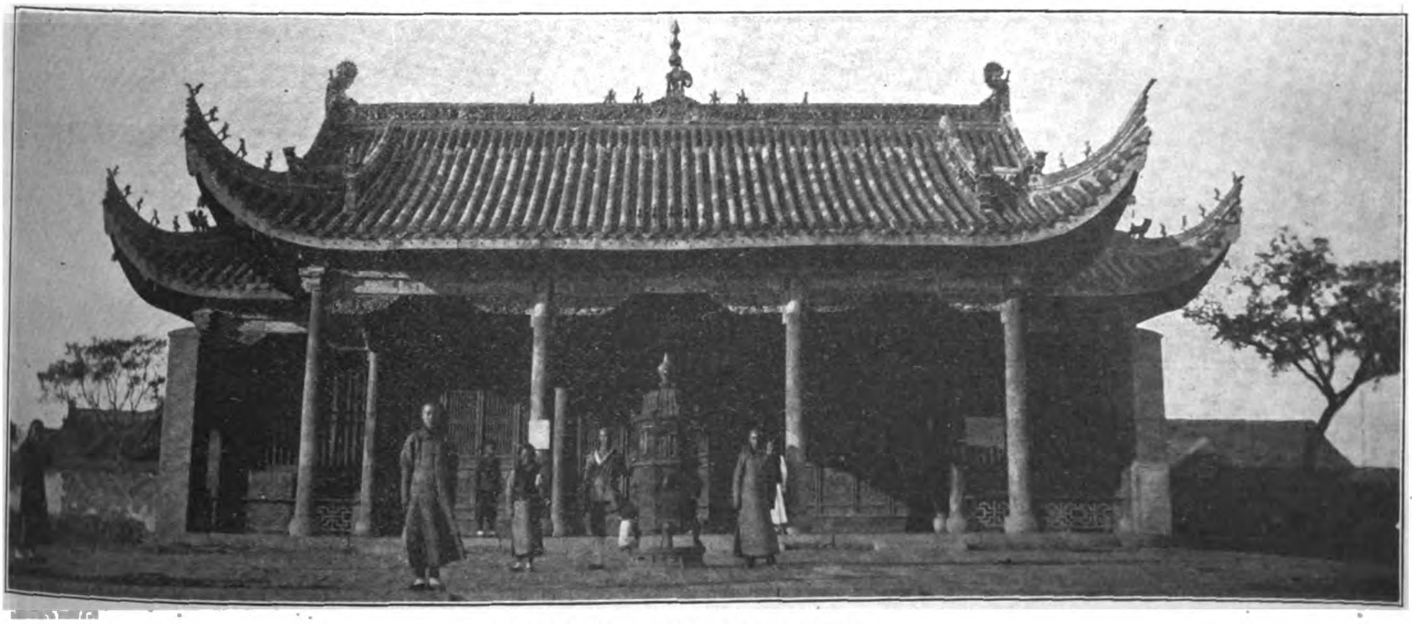
(KAIFENG-FU TO HONAN-FU)

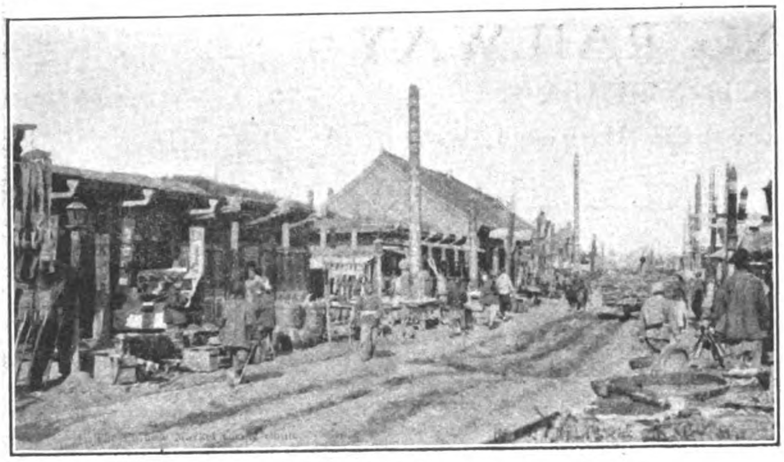
"THE FIRST SECTION OF THE PROJECTED CENTRAL TRUNKLINE"



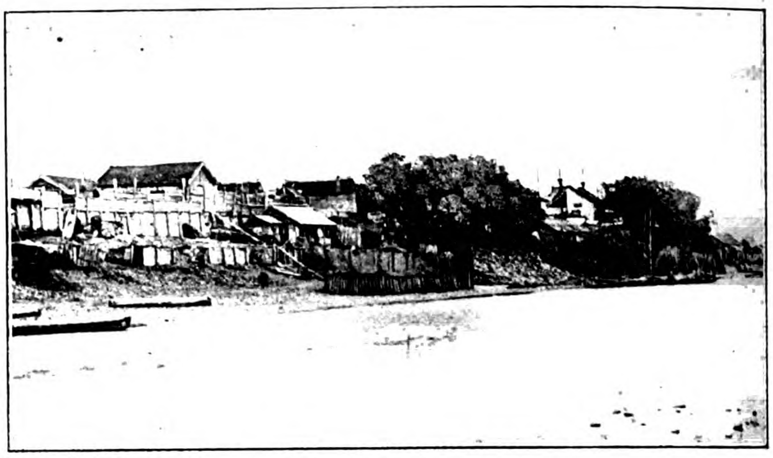
CHUNG-HUAN TEMPLE, KAIFENG-FU.

This line connects with the through service of the Peking-Hankow Railway at Tcheng Tchéou, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

IMPERIAL CHINESE RAILWAYS
KIRIN-CHANGCHUN LINE



CHINESE MARKET AT CHANG-CHUN



VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

TIME TABLE

The Kirin-Changchung Railway

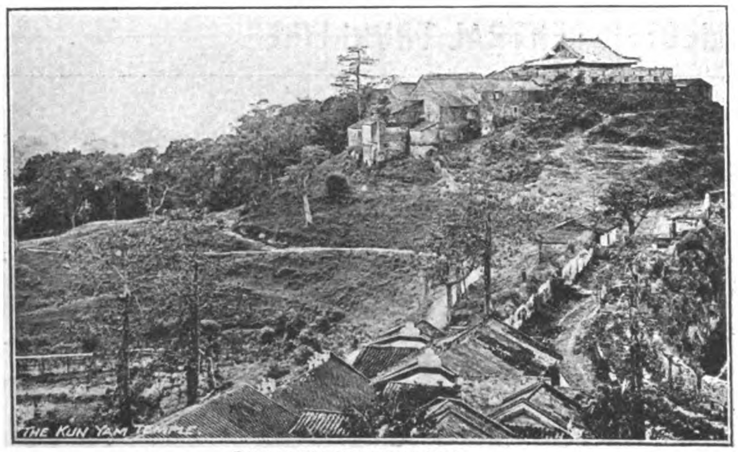
Down Train

Station	*No. 1* a. m.	*No. 2* a. m.
Changchung	7:00	12:00
Coran	8:17	1:17

Up Train

Station	*No. 2* a. m.	*No. 4* p m.
Coran	10:00	5:00
Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS
CANTON-KOWLOON LINE



THE KUN YAM TEMPLE

VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 10th JANUARY 1911 UNTIL FURTHER NOTICE.

Canton (Tai Sha Tou) to Sien Tsun.

Miles	STATION		Daily Passenger Trains. No. 1 A. M.	No. 3 P. M.
	Canton (Tai Sha Tou)	dep	7.30	2.00
3.63	Shiek Pai	arr	7.39	2.09
		dep	7.42	2.12
7.90	Che Pi	arr	7.53	2-23
		dep	7.57	2.27
12.58	Wu Chung	arr	8 08	2.38
		dep	8.11	2.41
17.09	Nam Kong	arr	8.22	2 52
		dep	8.26	2.56
21.67	Sun Tong	arr	8.38	3.08
		dep	8.41	3.11
23.61	Tong Mei	arr	8.46	3.16
		dep	8.50	3.20
25.54	Nga Yeo	arr	8.55	3.25
		dep	8 58	3.28
29.00	Sien Tsun	arr	9.07	3 37

Sien Tsun to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2 A. M.	No. 4 P. M.
	Sien Tsun	dep	9.25	4.00
3.46	Nga Yeo	arr	9.34	4.09
		dep	9.37	4.12
5.39	Tong Mei	arr	9.42	4.17
		dep	9.46	4.21
7.33	Sun Tong	arr	9 51	4.26
		dep	9.54	4.29
11.91	Nam Kong	arr	10.06	4.41
		dep	10.10	4.45
16.42	Wu Chung	arr	10 21	4.56
		dep	10.24	4.59
21.10	Che Pi	arr	10.35	5.10
		dep	10.39	5.14
25.37	Shiek Pai	arr	10.50	5.25
		dep	10.53	5.28
29.00	Canton (Tai Sha Tou)	arr	11.02	5.37

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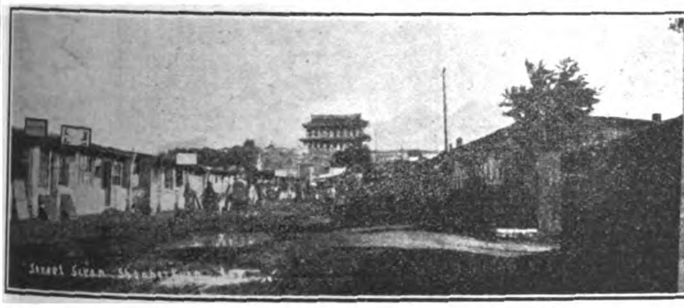
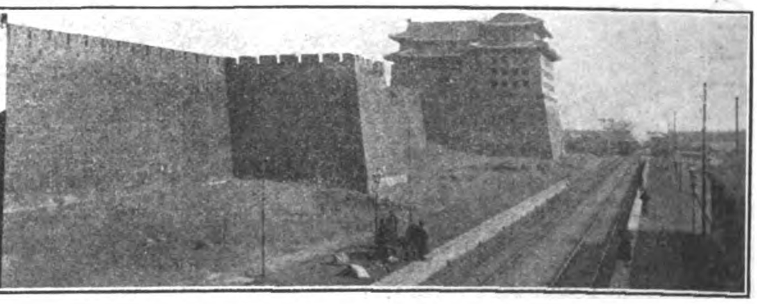


STREET SCENE AT SHANHAIKUAN



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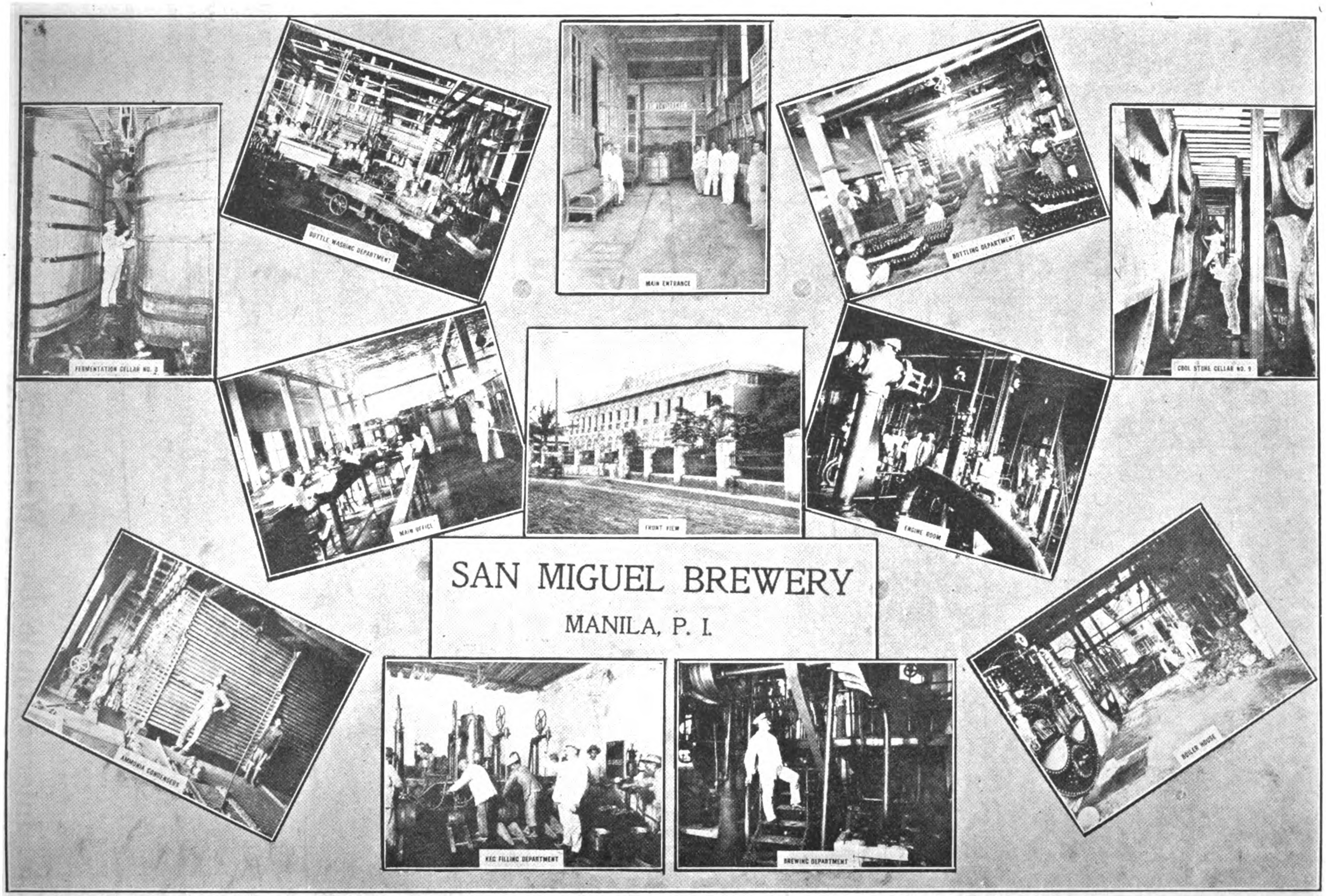

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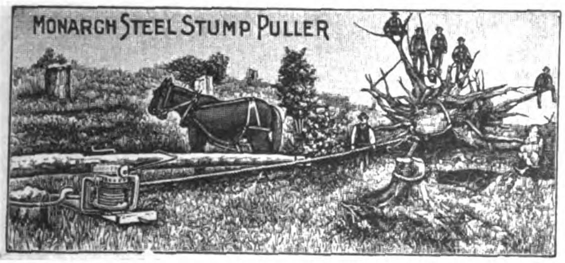

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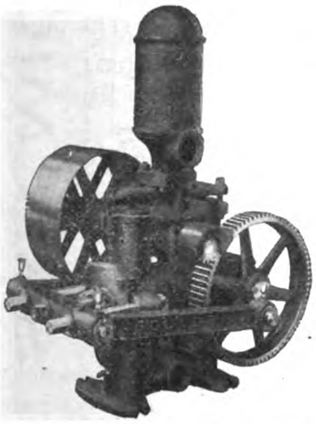

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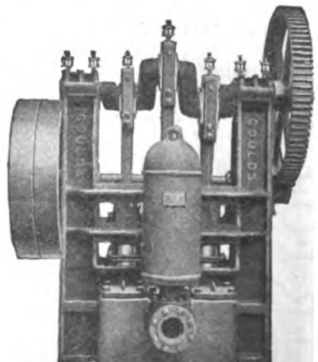

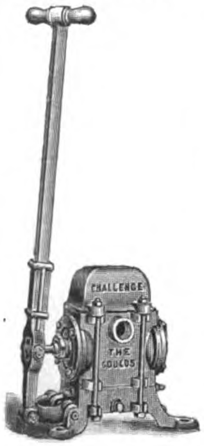

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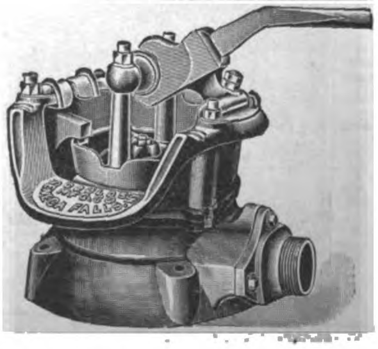

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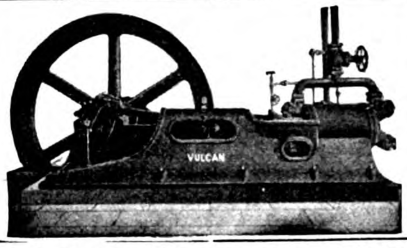
VUL  CAN

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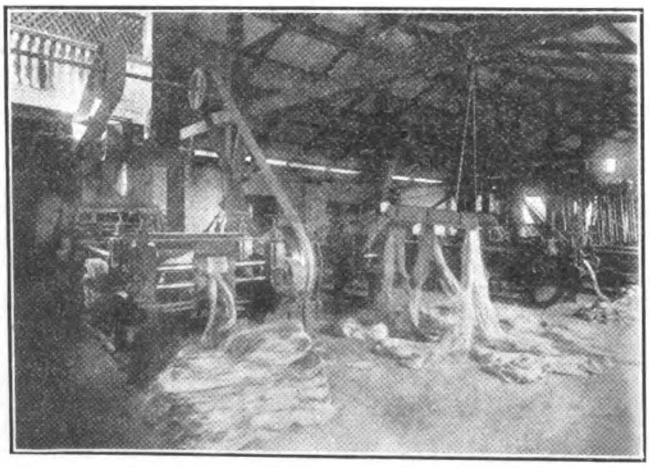

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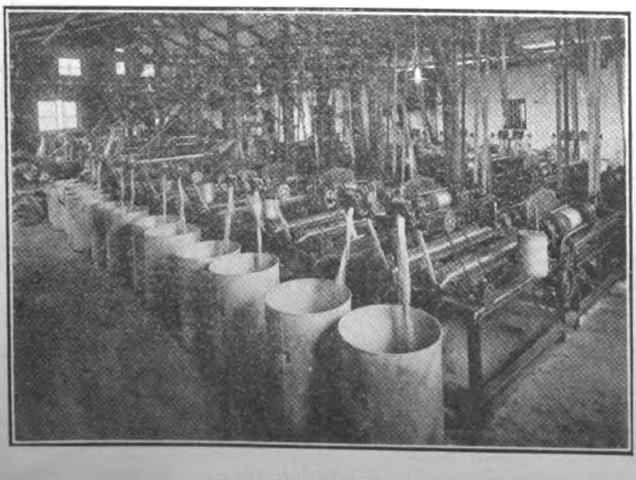

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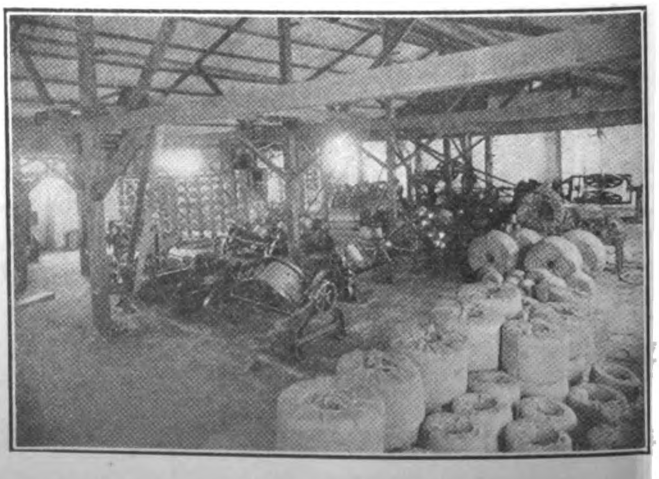

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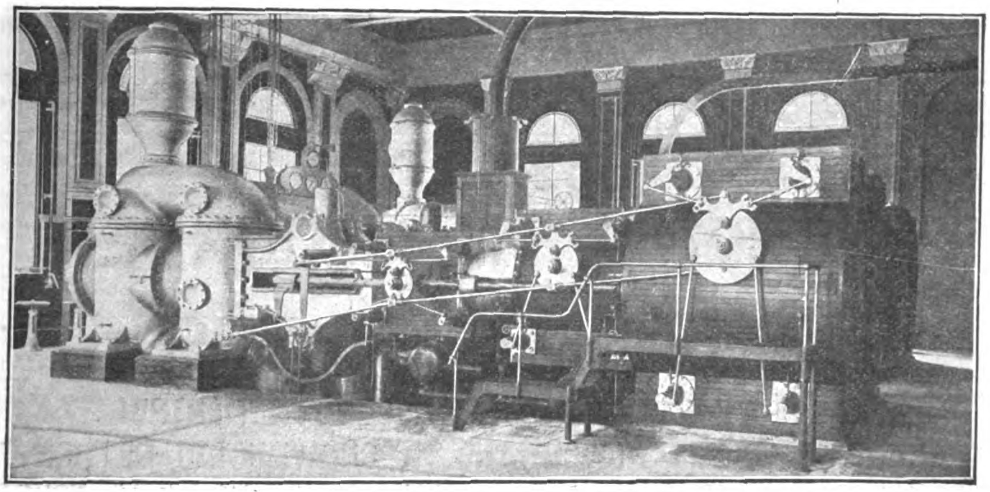

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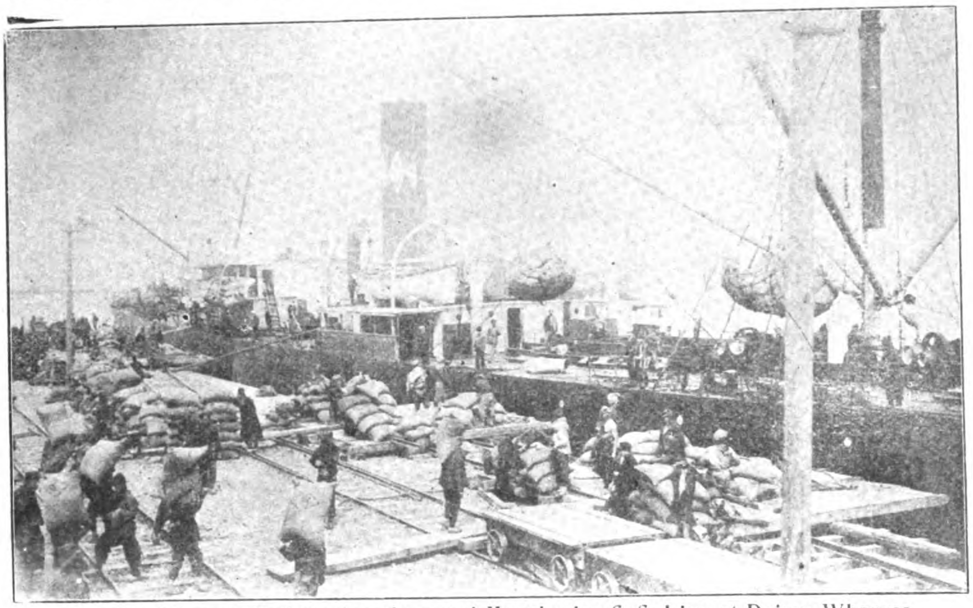

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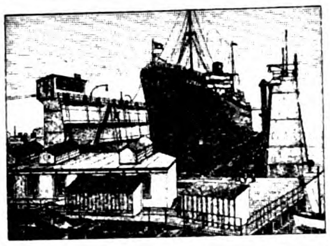

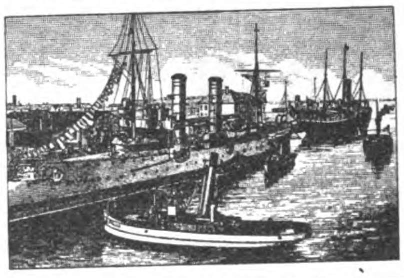

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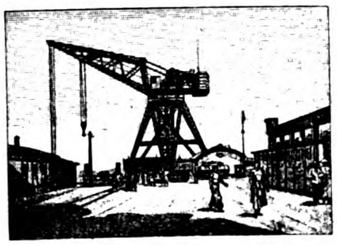

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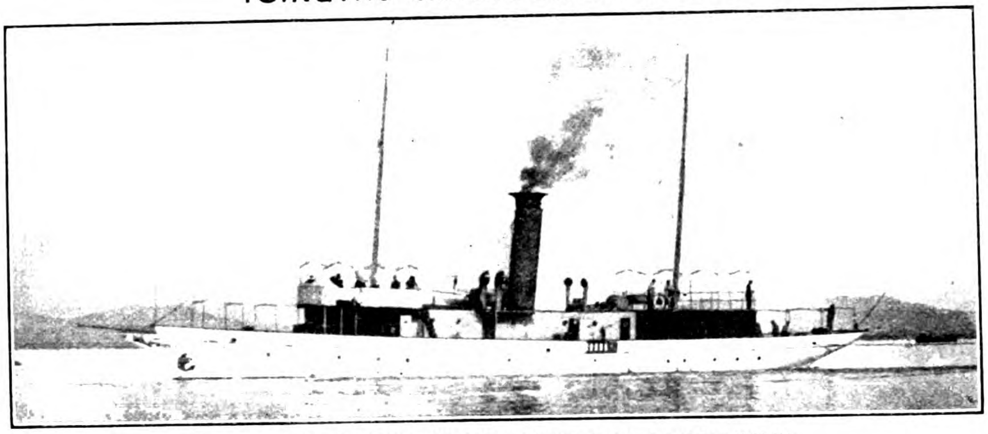

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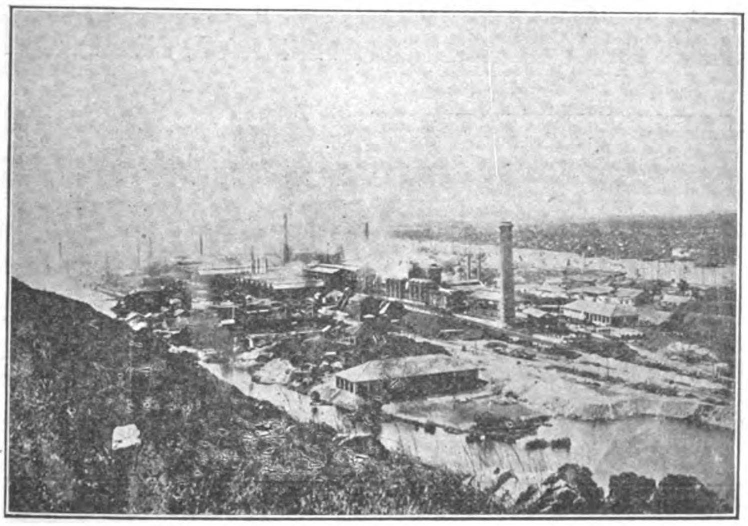

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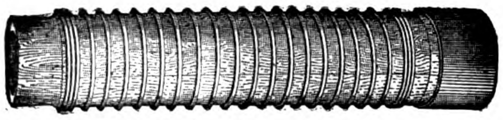

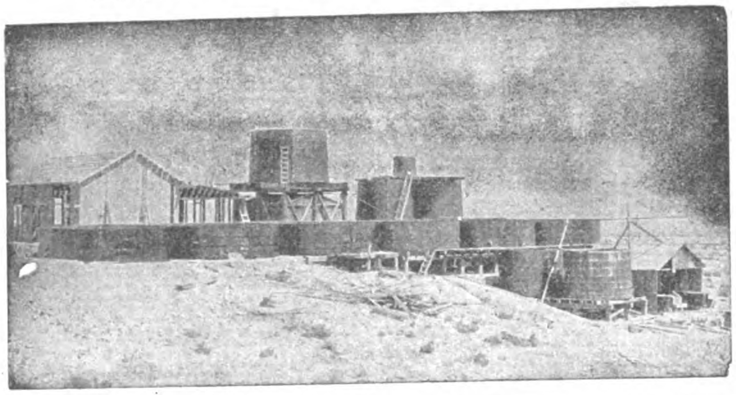

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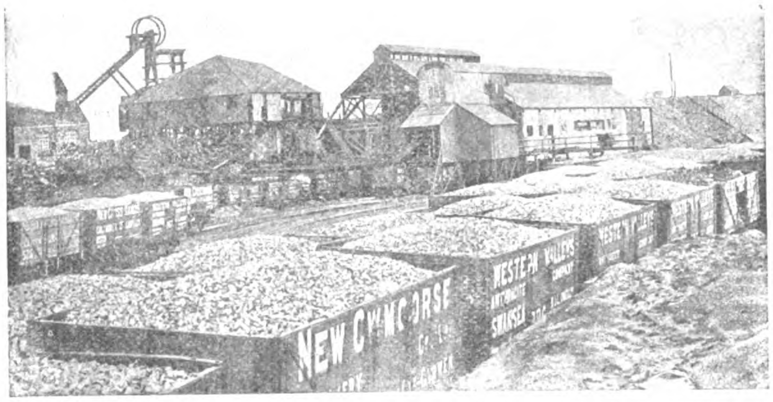

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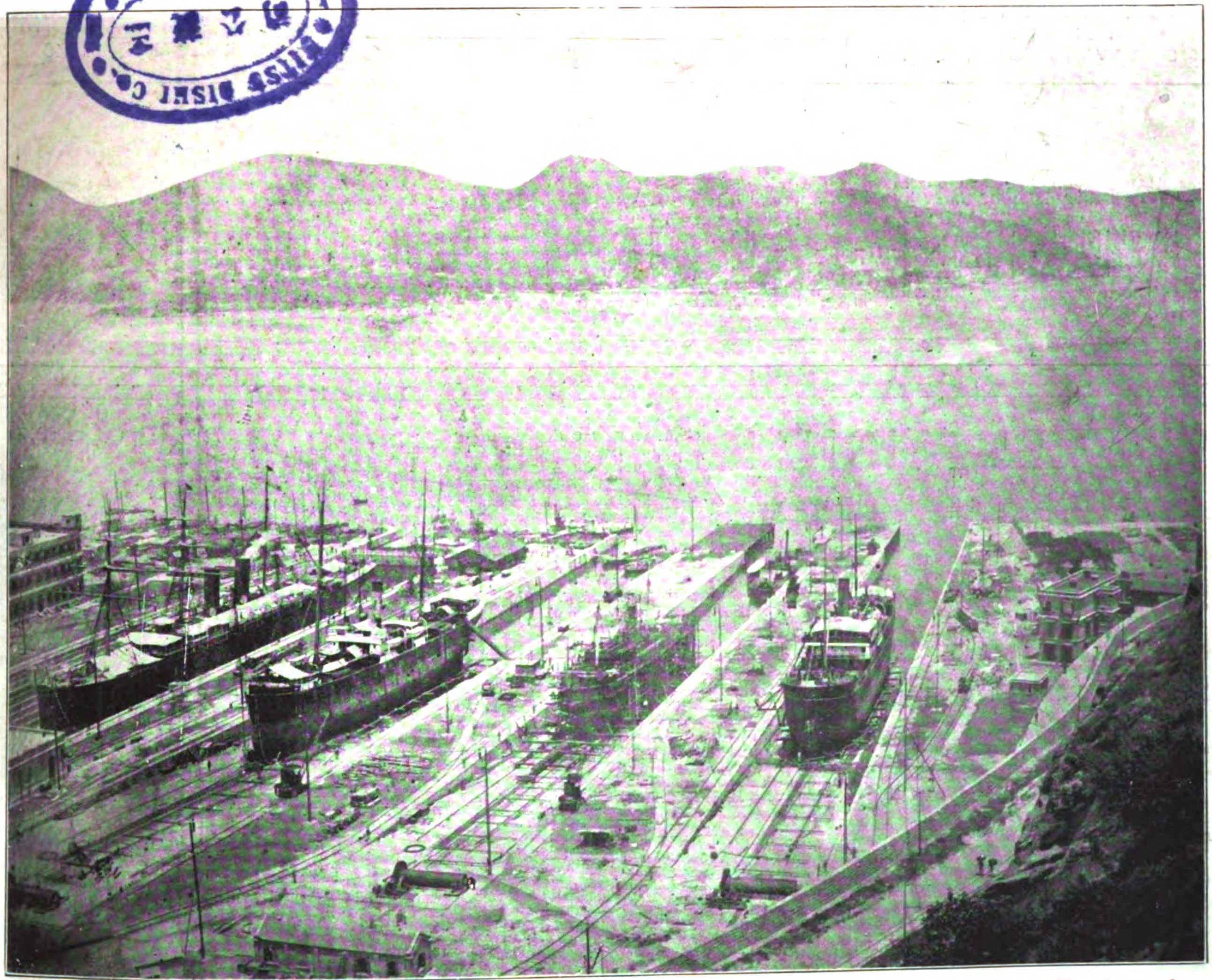

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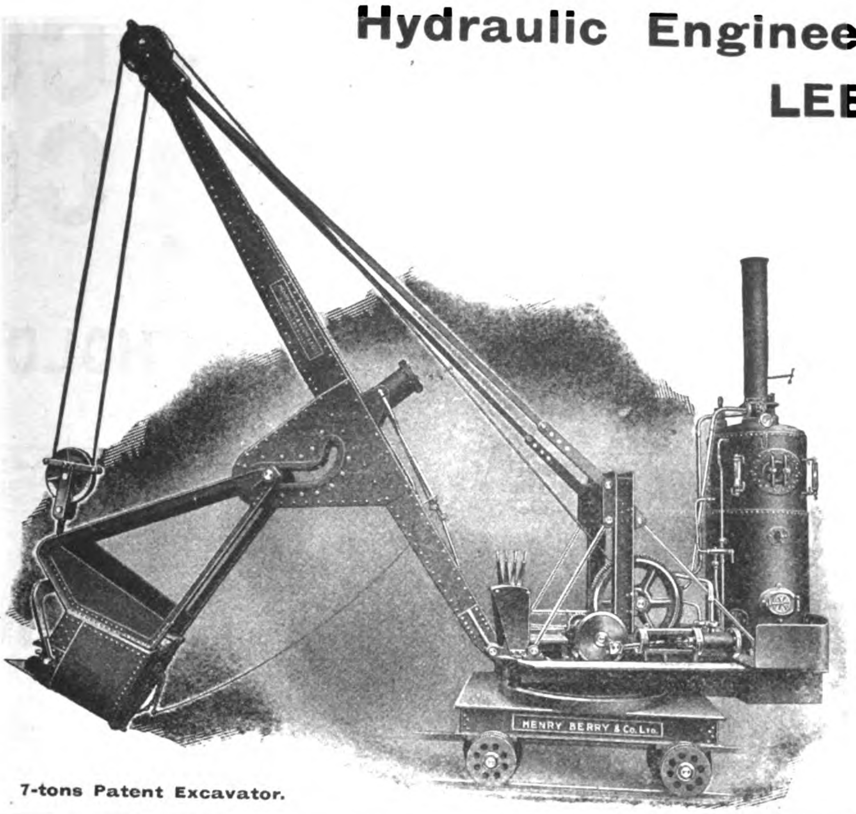

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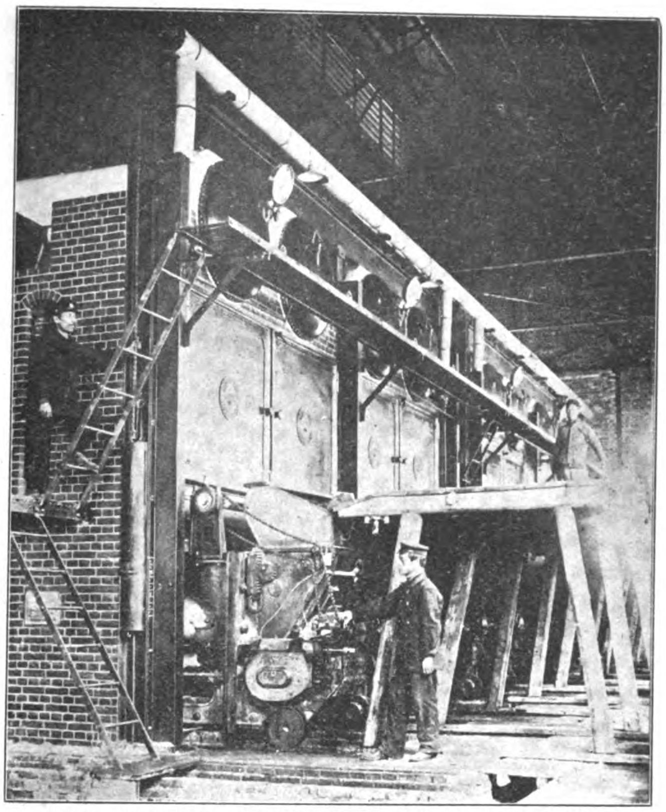

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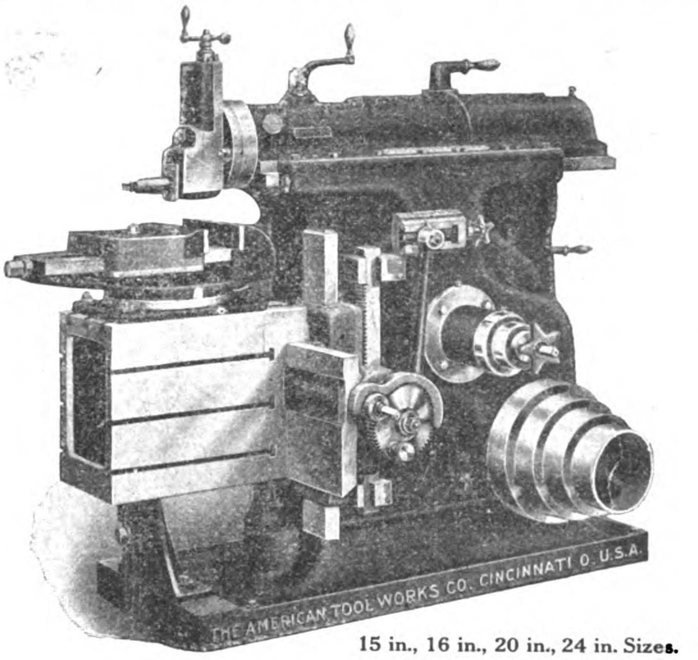

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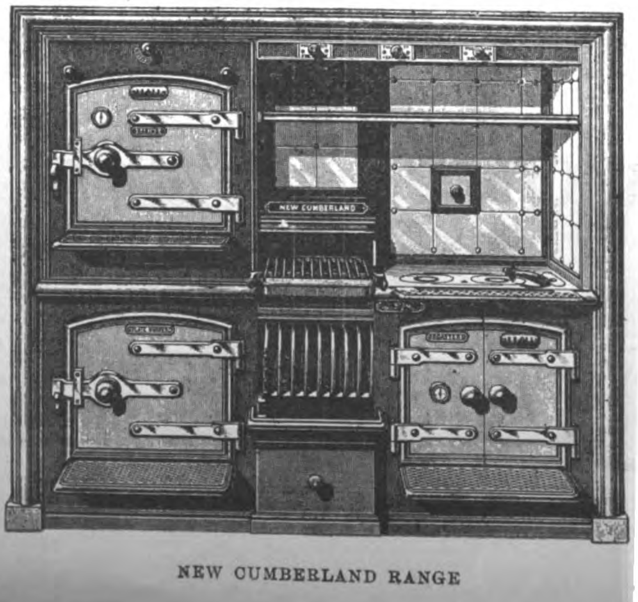

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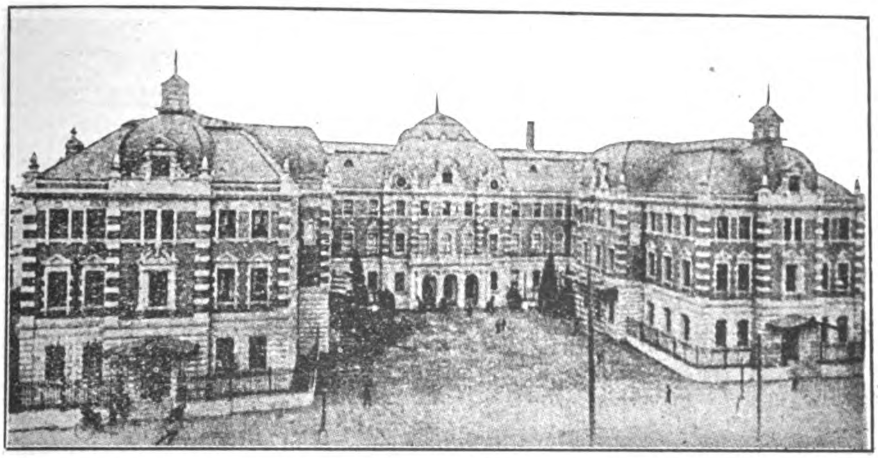

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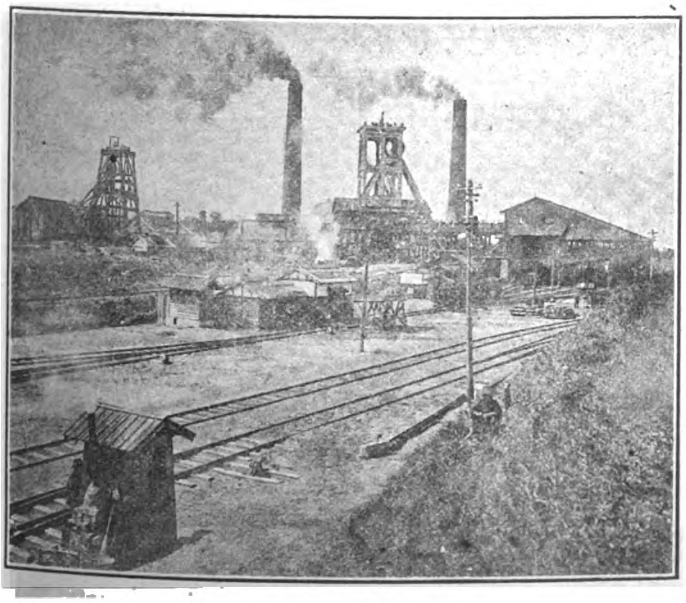

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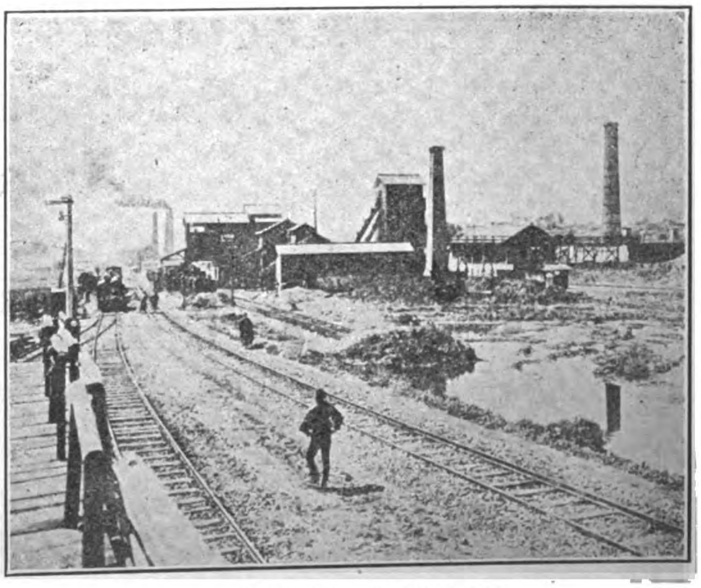

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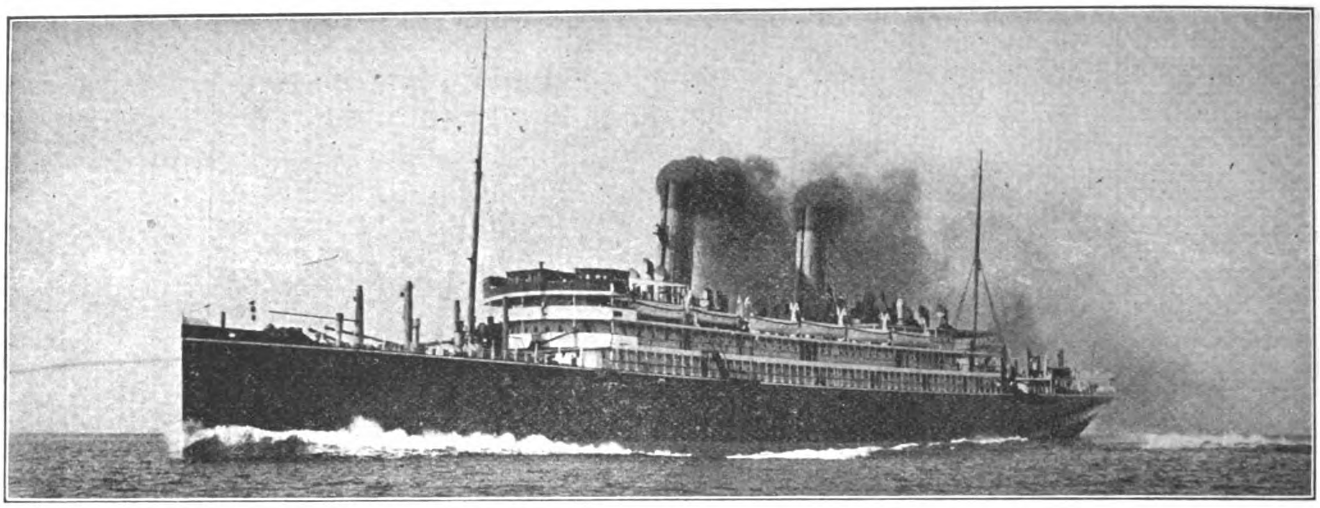

S. S. "CHIYO-MARU"

TRANS-PACIFIC TURBINE DRIVEN PASSENGER STEAMER "CHIYO-MARU" FOR T. K. K.—Built and engined by the Mitsu Bishi Dockyard and Engine Works, Nagasaki, November 1908.—Length (overall), 570 feet 0"; Breadth, moulded, 63 feet 0"; Depth (shelter deck), 46 feet 6"; Gross tonnage, 13,426 tons; Displacement, 18,725 tons; Engines, Parsons' Three Shaft Arrangement; Boilers, Single Ended Scotch Boilers (13); I. H. P., 19,591; Speed, 21 knots. (This photo was taken on her full speed trials the 13th October, 1908.)

MITSU BISHI DOCKYARDS & ENGINE WORKS, NAGASAKI

	DOCK NO. 1.	DOCK NO. 2.	DOCK NO. 3.
EXTREME LENGTH	523 FT.	371 FT.	722 FT.
LENGTH ON BLOCKS	513 "	360 "	714 "
WIDTH OF ENTRANCE ON TOP	88 "	66 "	99½ "
" " " BOTTOM	77 "	53 "	88½ "
WATER ON BLOCKS AT SPRING TIDE	26½ "	22 "	34½ "

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WITH SPECIAL FACILITIES FOR HANDLING THE HEAVIEST CASTINGS AND THE REPAIRING OR BUILDING OF SHIPS, ENGINES AND BOILERS, ALSO ELECTRICAL WORK.

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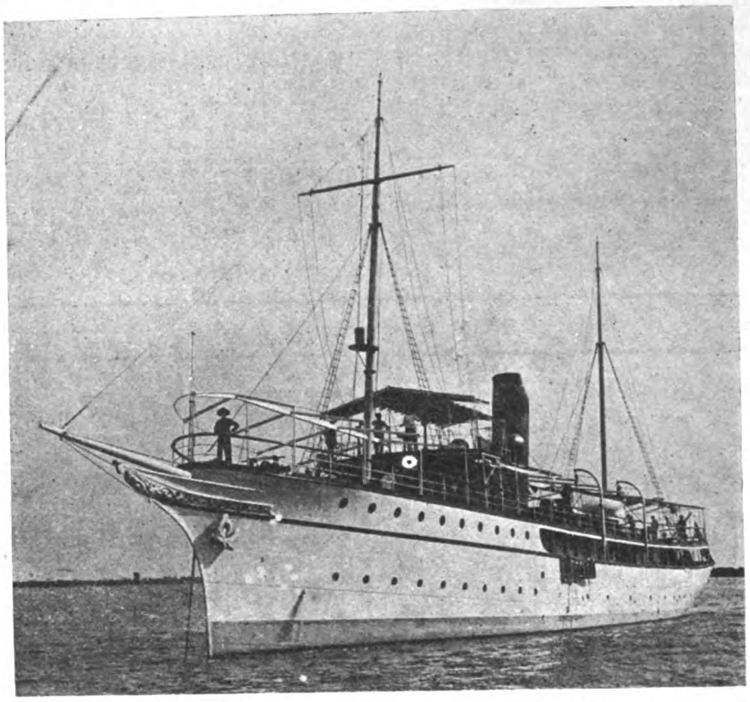
Yacht of H. I. H. Prince Hsui, Built by the Kiangnan Dock & Engineering Works.

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Length over all, 385′; length on blocks, 575′; water on sill, 19′; dock entrance, top 70′, bottom, 60′.

The dock accommodates the largest coasting steamers and is equipped with complete modern facilities for handling work thoroughly and promptly.

The new machine and boiler shops, and the foundry and shipbuilding plant are equal to any this side of Suez.

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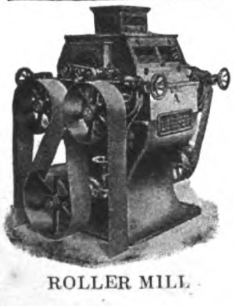
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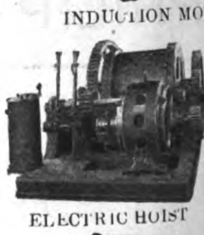
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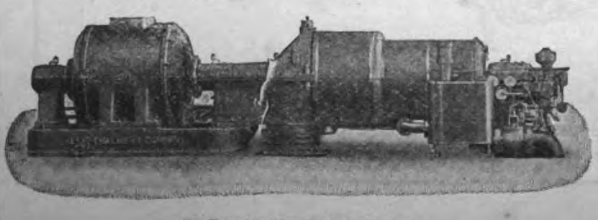
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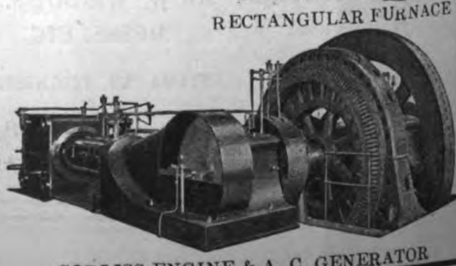
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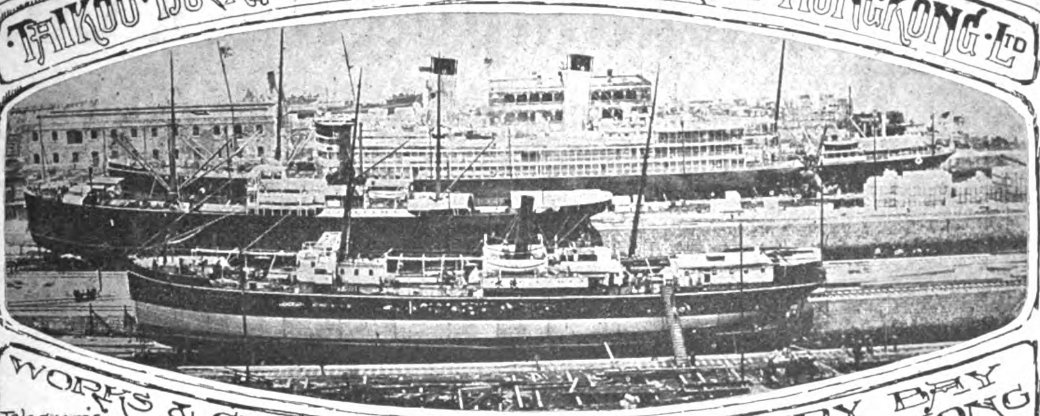

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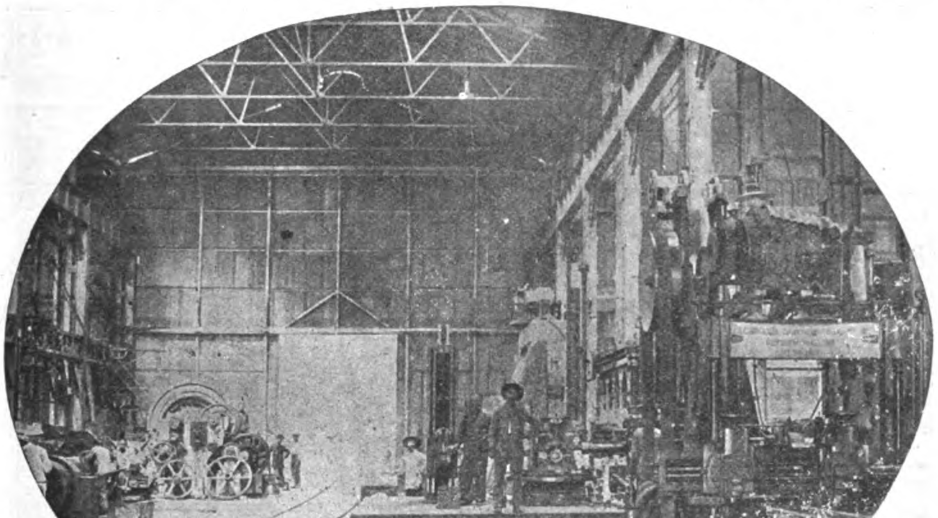

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THE POWER FOR THE ESTABLISHMENT is generated by Gas Producers, on the Mond System, supplying 4 Cockerill Gas Engines of 3,000 collective horse power, driving Electrical Generators, and is transmitted throughout the Works by means of Electrical Motors.

AN ELECTRIC DERRICK CRANE capable of lifting weights up to 100 tons, is erected on the Sea Wall, and 14 Electric Overhead Travelling Cranes ranging from 5 tons to 100 tons, are fitted throughout the Workshops.

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THE DOCK PUMPS consist of 2 sets of Centrifugal, Electrically driven, pumps, together capable of emptying the Dock with 35 feet of water on the Sill in 2¾ hours.

THE MACHINERY in the Engine Works is laid out for dealing with the heaviest classes of Engines.

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TENDERS SUBMITTED AND ESTIMATES GIVEN FOR BUILDING AND REPAIRING ALL CLASSES OF VESSELS; ALSO FOR EVERY DESCRIPTION OF ENGINE AND BOILER, MECHANICAL, ELECTRICAL AND CONSTRUCTIONAL WORK

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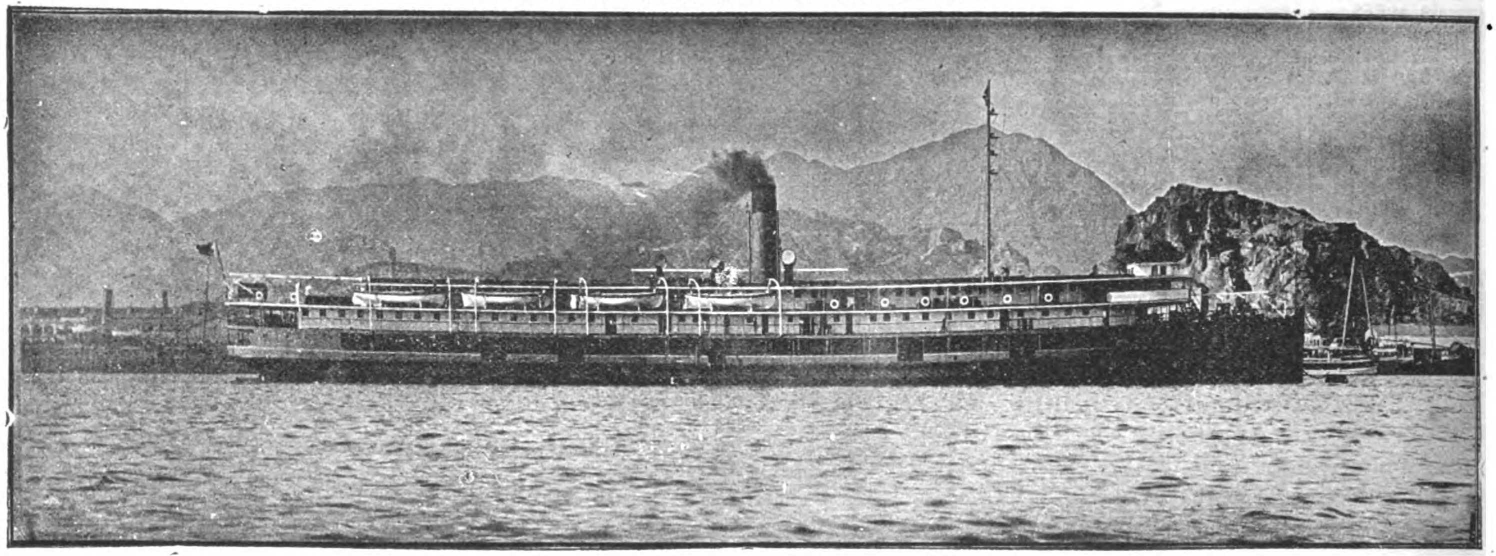

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All classes of CONSTRUCTIONAL and GENERAL ENGINEERING WORK undertaken, also LOCOMOTIVES, RAILWAY ROLLING STOCK and PLANT, BRIDGES, etc.

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AUXILIARY MACHINERY for MARINE and LAND Purposes.

LAND and MARINE BOILERS of all sizes and classes.

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IRON and BRASS CASTINGS of all descriptions.

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BOLTS, NUTS and RIVETS MANUFACTURED at SHORT NOTICE.

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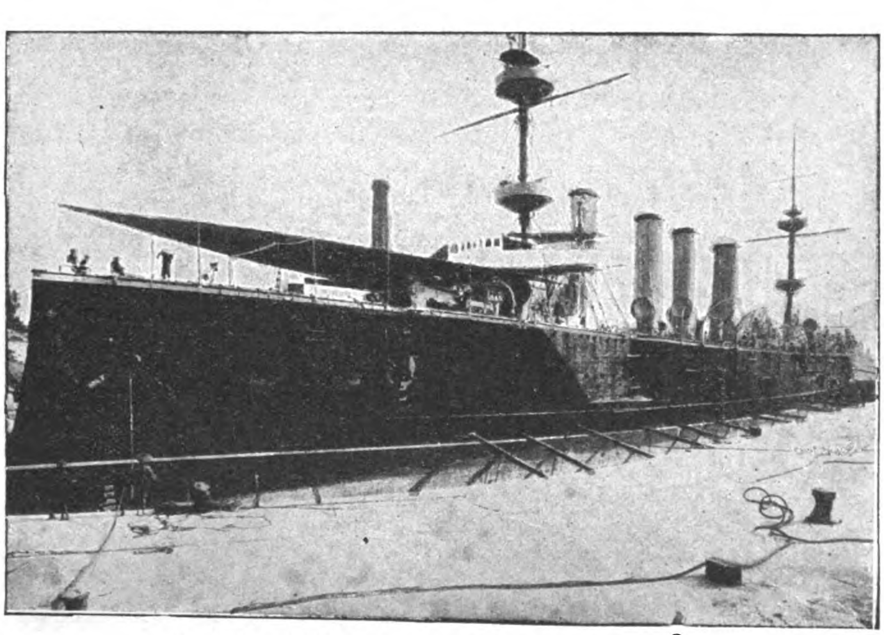

H. M. S. POWERFUL IN NO. 1 DOCK, KOWLOON.

The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	*Length on Keel Blocks*	*Entrance Breadth*	*Depth Over Sill at Ordinary Spring Tides*	*Rise of Tide*	
				Springs	*Neaps*
KOWLOON	*Feet*	*Feet*	*Feet*	*Feet*	*Feet*
No. 1 Dock, Kowloon.........	700	{86 ft. top / 70 ft. bottom}	30′	7′ 6″	3
No. 2 Dock, Kowloon	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon.........	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon...	240	60′	14′	7′ 6″	—
Patent Slip, No. 2, Kowloon...	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock...........	466	85′ 6″	20′	7′ 6′	—
ABERDEEN					
Hope Dock..................	430	84′	23′	7′ 6″	—
Lamont Dock................	333	64′	16′	7′ 6″	—

Please Address Enquiries to the Chief Manager,

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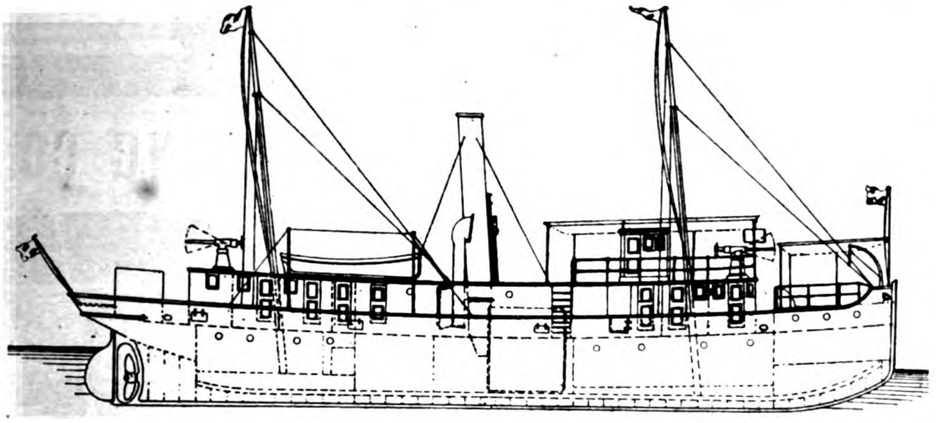

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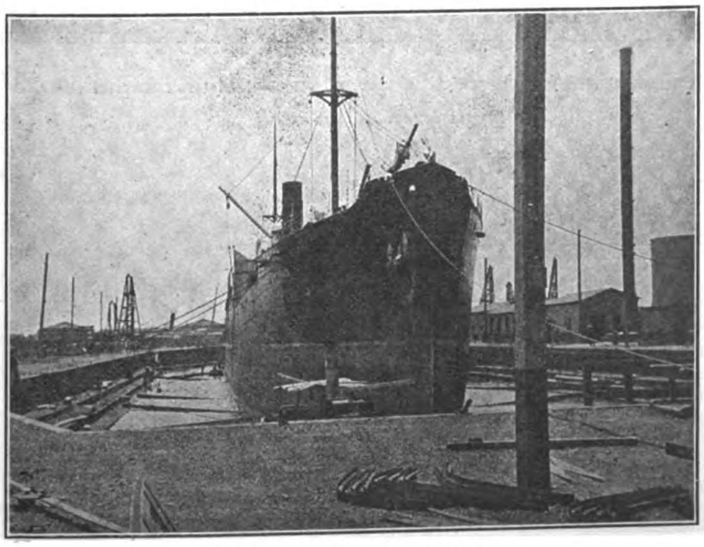
THE WORKS ARE EQUIPPED WITH THE MOST MODERN MACHINERY, CAPABLE OF HANDLING THE LARGEST MARINE ENGINEERING WORK



VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK
LENGTH ON BLOCKS 455′0″
„ OVERALL - 469′0″
WIDTH, ENTRANCE 74′0″
„ SILL - - 64′0″
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21′0″
DEPTH ON 3′0″ BLOCKS (H. W. O. S. TIDES) 19′0″
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
WORKSHOPS LOCATED AT HEAD OF DOCK

OFFICE, DOCK & WORKS, 37 YANGTSZEPOO ROAD, SHANGHAI

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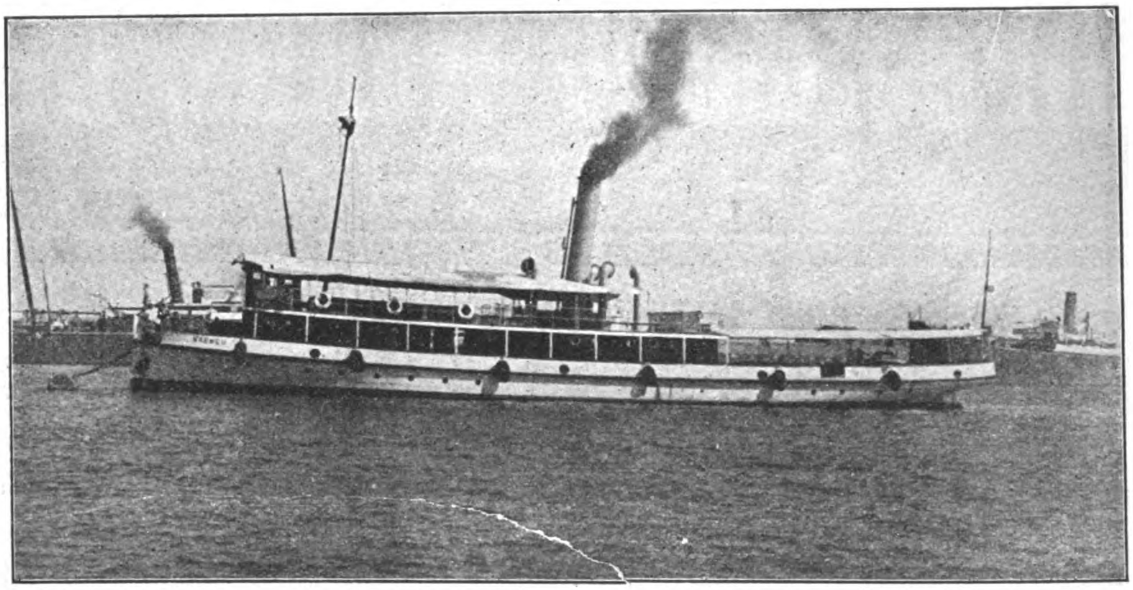

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The Docks are five in number, ranging in length from 360 feet to 560 feet, and breadth of entrance from 57 feet to 82 feet, with the depth of water on the sill from 16 feet to 24 feet.

The Dock charges are very moderate.

The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops are provided with the latest improvements in tools, traveling cranes of 70 tons' capacity, hydraulic and pneumatic machinery.

Lit up by Electric light with railway lines through workshops and yards.

Powerful salvage appliances can be supplied at short notice. Enquiries immediately attended to.

Estimates given for all classes of work; Coast Steamers, Side and Stern-Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools, Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and engineering accessories generally.

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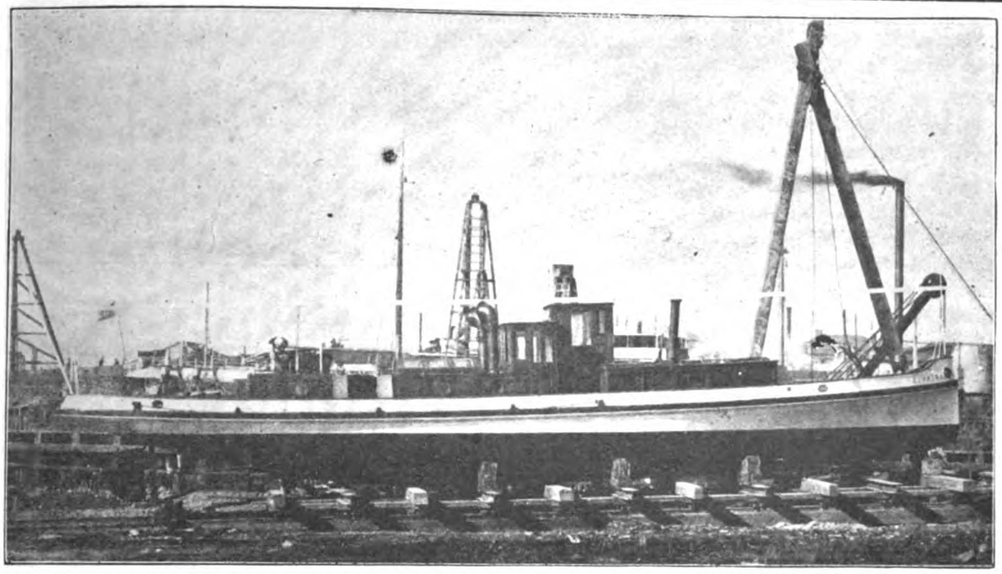

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ESTIMATES given for every description of Engineering and Constructional work and repairs, including supplying and installing of HOT WATER and STEAM HEATING in all its branches and HOT and COLD WATER SUPPLIES.

THE WORKS are electrically driven, and are equipped throughout with up-to-date machinery and labour saving devices, including an HYDRAULIC PLANT, and appliances to undertake constructing or repairing SHIPS, ENGINES, BOILERS, etc.

EXPERIENCED EUROPEAN STAFF SUPERVISES ALL BRANCHES OF WORK

RAILWAY COACHES AND GOODS WAGONS ASSEMBLED—STRUCTURAL STEEL WORK ERECTED

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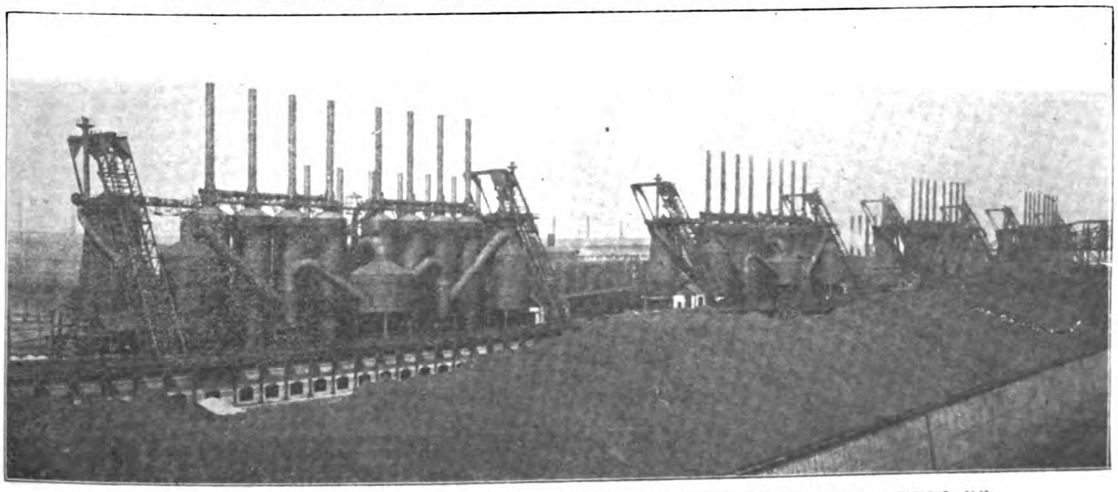

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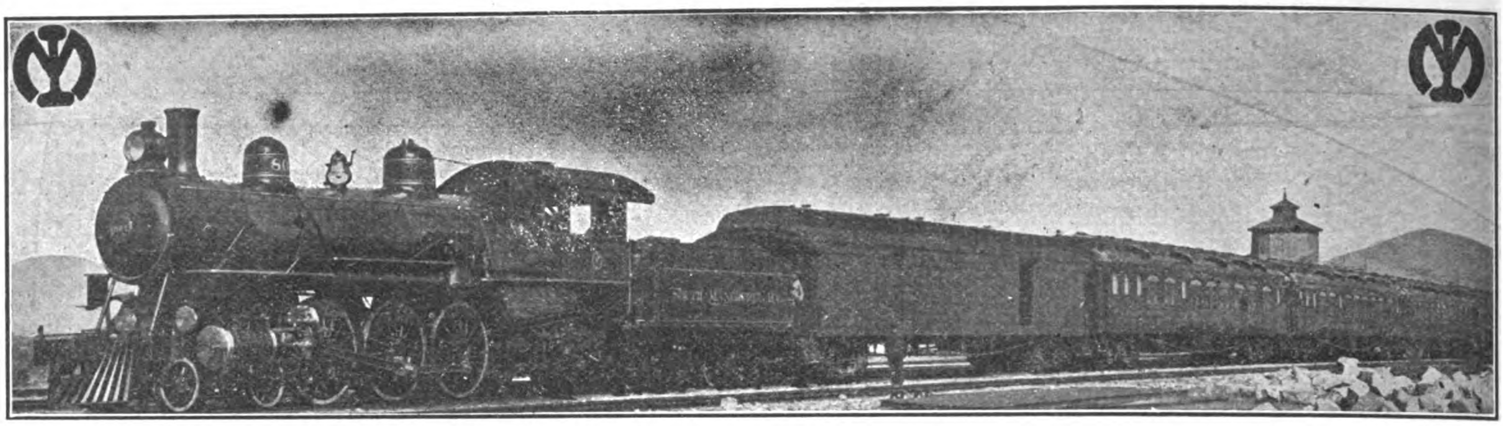

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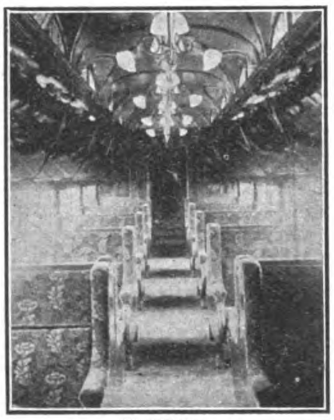

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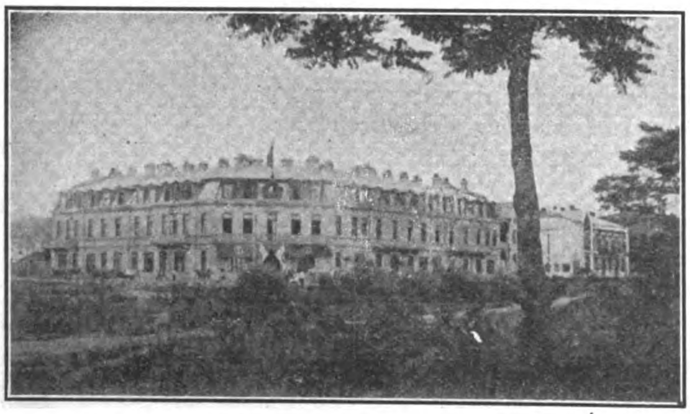

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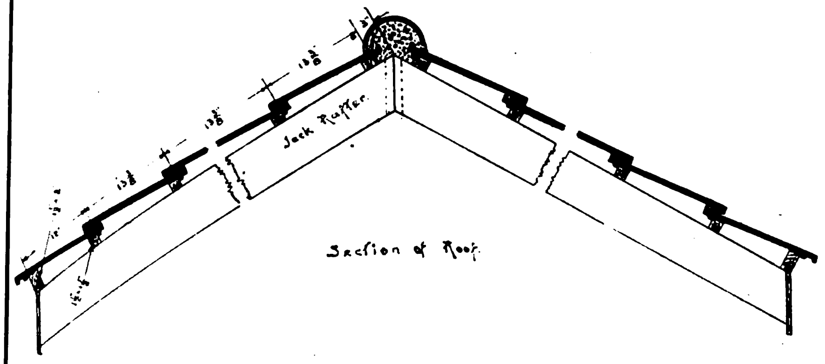

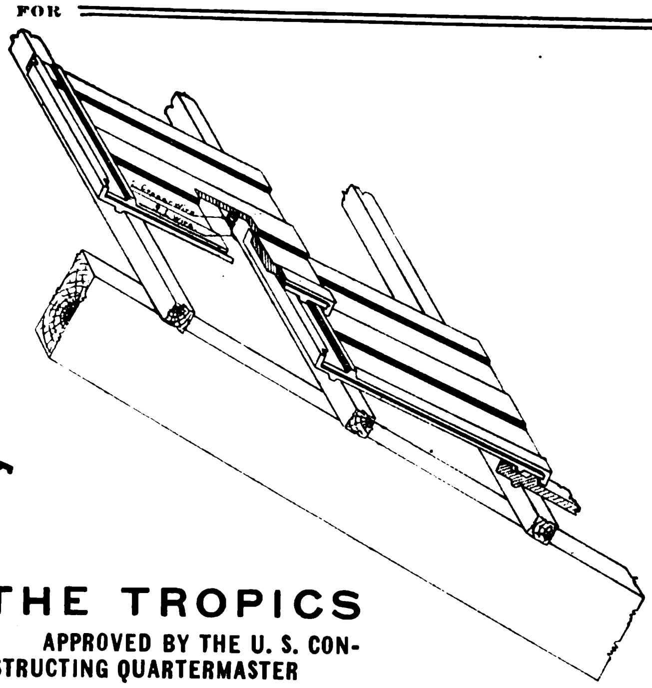

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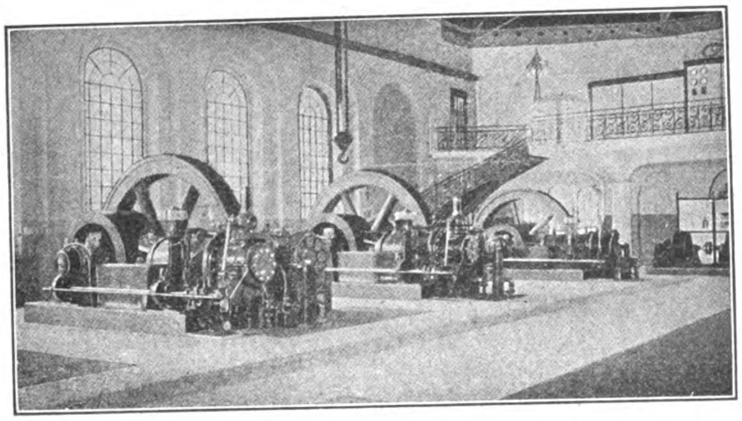

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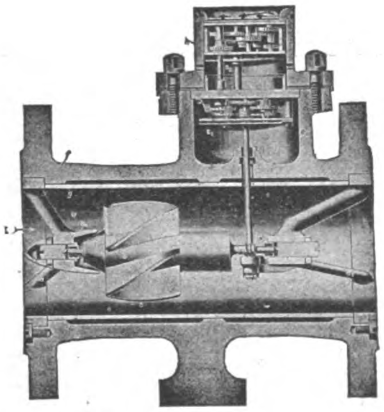

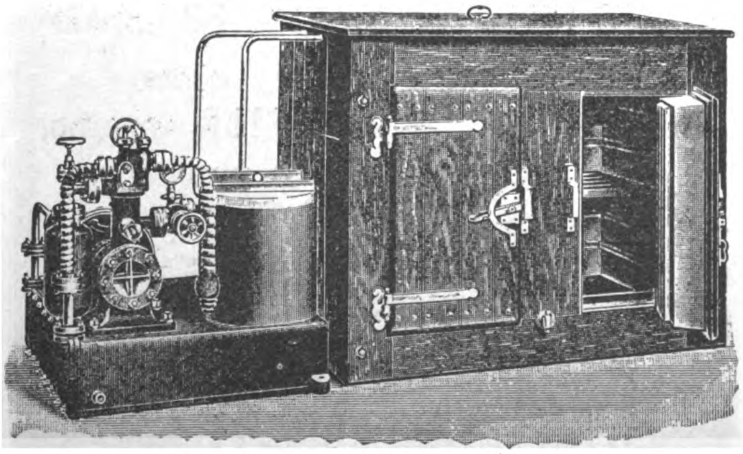

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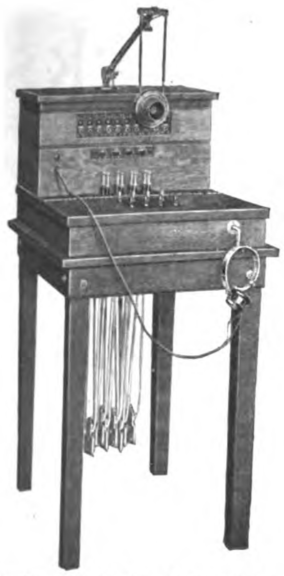

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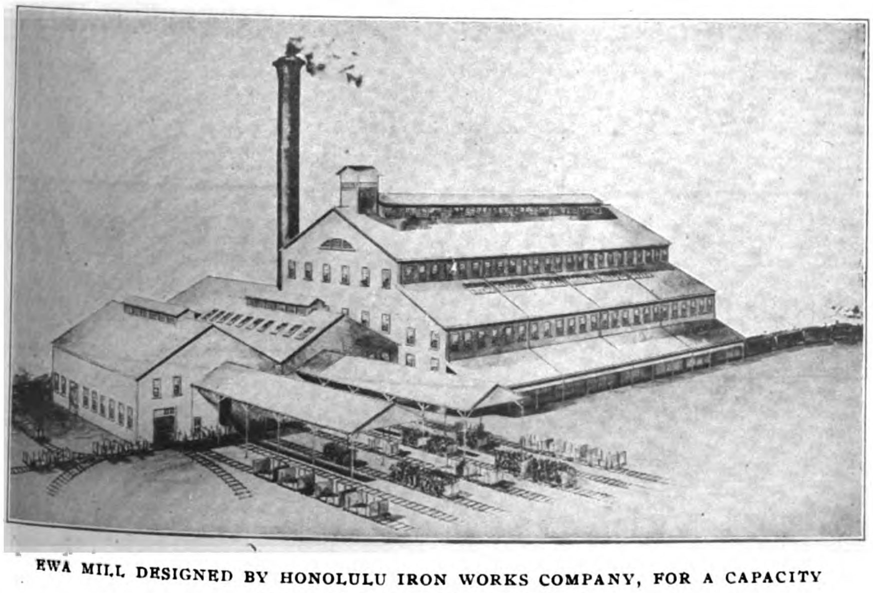

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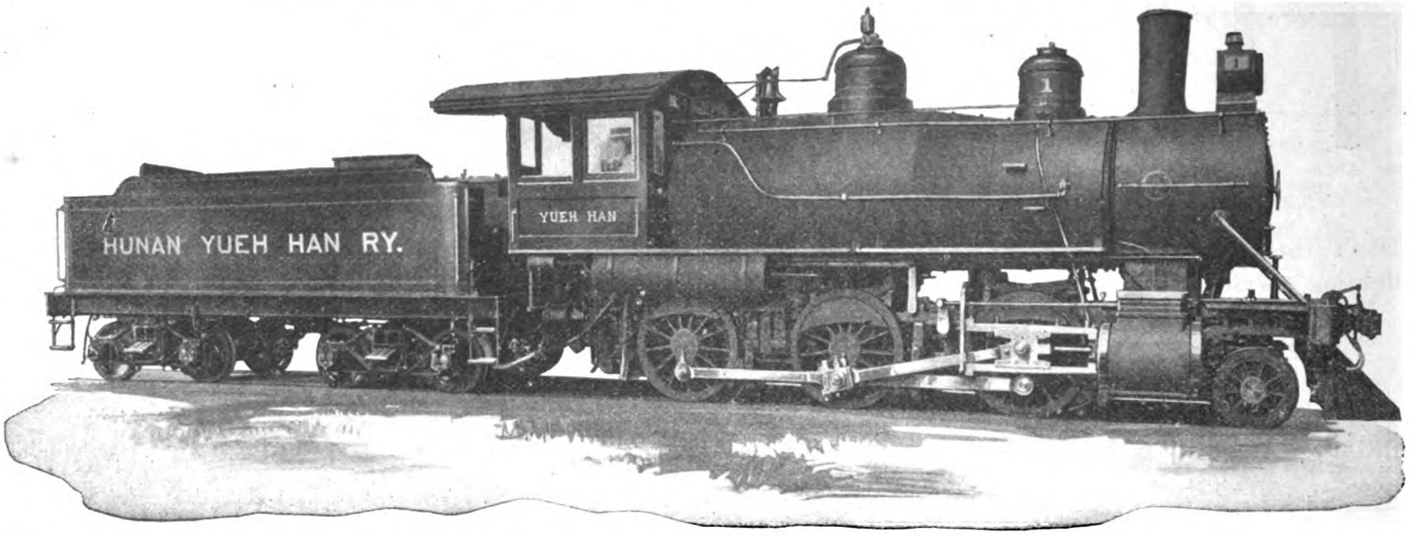

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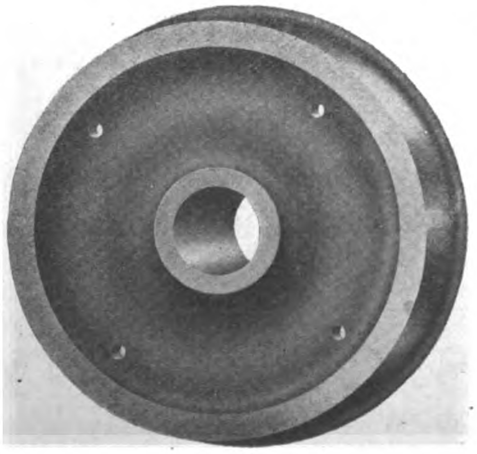

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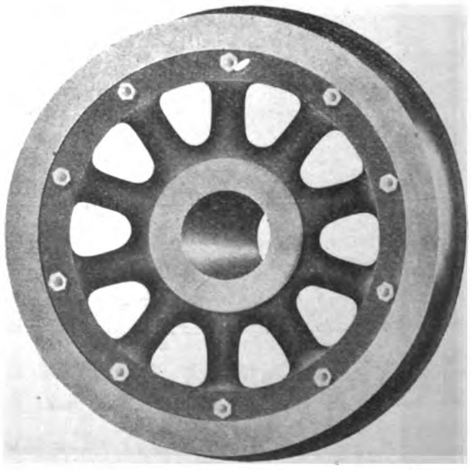

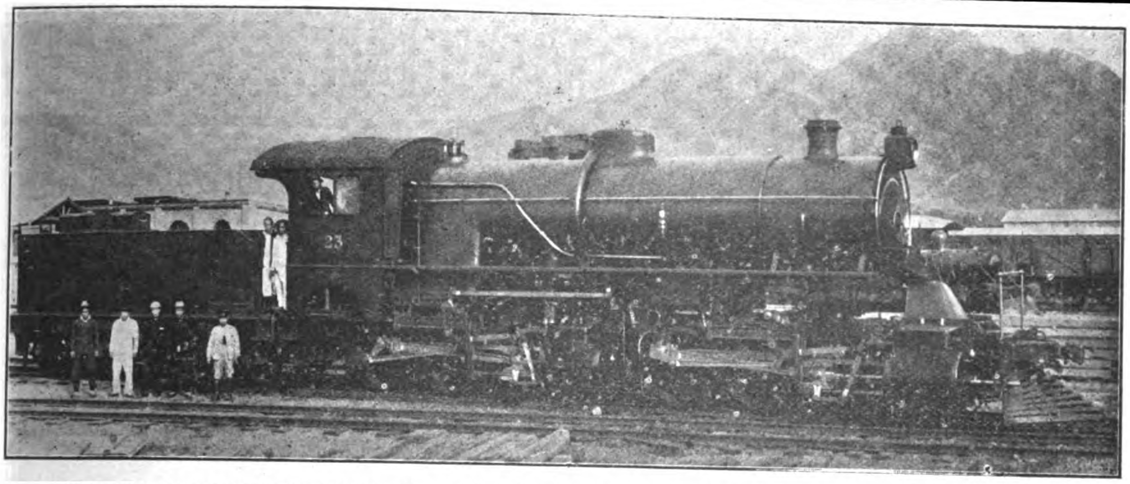

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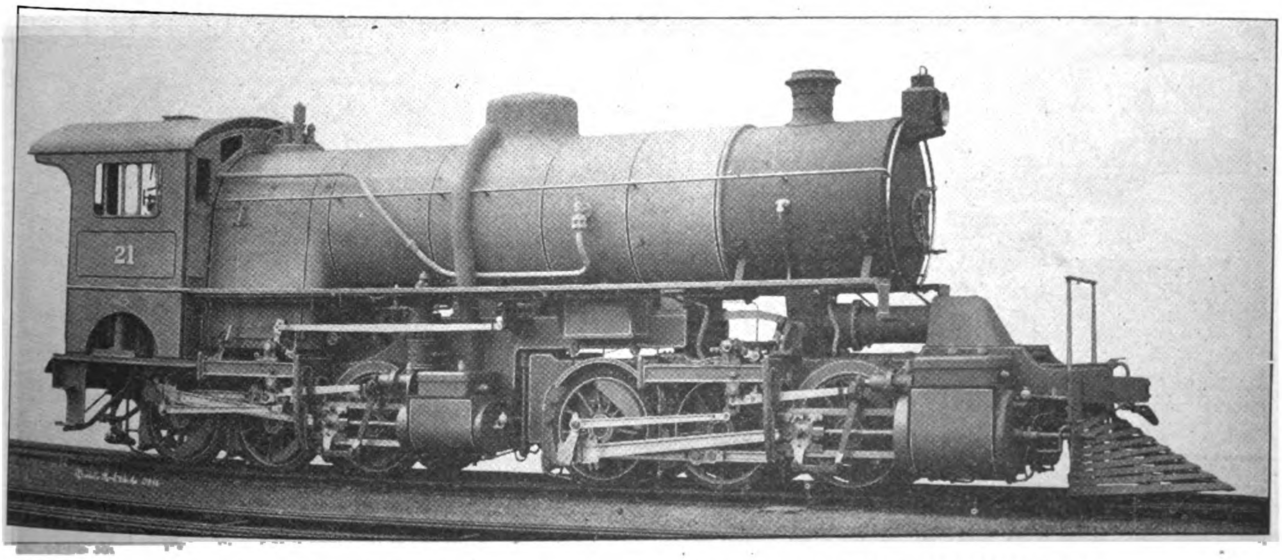

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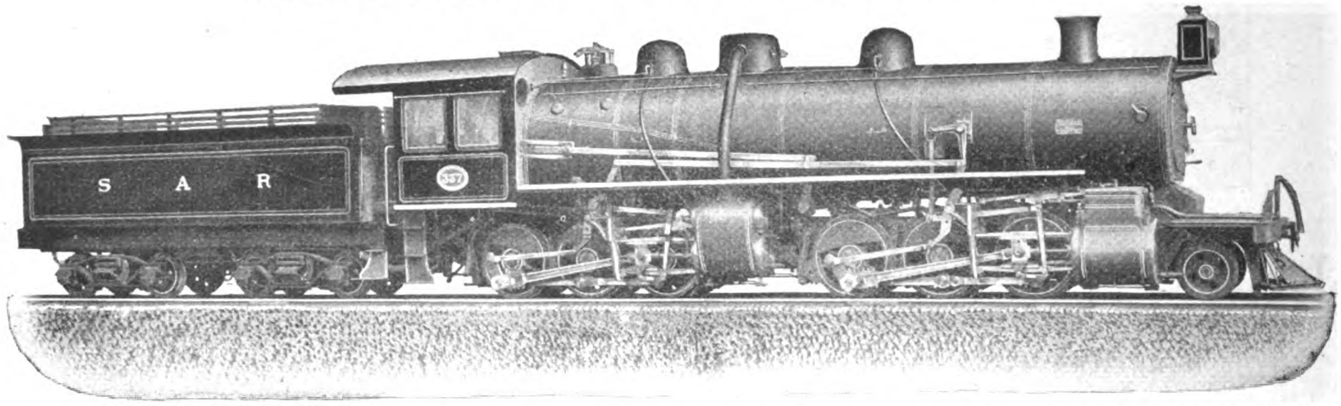
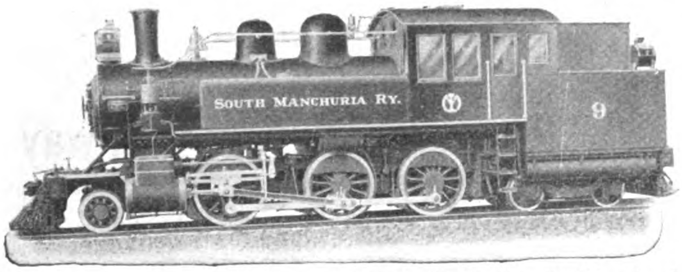
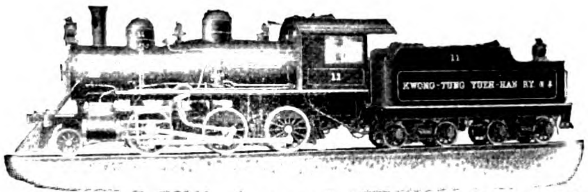


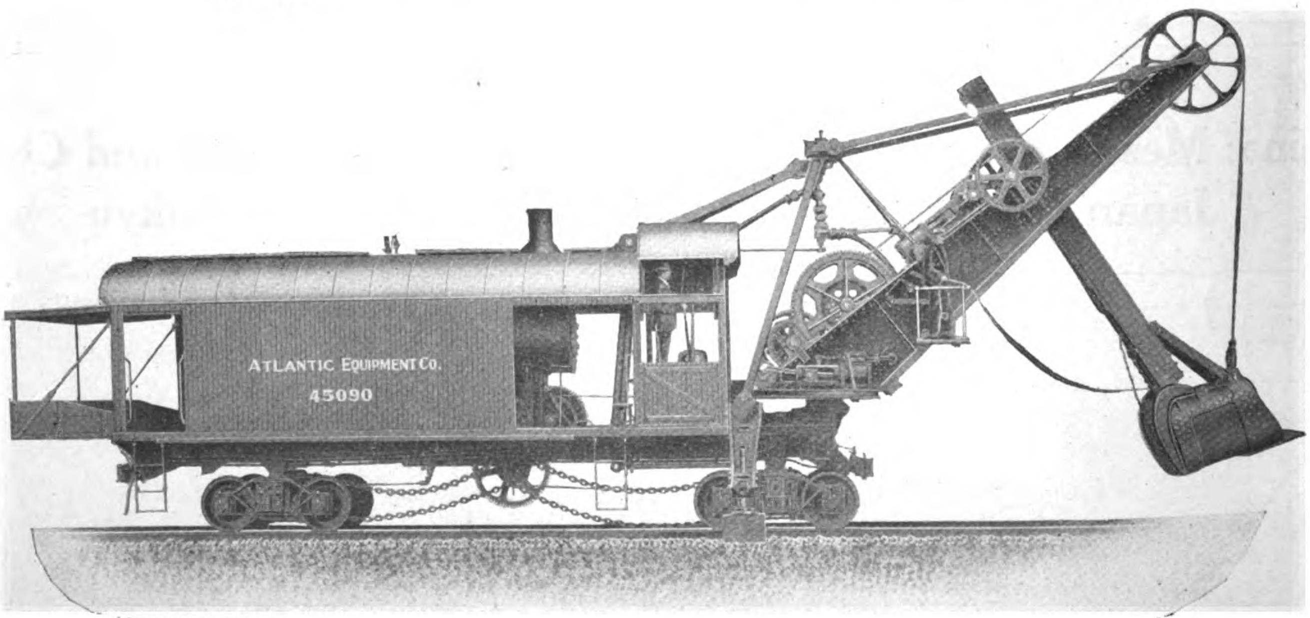
Articulated compound locomotive built for South African Government Railways to operate heavy trains on roads with steep grades and sharp curves.



Six coupled, double end locomotive built for South Manchuria Railway.



Mogul type locomotive built for Kwong-Tung Yueh Han Railway.



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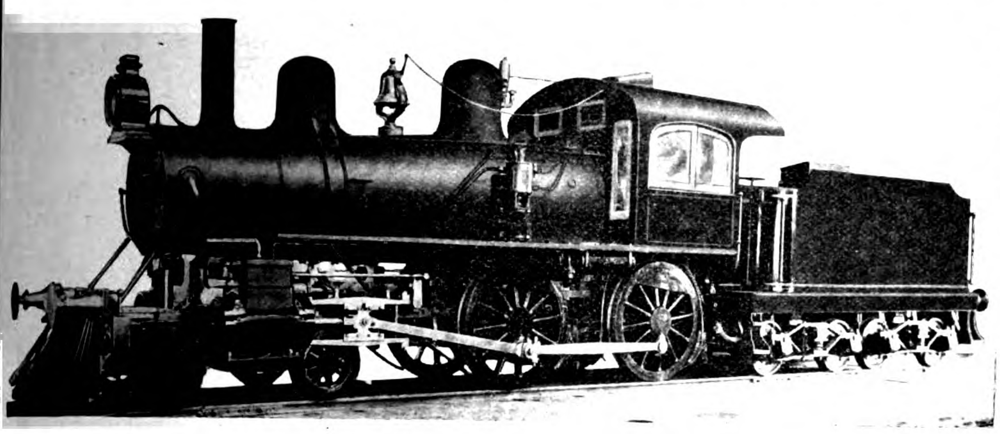

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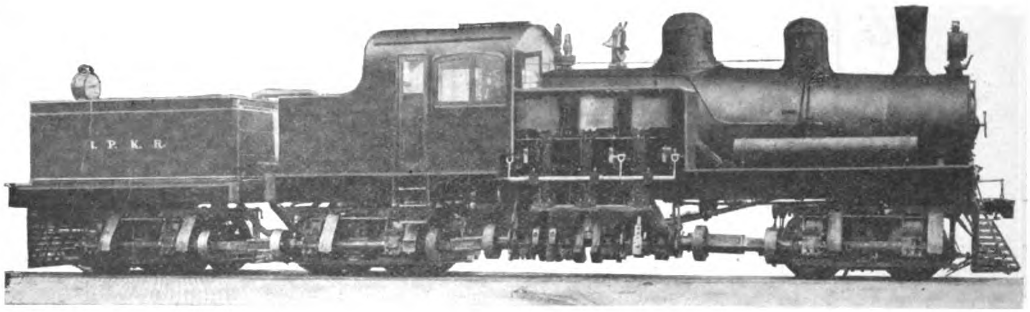

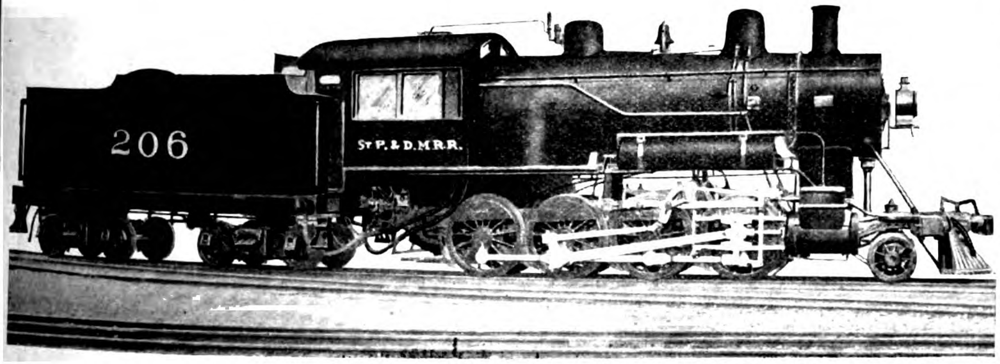

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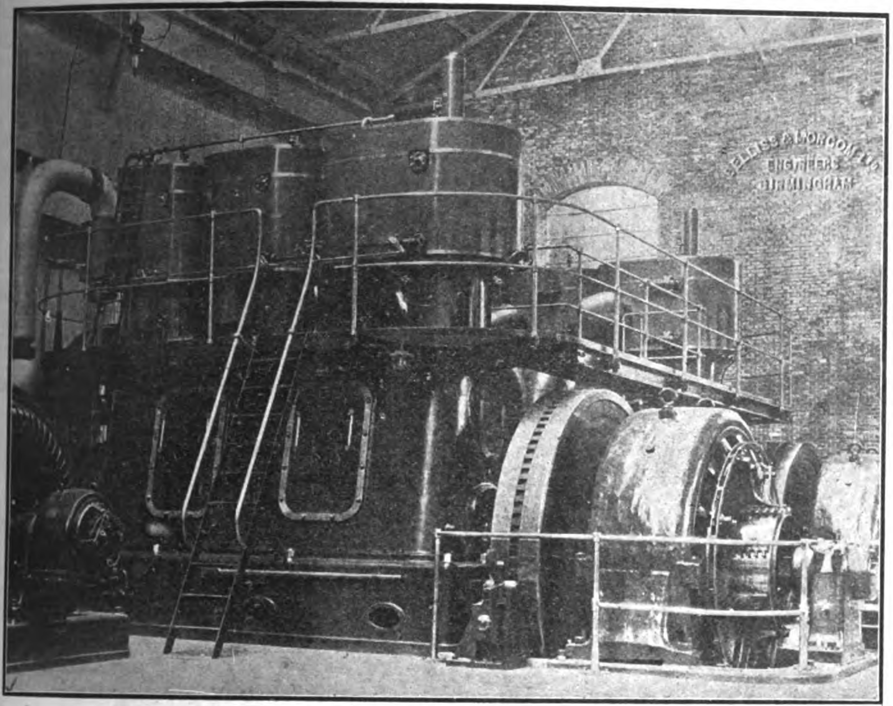

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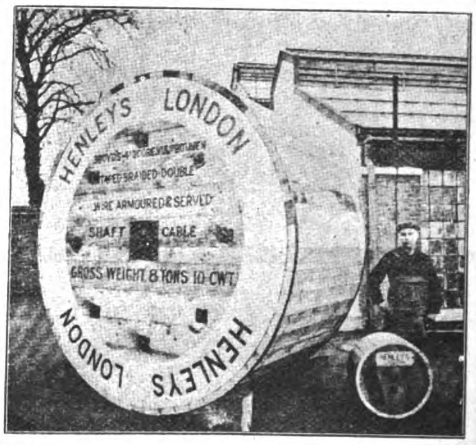

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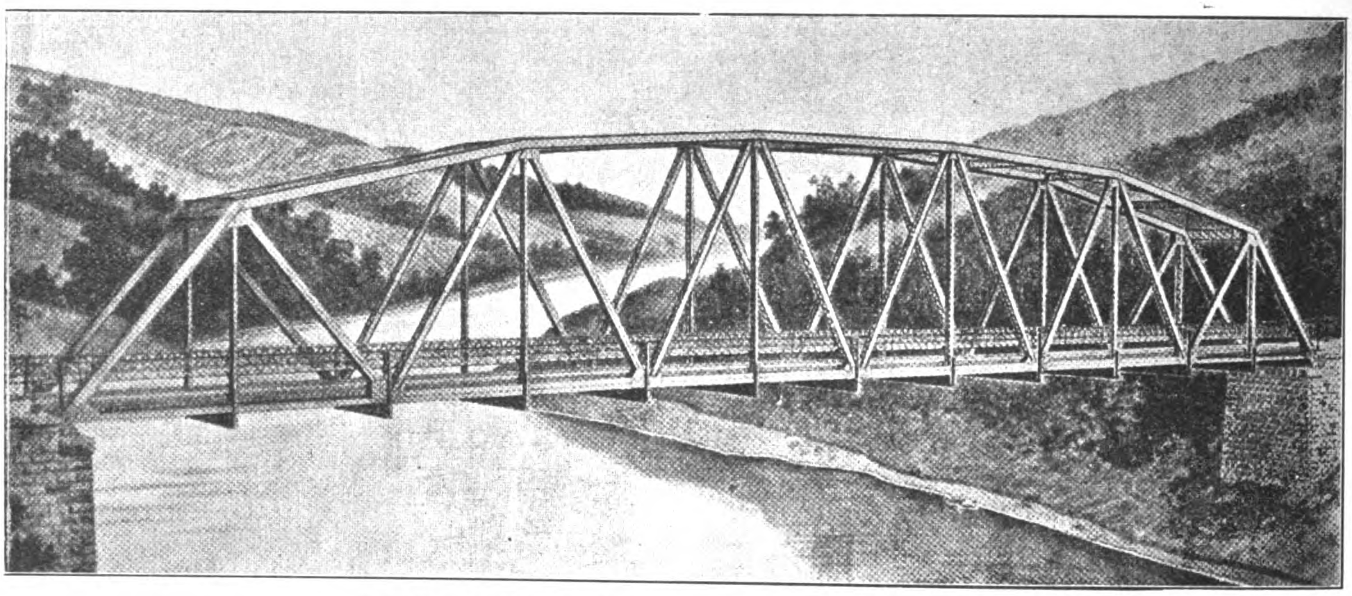

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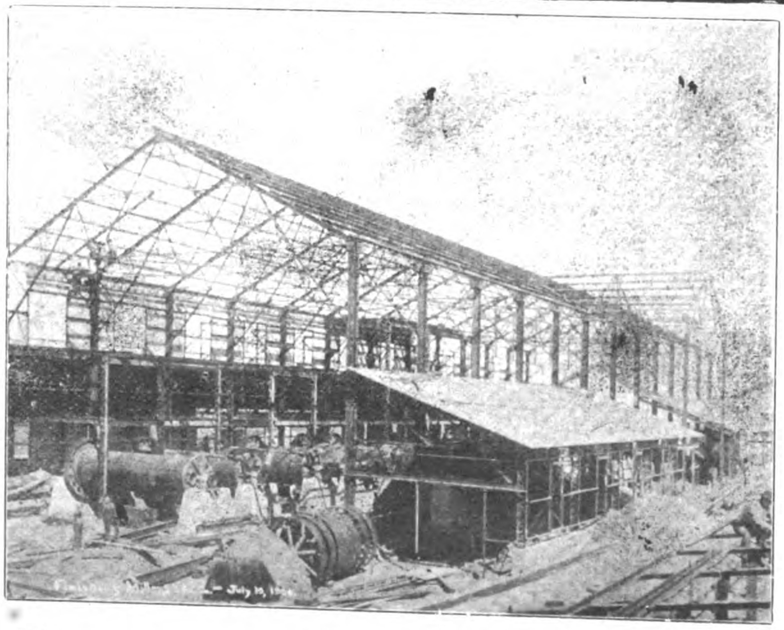

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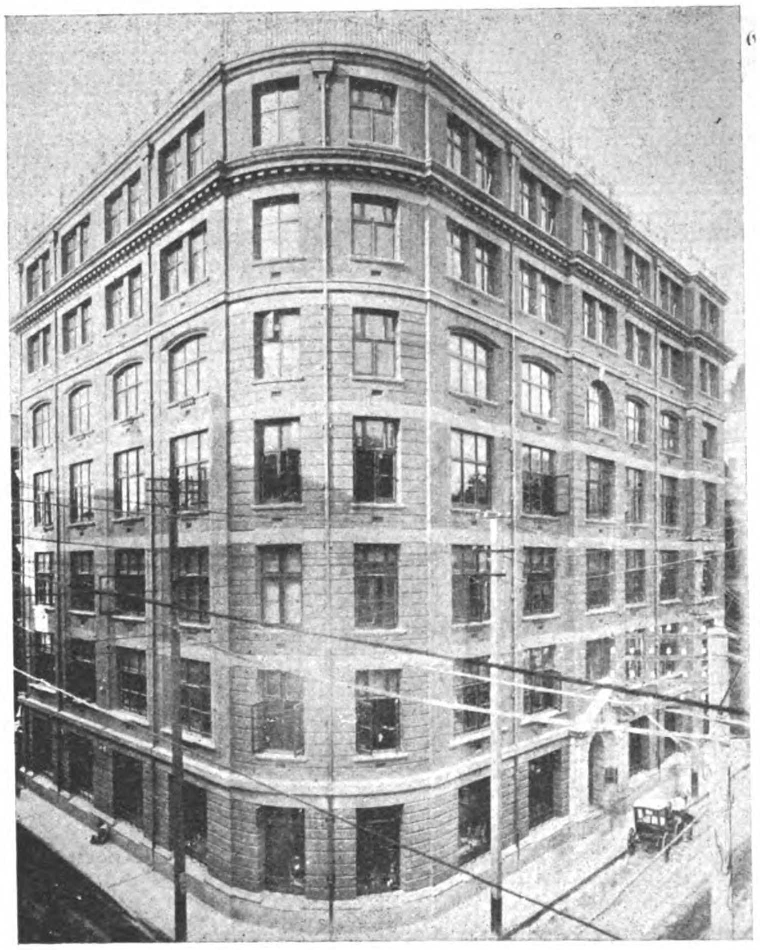

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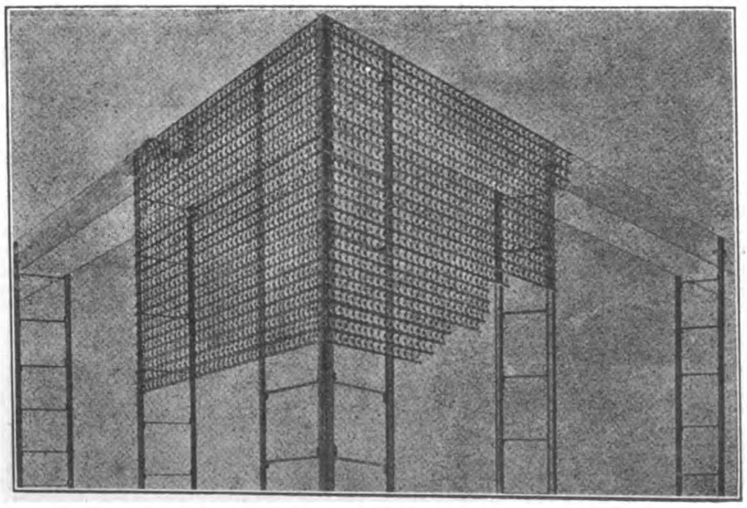

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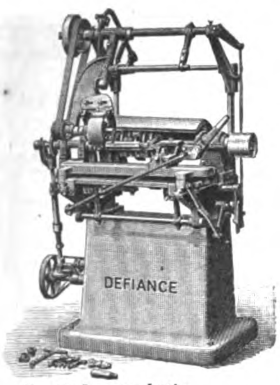

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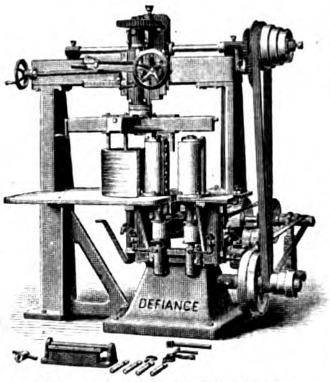

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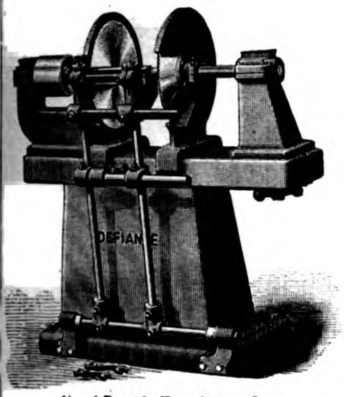
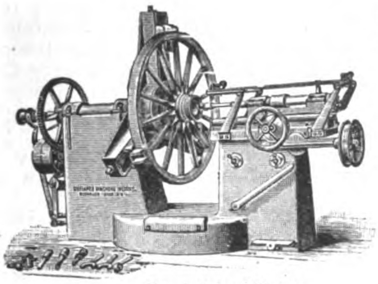
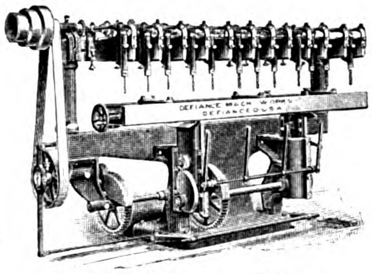
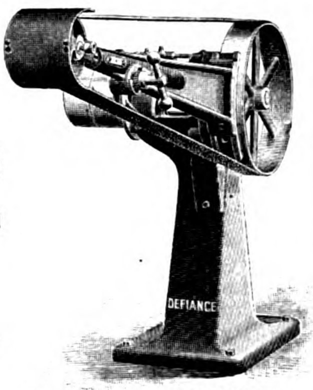

No. 6 Double Equalizing Saw


No. 1 Wheel Boxer


No. 10 Gang Boring Machine



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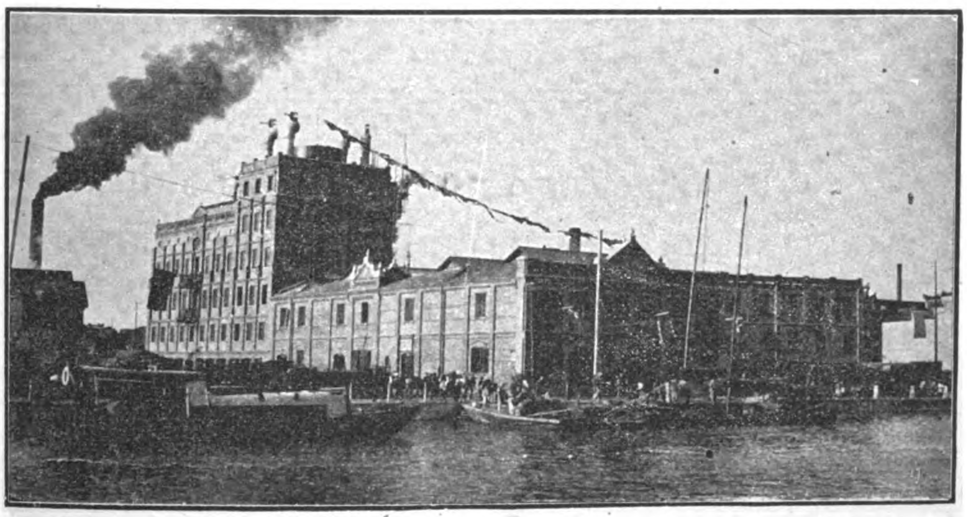

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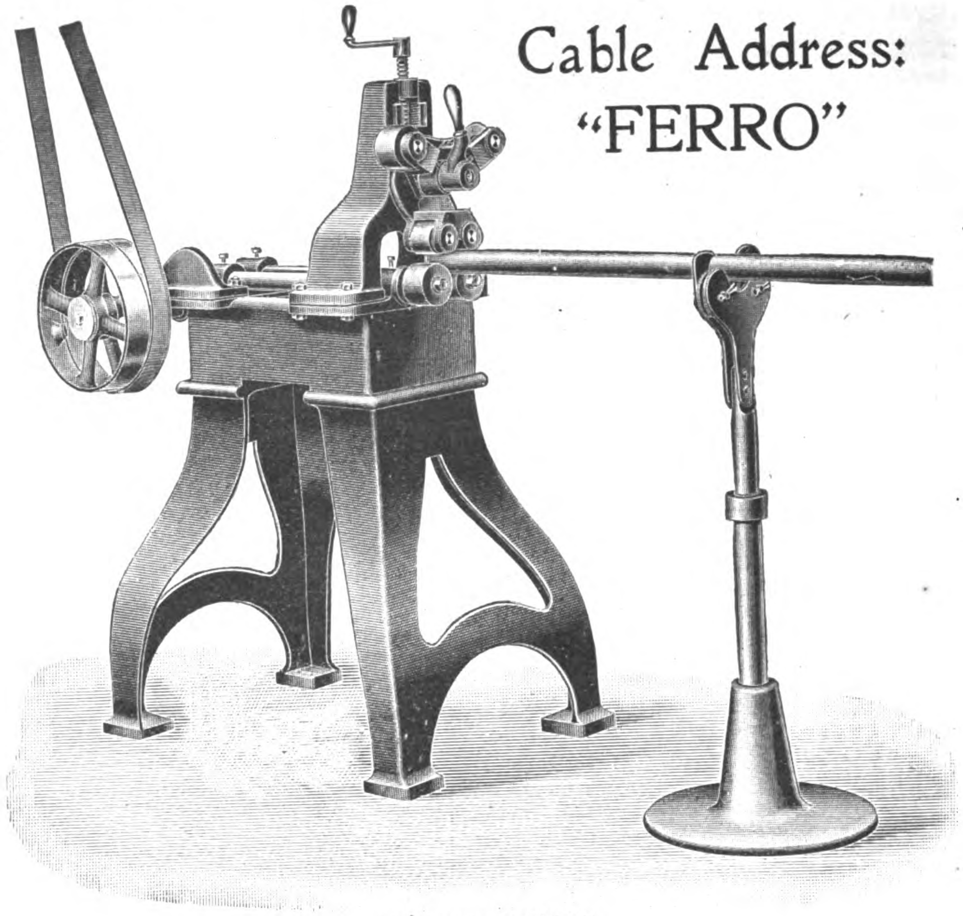

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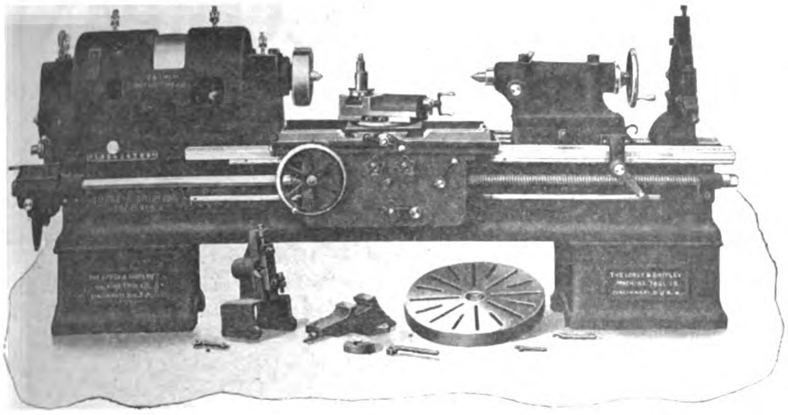

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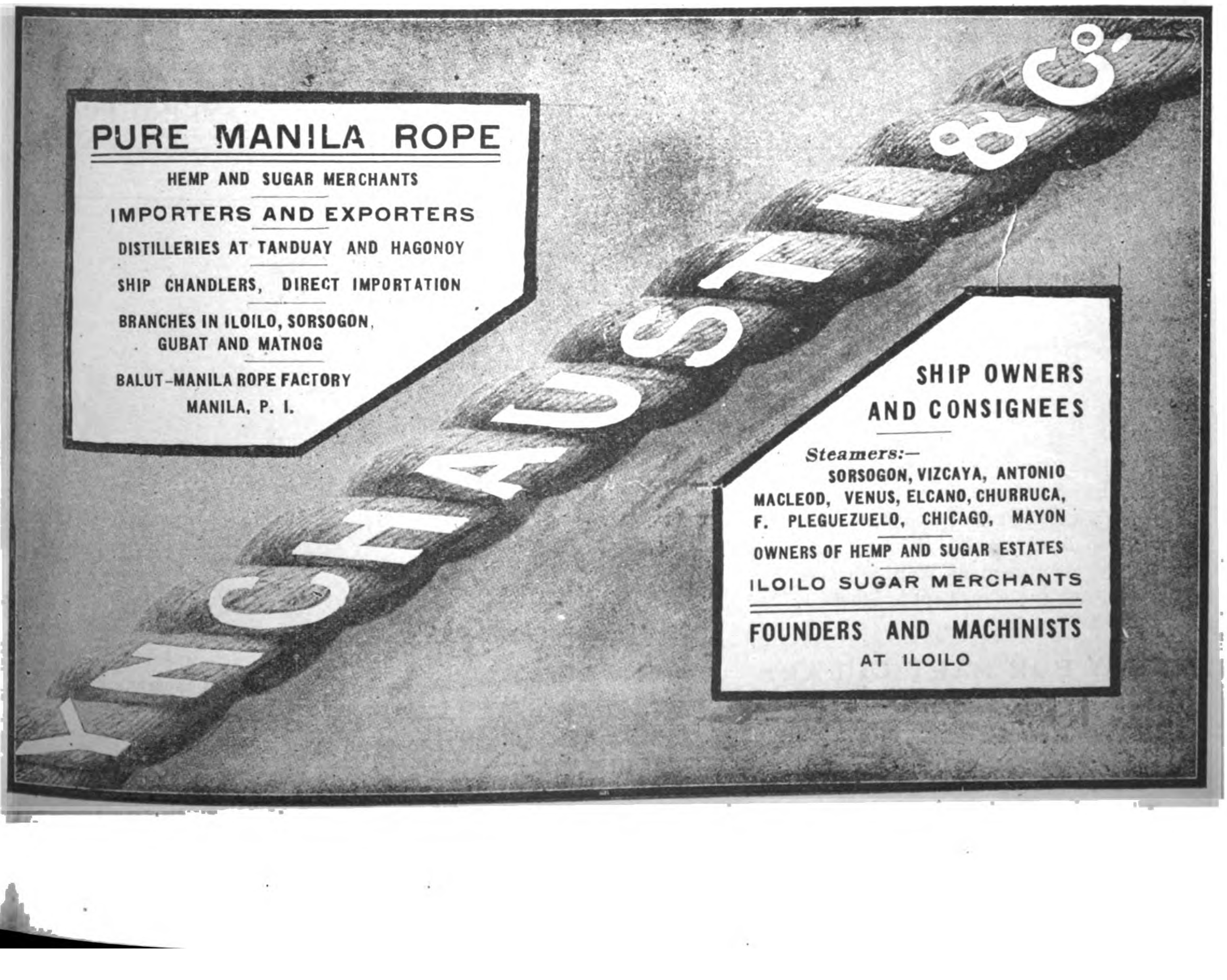

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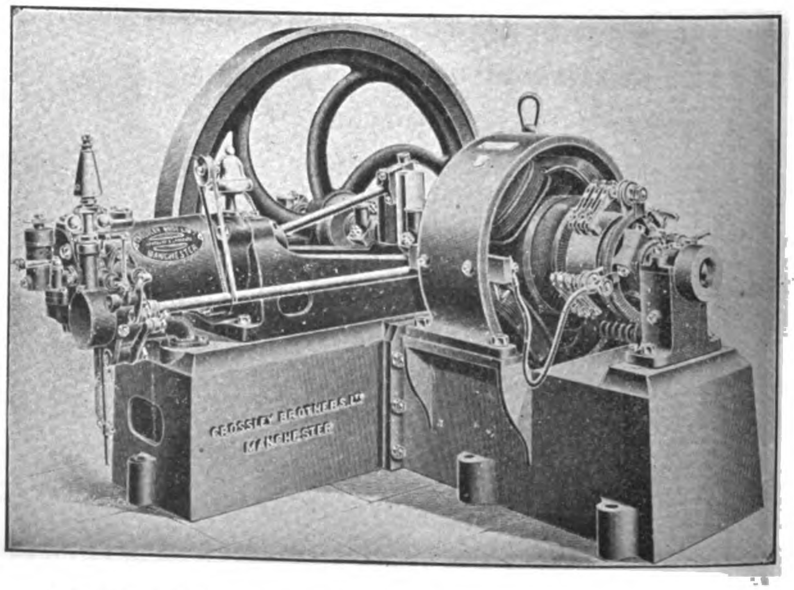

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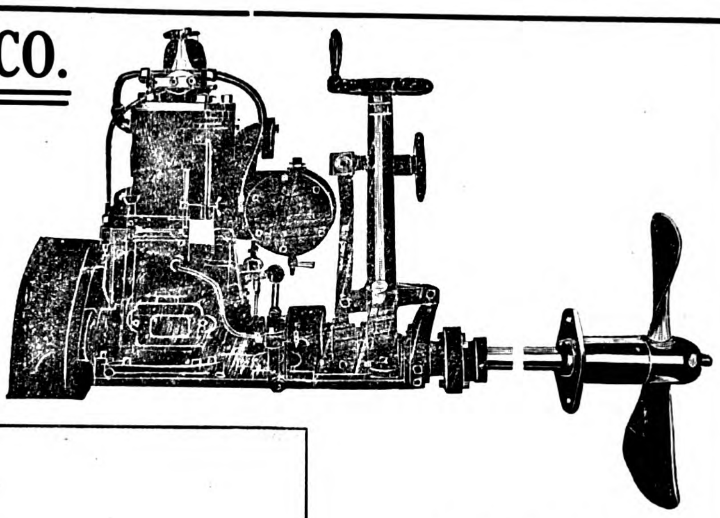

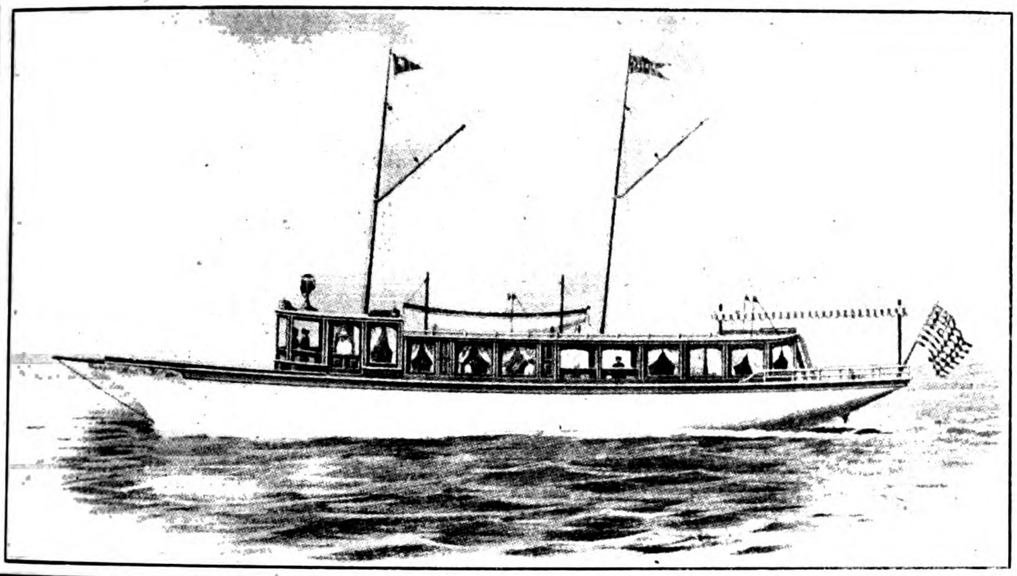

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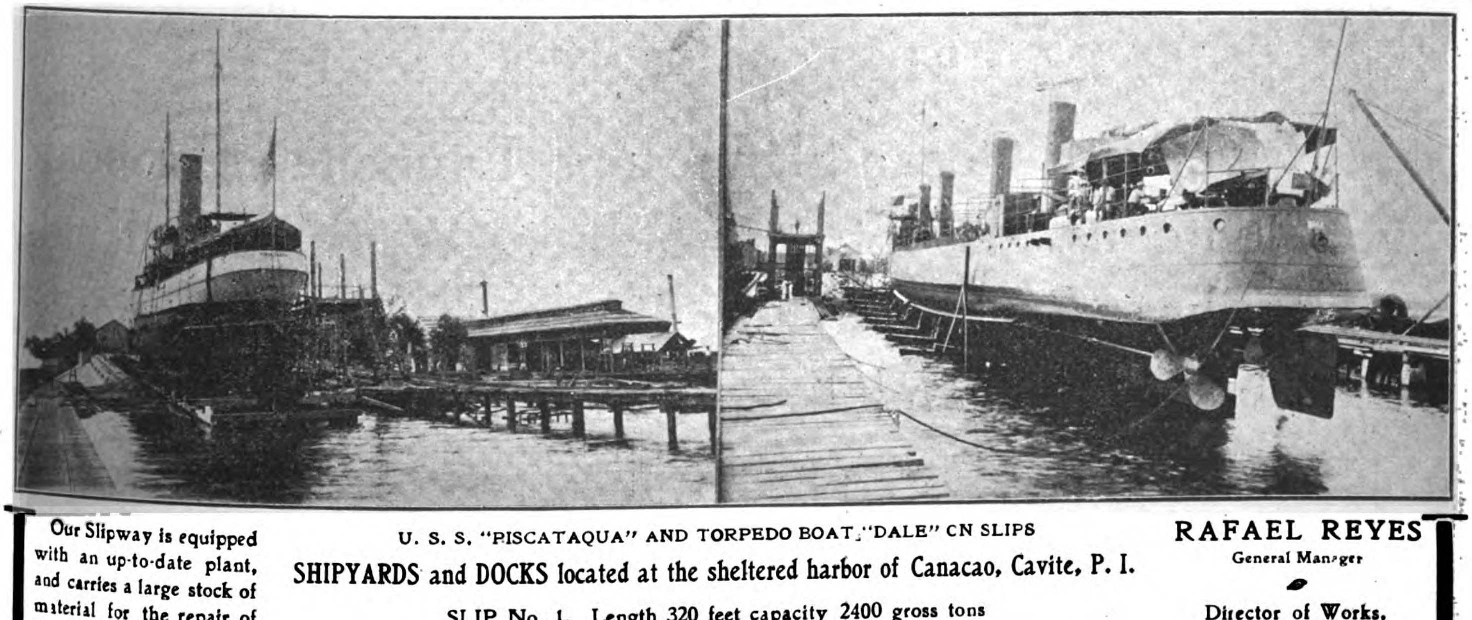

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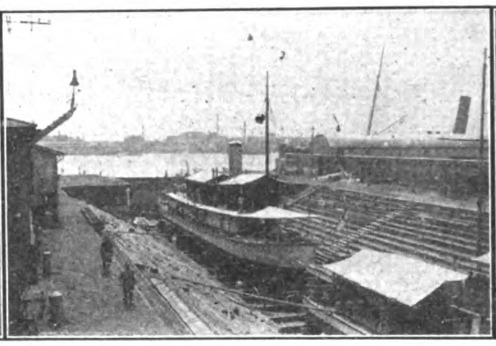
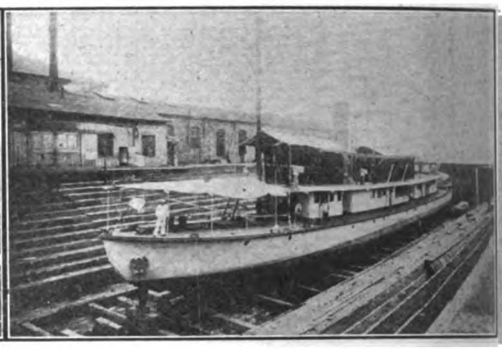

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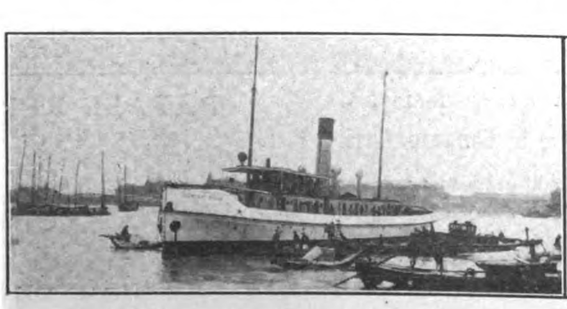
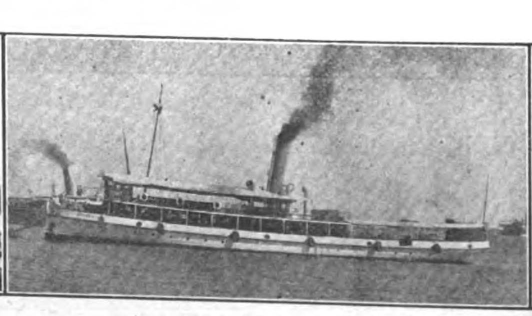

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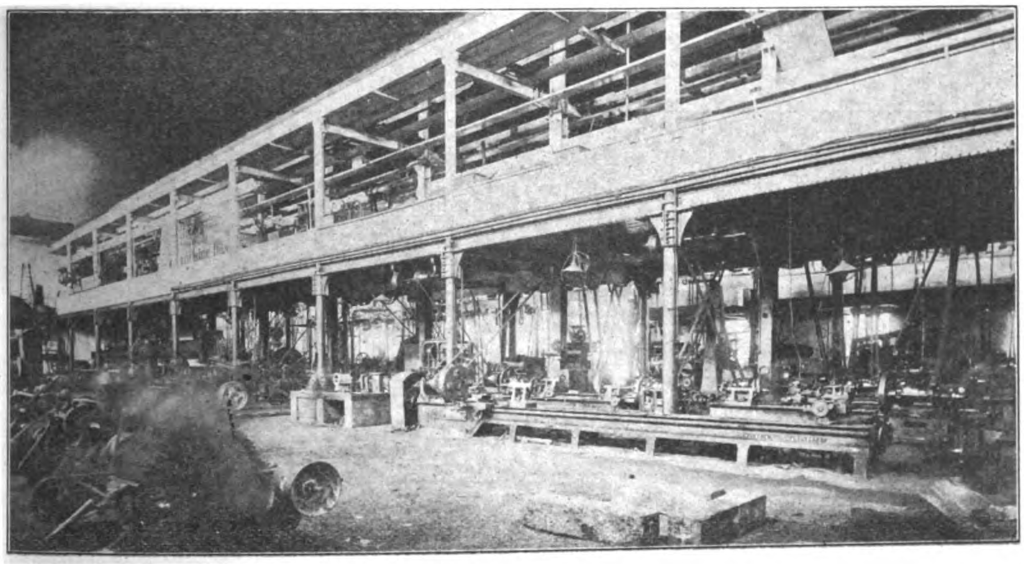

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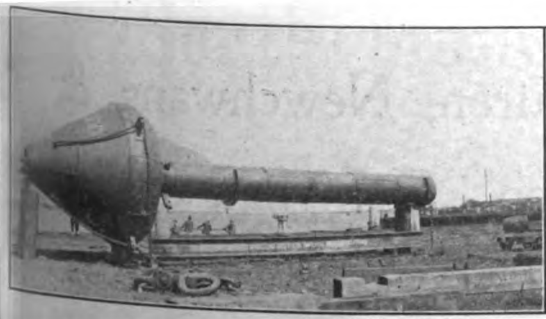

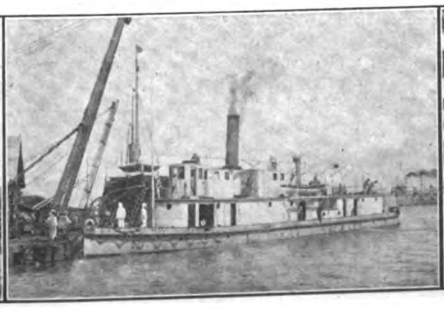

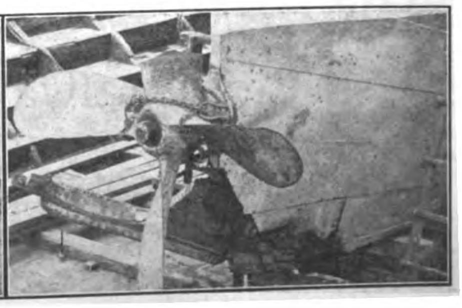

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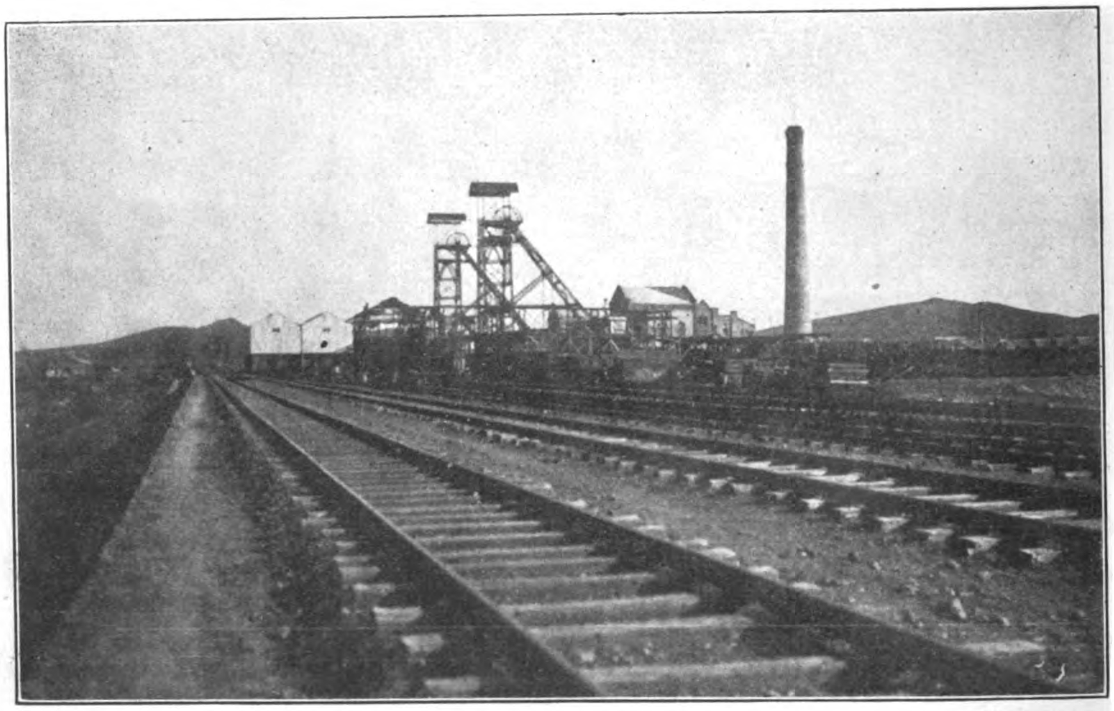

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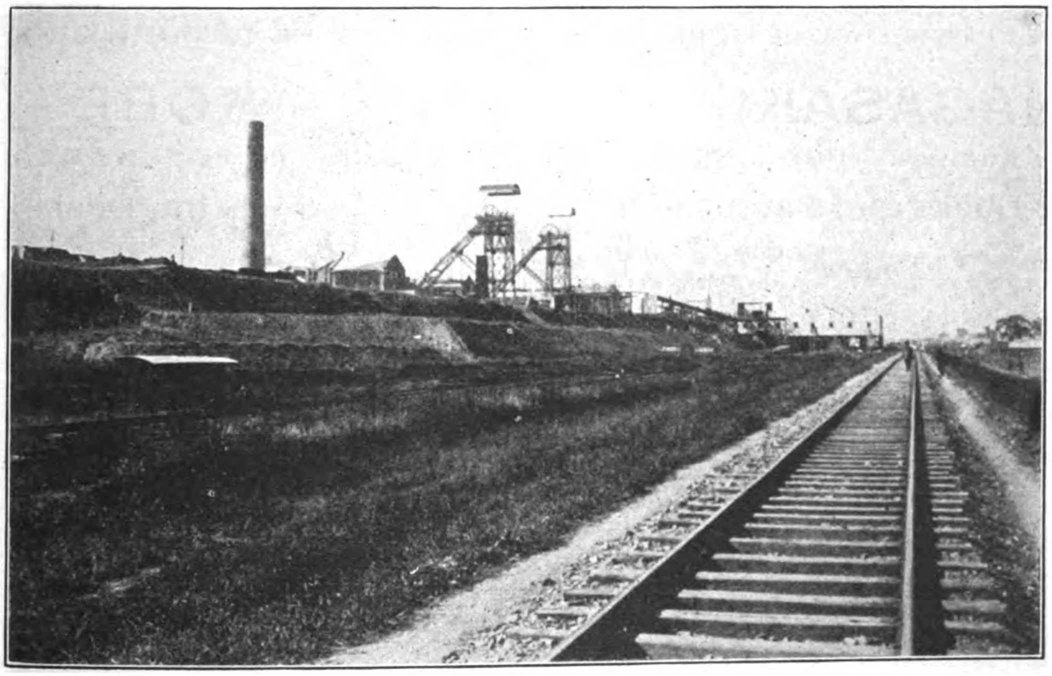

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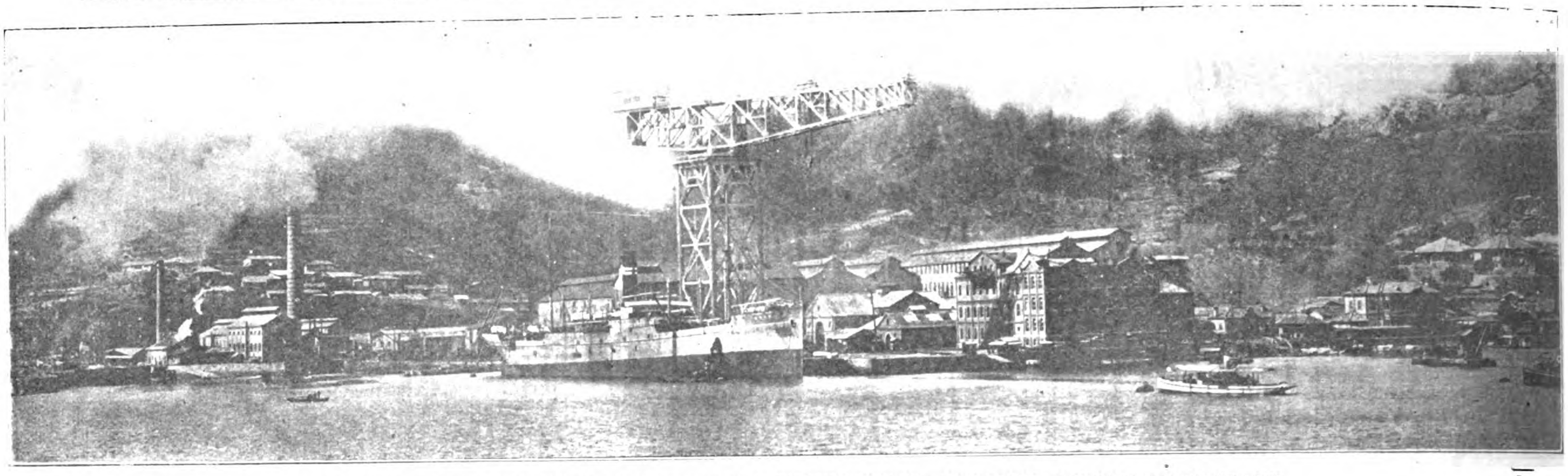

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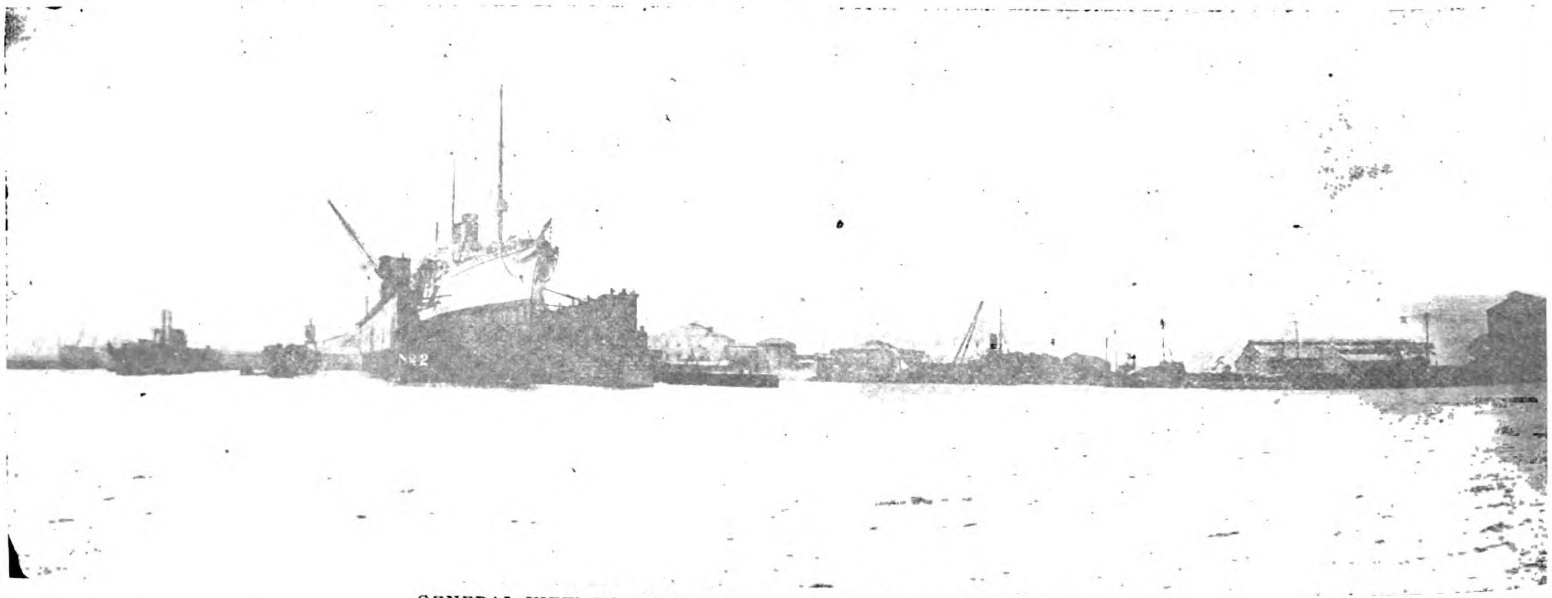

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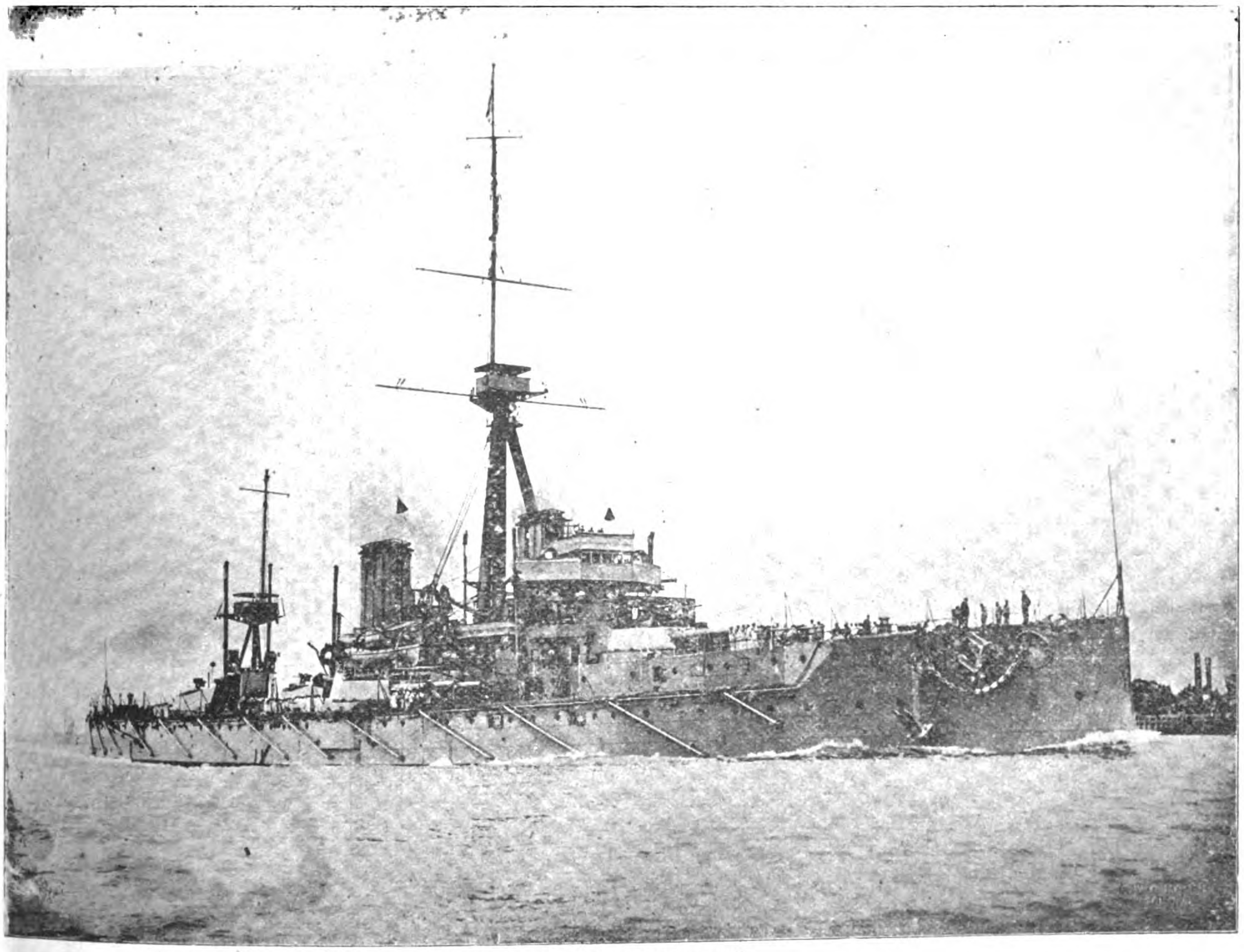

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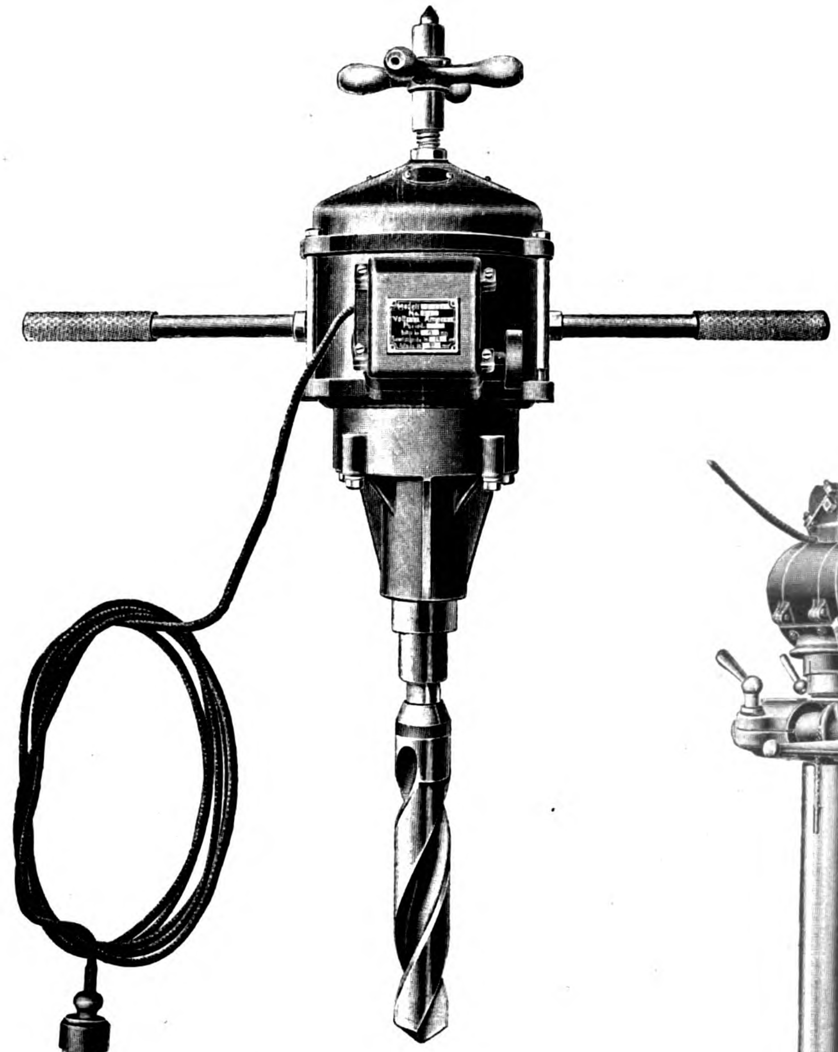

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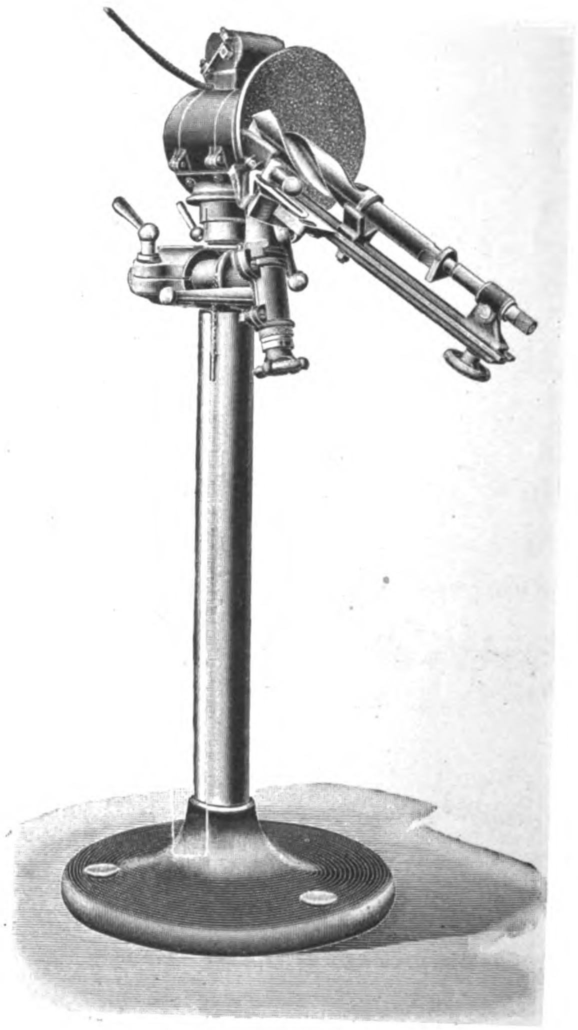

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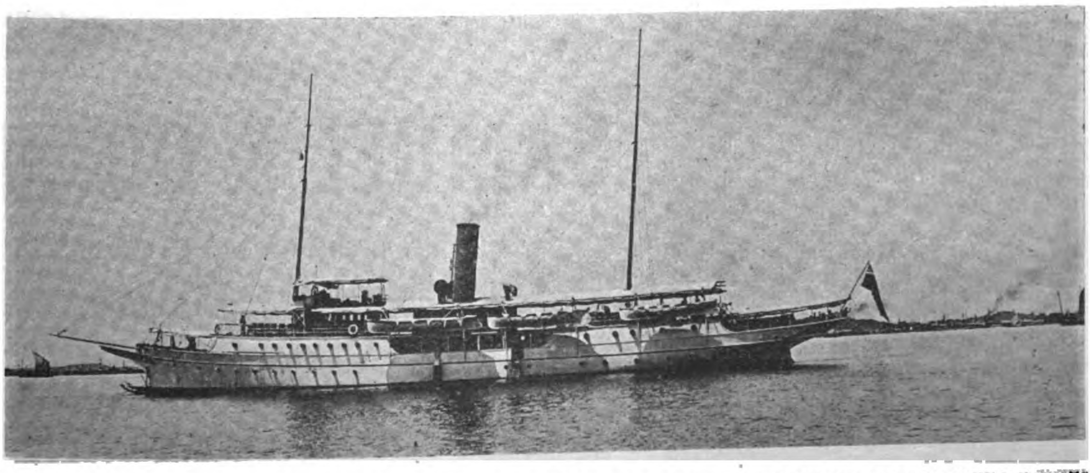

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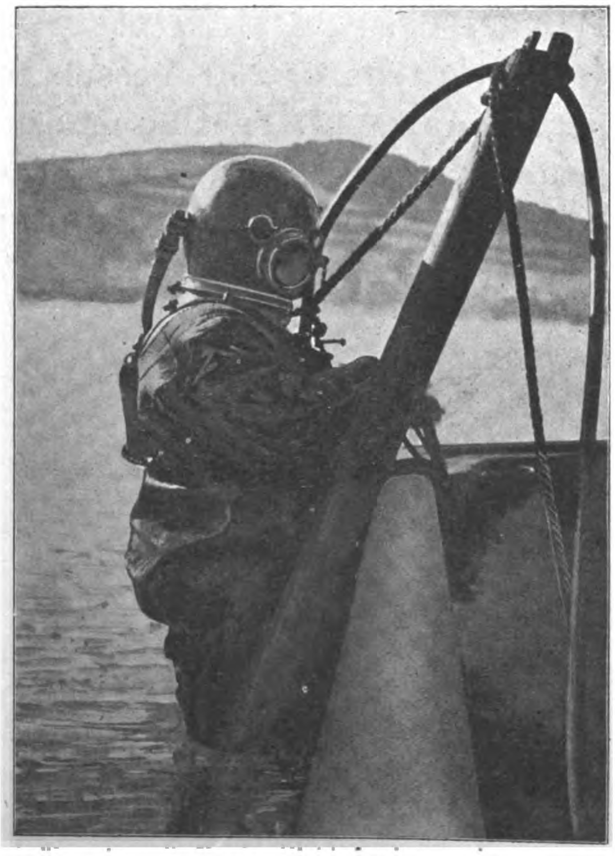

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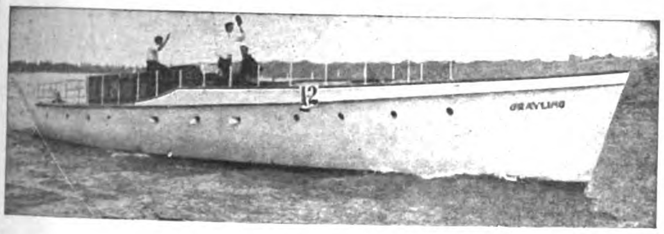

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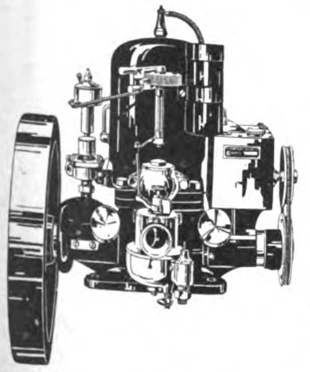

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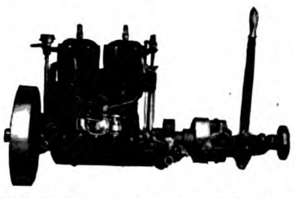

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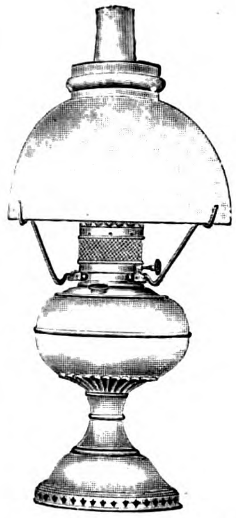

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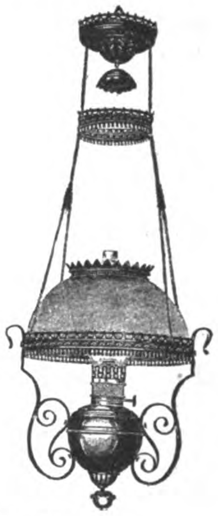

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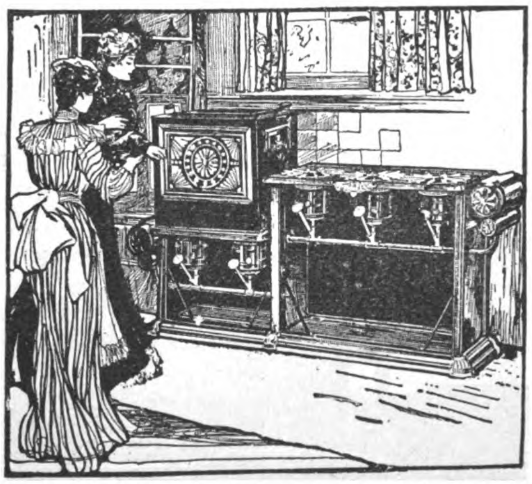

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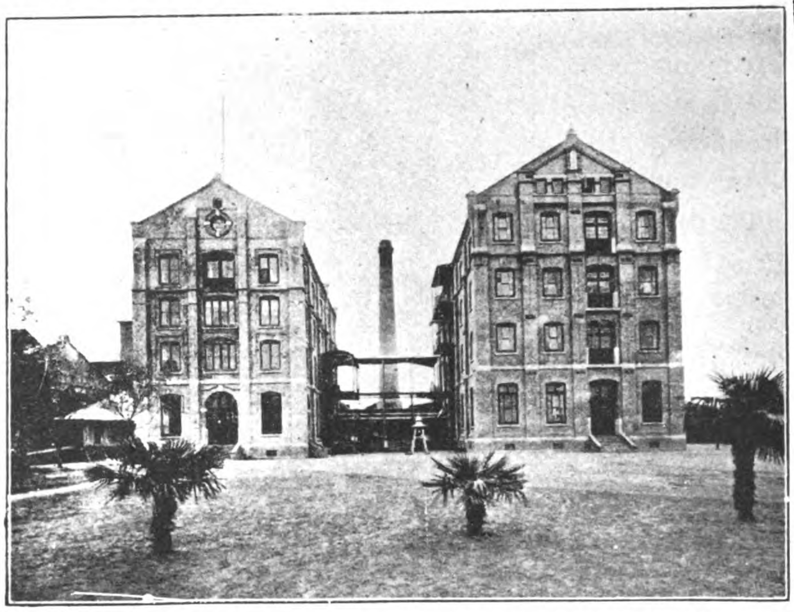

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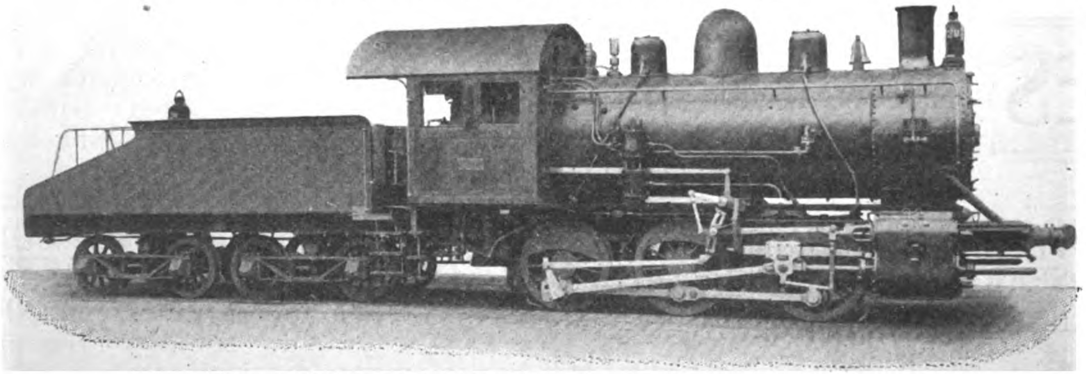

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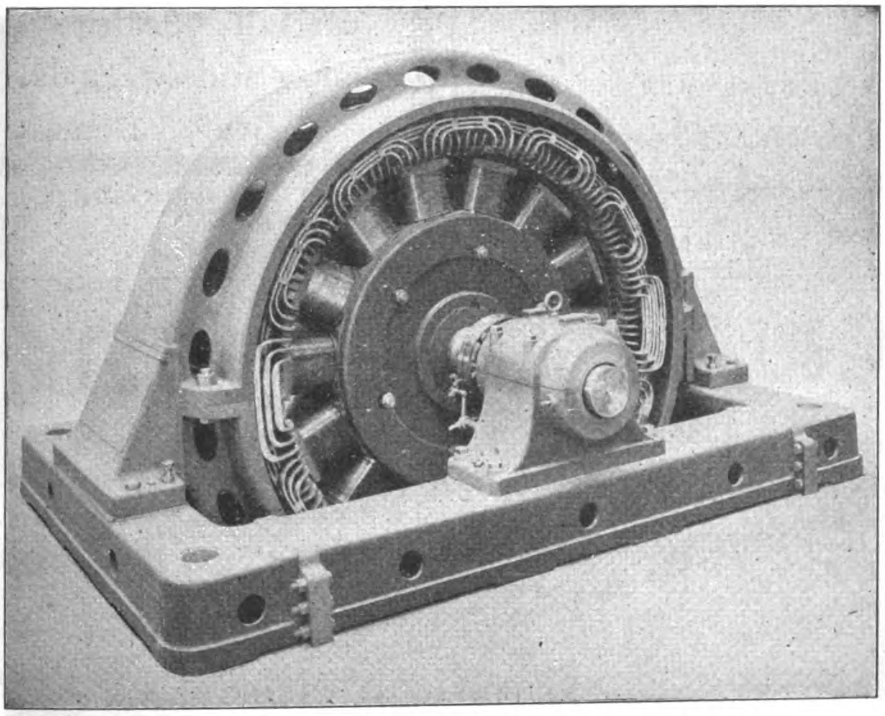

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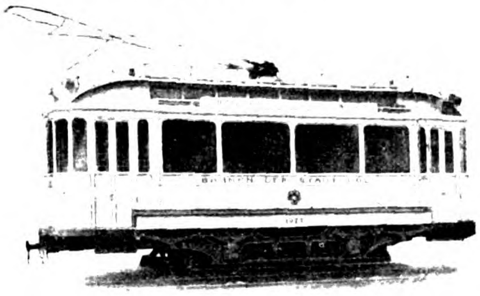

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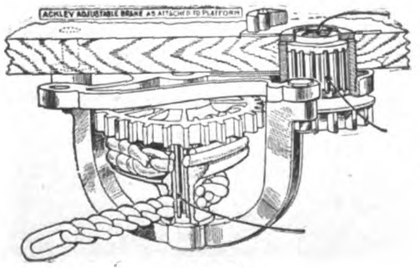

FIG. 1

FIG. 3

The ACKLEY ADJUSTABLE is the only gear brake that can be attached to the platform at any
angle, owing to the adjustable yoke.
It requires no machine fitted bearings on the staff—(Fig. 2) simply square the staff in blacksmith
shop for loose fit—reducing cost of labor to less than one-fourth required to fit any other geared brake
staff.
All movable parts revolve on roller bearings (B, C, Figs. 1 and 3), eliminating friction, thereby giving
ease of action in applying brake shoes and releasing.
Three different gear ratios, 12×36, 14×34 and 18×30, all interchangeable in same frame, can be
obtained with different sized winding drums, as desired, to take up required amount of slack chain,
according to type or weight of car.
It is the only gear brake which has no staff bearing in the frame. The journaling of the pinion
(Fig. 4), in the frame (Fig. 3 at D), independently of the staff (Fig. 2), places the gears at a fixed posi-
tion, preventing **BINDING,** which occurs to gear brakes having staff bearings in frame. (See THE
OLD—Figs. 5 and 6, G and I.)
Here is the conclusion: It is EASY AND INEXPENSIVE TO INSTALL; POWERFUL, YET
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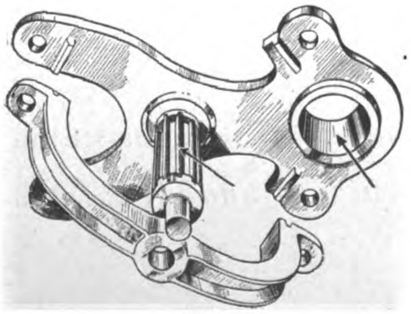

FIG. 2

FIG. 4

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VOL. VI. MANILA, P. I., SHANGHAI, AND YOKOHAMA, APRIL, 1911 No. 11.

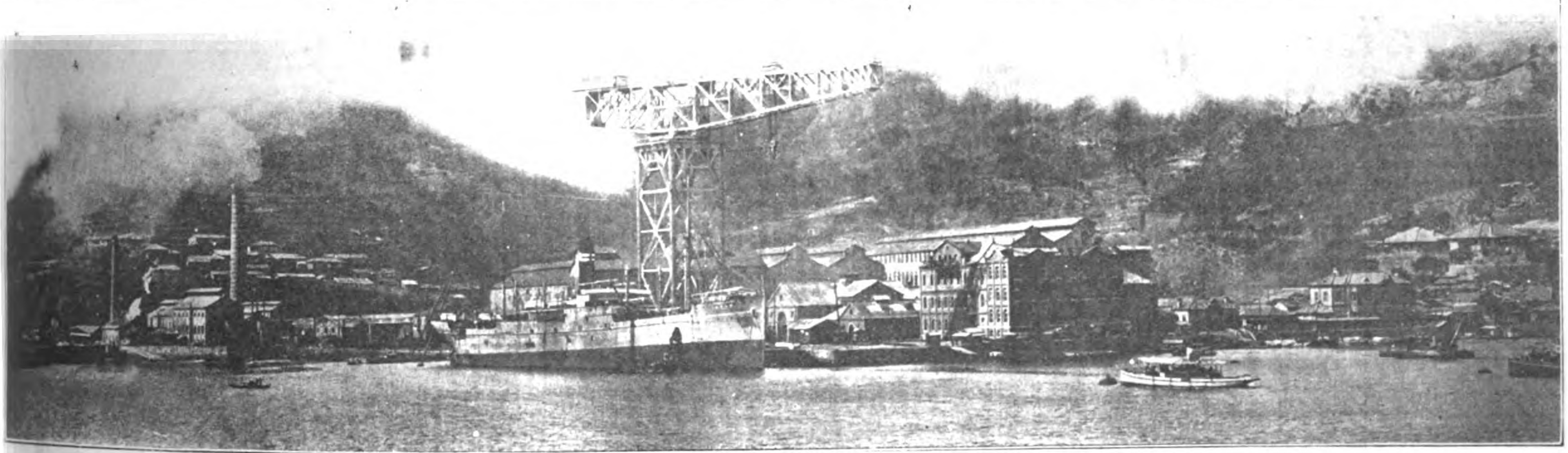
THE MITSU BISHI DOCKYARD AND ENGINE WORKS AT NAGASAKI

The Mitsu-Bishi Dockyard and Engine Works at Nagasaki is one of the oldest and largest shipbuilding and engineering establishments in Japan, if not in the East. It is not only one of the largest, but it is equipped with the greatest variety of tools for the production without sub-contracting of every type of ship, machinery and boilers for land and marine use, steel girders and buildings, also electrical machinery. Its specialities are Parsons' Marine Steam Turbines and Turbo-Generators, Stone's Manganese Bronze Casting and Morison's Contraflo Condenser.

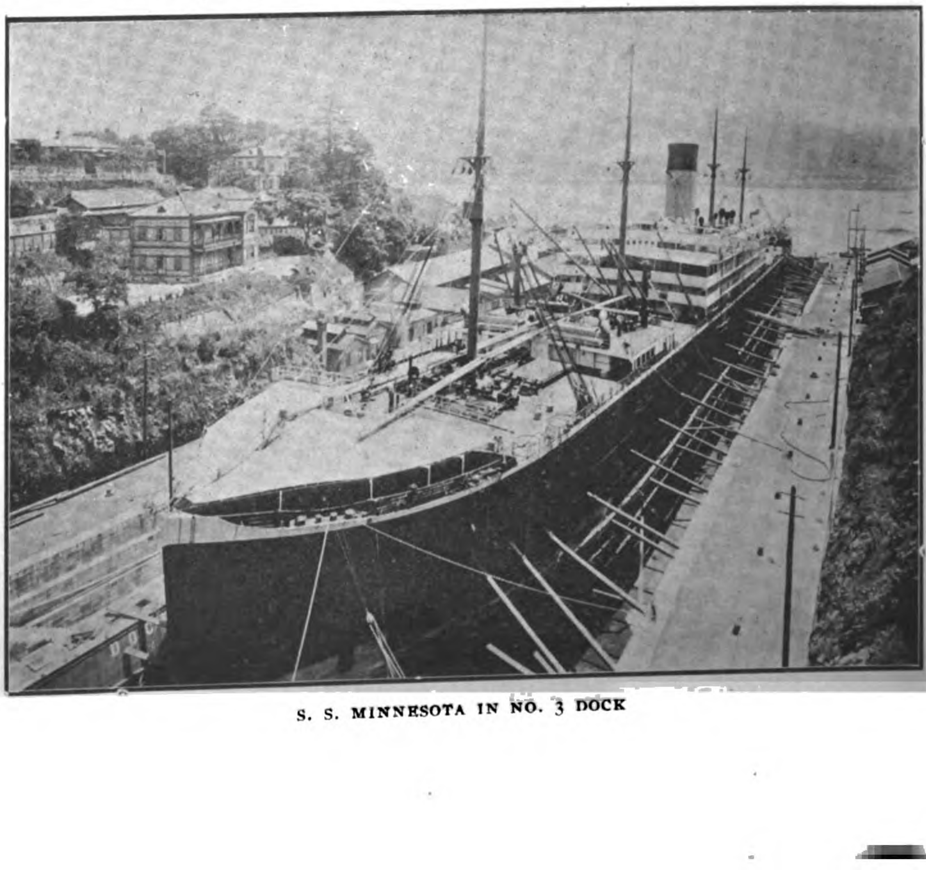
Many shipbuilding firms are content to construct the more important items of a ship, depending to a great extent upon other establishments for the manufacture of auxiliary parts. The principal advantage of this practice is that there is less capital involved in plant, consequently less loss incurred during the periods of depression which regularly recur.

Maximum Amount of Work.—The Mitsu-Bishi Works on the other hand, like those at Barrow or Clydebank in Great Britain, are laid out with the object of doing the maximum amount of work upon any ship, purchasing from outside sources only raw materials and proprietary or patented articles. The advantage of this method is that there is not only economy in production under one management, but less likelihood of the separate items being delivered behind time, and so interfering with the consecutive progress of the building of the ships. Moreover, there is no better plan for the Mitsu-Bishi Works to adopt than this, for, although Japanese manufactures are rapidly improving, those of shipbuilding and engineering accessories are yet in their infancy, and cannot be depended upon for the best class of work and material, which the Mitsu-Bishi Co. is ever anxious to turn out from their works.

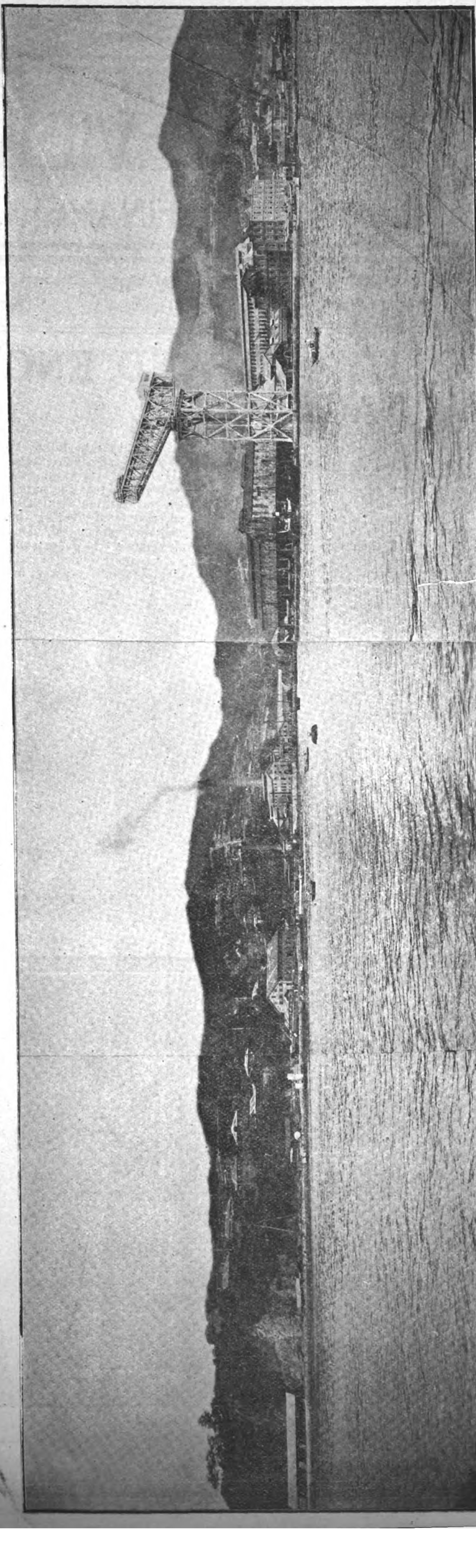
History of the Works.—The works have a very interesting history, being founded by the "Shogun" Government in 1856. Dutch engineers were employed, and the necessary machines and gear for commencing the works were imported from Holland. A portion of the jetty where the 150 ton giant crane now stands was constructed then by means of an old-fashioned diving bell of Dutch make, which apparatus still remains in the works in memory of the founders. Work was then carried on only on a very small scale for the purpose of repairing small steamers owned by the "Shogun." At the restoration the Works came under the control of the Public Works Department and were very much extended. In 1871 a large dry dock at Tategami, now called No. 1 Dock, was constructed, the patent slip at Kosuge, then owned by a British merchant, was purchased, and from time to time the works were considerably developed. In 1883 a wooden steamer named the *Kosuge Maru* of 1,500 tons gross was built, which was the forerunner of the shipbuilding industry in this Island Empire.



GENERAL VIEW, MITSU BISHI DOCKYARD AND ENGINE WORKS, NAGASAKI, JAPAN



S. S. MINNESOTA IN NO. 3 DOCK



GENERAL VIEW OF THE AKUNOURA ENGINE WORKS OF THE MITSU BISHI CO. AT NAGASAKI

First Iron Steamer Built.—In 1884, on the abolition of the Department of Public Works, the establishment and the various subsidiary works connected with it were purchased by the Mitsu-Bishi Company, who started this branch of business with only 800 men. Three years later the first iron steamer of about 206 tons gross, named the *Yugao Maru*, was built, followed by three other steel steamers, the *Chikugogawa Maru*, the *Kisogawa Maru* and the *Shinanogawa Maru*, each about 700 tons gross, and also by the steel steamer *Suma Maru*, 1592 tons gross, built in 1895, which was then considered an epoch in the shipbuilding industry of Japan. But the true development dates from the termination of the Chino-Japanese War. In 1896 a great stimulus was given to the growth of shipping and shipbuilding in Japan by the enactment of the Navigation Encouragement Law and the Shipbuilding Encouragement Law. About this time the Nippon Yusen Kaisha first organized its European Line, and decided to build six steamers of 6,000 tons each. The construction of one of these steamers was undertaken by the works and was finished in 1898. This was the first steamer of such dimensions ever built in Japan, and subsequently there were built many vessels including the Turbine Trans-Pacific liners of 13,500 tons, destroyers, despatch boats, etc. During this period the Mitsu-Bishi Company continued to keep the works constantly supplied with the latest and most improved tools, appliances and plant. Leading members of the staff were despatched to the various European engineering centres to learn the most up-to-date method of construction, and a number of British experts were engaged as technical advisers and instructors. Immediate returns were looked upon as a very secondary consideration, the whole aim of the firm being to equip an establishment of which Japan might be proud in respect to both workmanship and business integrity, so that it has now grown to the position of being the most important works in the Far East. The accompanying tables afford some evidence of the work done during the past twelve years.

TABLE I.

Annual Production of the Works during the past Twelve Years.

Year.	No. of Vessels.	Engines.	Gross Tons.	I. H. P.	Average Workmen employed per day.
1898	4	4	7,703	4,225	3,430
1899	12	12	4,007	3,189	3,558
1900	13	9	11,617	13,519	3,792
1901	6	6	7,194	6,238	5,209
1902	9	6	15,807	13,336	5,193
1903	8	8	13,078	11,463	5,658
1904	7	5	11,859	12,082	5,292
1905	9	7	12,973	12,731	6,745
1906	13	11	10,031	22,735	8,871
1907	4	4	7,859	23,519	9,669
1908	4	4	23,332	36,417	9,011
1909	4	4	29,596	33,379	5,703

TABLE II.

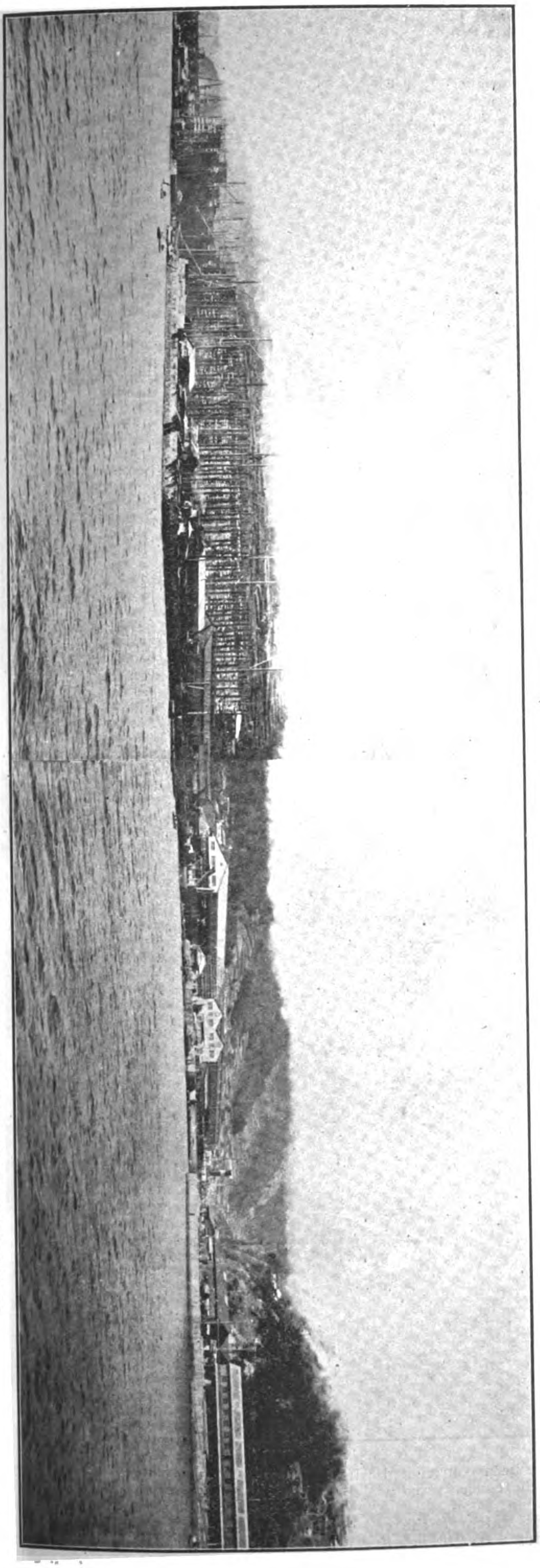
Numbers and Gross Tonnage of Vessels docked during the Past Twelve Years.

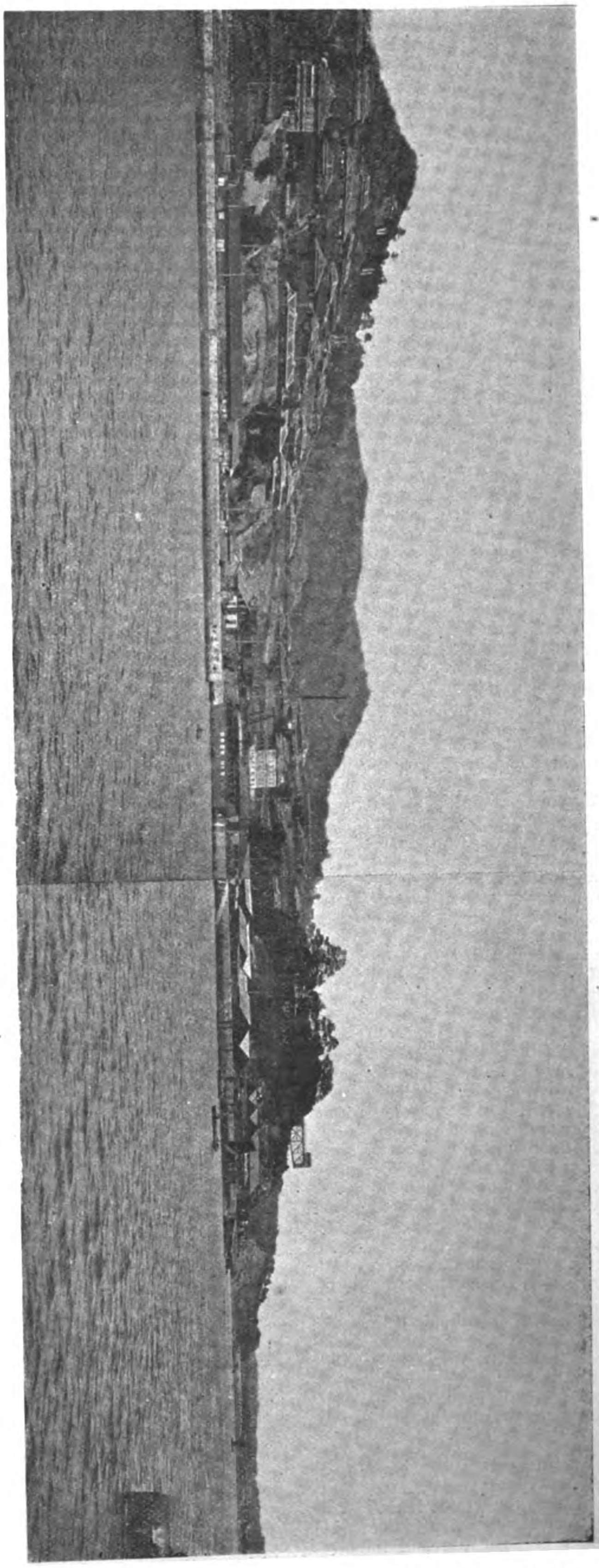
Year.	Dry Docks. No. of Vessels.	Dry Docks. Gross Tonnage.	Slip. No. of Vessels.	Slip. Gross Tonnage.
1898	84	254,069	19	3,539
1899	95	272,146	29	9,042
1900	103	260,269	32	9,271
1901	111	283,977	30	10,013
1902	76	177,418	31	10,121
1903	47	133,840	20	5,295
1904	65	155,279	26	6,271
1905	117	352,758	22	7,776
1906	97	385,834	26	8,167
1907	90	243,808	17	3,928
1908	39	135,606	17	3,672
1909	57	148,102	13	1,657

General Arrangement of the Works.—The establishment, which is situated on the inner harbour of Nagasaki, extends along almost the whole of the Western Shore of the harbor, having a water frontage of about 8,000 ft., and covering an area of over 114 acres, with numerous workshops and dry docks equipped with all the latest and most up-to-date machine tools and appliances for shipbuilding, engineering, dry-docking and electrical engineering work, besides a powerful hydraulic and electrical installation, and pneumatic plants for the lighter class of work, such as rivetting, caulking, chipping, etc.

The works consist of four principal sections, viz: Shipbuilding Yard, Engine Works, Dry Docks and Slip.

The shipyard at Tategami, which is at the south of the harbor, has seven building berths ranging from 240 ft. to 700 ft. long and an annual output capacity of over 30,000 tons. Mould loft, scribe boards, plate and angle bending shop, plater's machine shop, smith shop galvanizing shop and machine shop are arranged at this yard. The joiners', cabinet makers', polishing and woodworkers', upholstering and other departments associated with the ship-building are all laid out contiguous to the ship-building yard on a very extensive scale, and furnished with varied plant of the latest and most improved type.





MITSU BISHI DOCKYARD AND ENGINE WORKS: PANORAMIC VIEW OF THE YATEGANIC SHIPYARDS AND VICICITY AT NAGASAKI

The engine works at Akunoura, which is at the inner side of the harbour, covers a large area, and embraces erecting and fitting shops, boiler shop, machine shop, turbine shop, electric shop, blacksmith shop, copper smith shop, pattern and foundry shops, etc. Most of them are adequately fitted with electrically driven overhead cranes of various capacities

Between the shipyard and engine works there are three dry docks. The largest of these can accommodate vessels up to 714 ft. on the keel, 84 ft. beam and 34 ft. 6 ins. draft, and is indeed one of the finest and largest graving docks in existence at the present day. The patent slip is situated on the other side of the harbor right opposite the shipyard, and is capable of lifting ships up to 1,000 tons gross.

ADMINISTRATIVE DEPARTMENT.

The administrative department, or main office, is a substantial brick building in three blocks, situated at Akunoura, at the main entrance to the engine works.

The basement of the front block contains the mess room for draughtsmen and the boiler room for steam heaters. The first floor has the board room, private office of the general manager, corresponding and secretarial office, and the telephone room. The second floor is entirely occupied by the estimating engineer's office, comprising buying, estimating, counting and general statistical departments. On the floor above is situated the drawing office for Admiralty work. It is 84 ft. by 31 ft., and has accommodation for 25 ship draughtsmen and 25 engine draughtsmen. The basement of the left wing contains the main time office, book and cashier's department; the first floor the main engine drawing office, which is 69 ft. by 47 ft. with accommodation for 110 draughtsmen; and the second floor for ship drawing office, with accommodation for 42 draughtsmen. Each drawing office has a large fireproof safe at one end of the office, in which the drawings are all classified and stored. The floor above is a completely equipped photographic department with six large sun-printing frames and one Hall's Continuous Electric Copier. The basement of the right wing contains the works police department and engine works time office, while on the first floor there is a series of offices for Admiralty overseers and other superintendents.

Drawing Offices.—It may be mentioned here that there is a second ship drawing office at the shipyard. It is 120 ft. long by 40 ft. broad and contains the detail and the decorative departments. In the former smith work, castings and all fittings are dealt with, and in the latter all the decorative works of the ships. These two departments are specially situated in the shipyard, so as to be contiguous to the ships under construction, and to the joiners and cabinet makers, upholstery and decorative painters' workshops. The office has accommodation for 60 draughtsmen, and is equipped with photographic room and large spacious fireproof safe.

The ship drawing offices, therefore, have a staff of 127 draughtsmen in all, under the charge of the chief ship draughtsman, who has also the charge of the experimental tank.

The engine works manager has an office close by the main office, and in the same block of buildings there is the electrical engineers' drawing office, with accommodation for 15 draughtsmen.

The shipyard manager has an office at Tategami with a time office in the vicinity; there are also a number of rooms for Lloyds' surveyors, government surveyors and ship owners' superintendents in the same block of buildings.

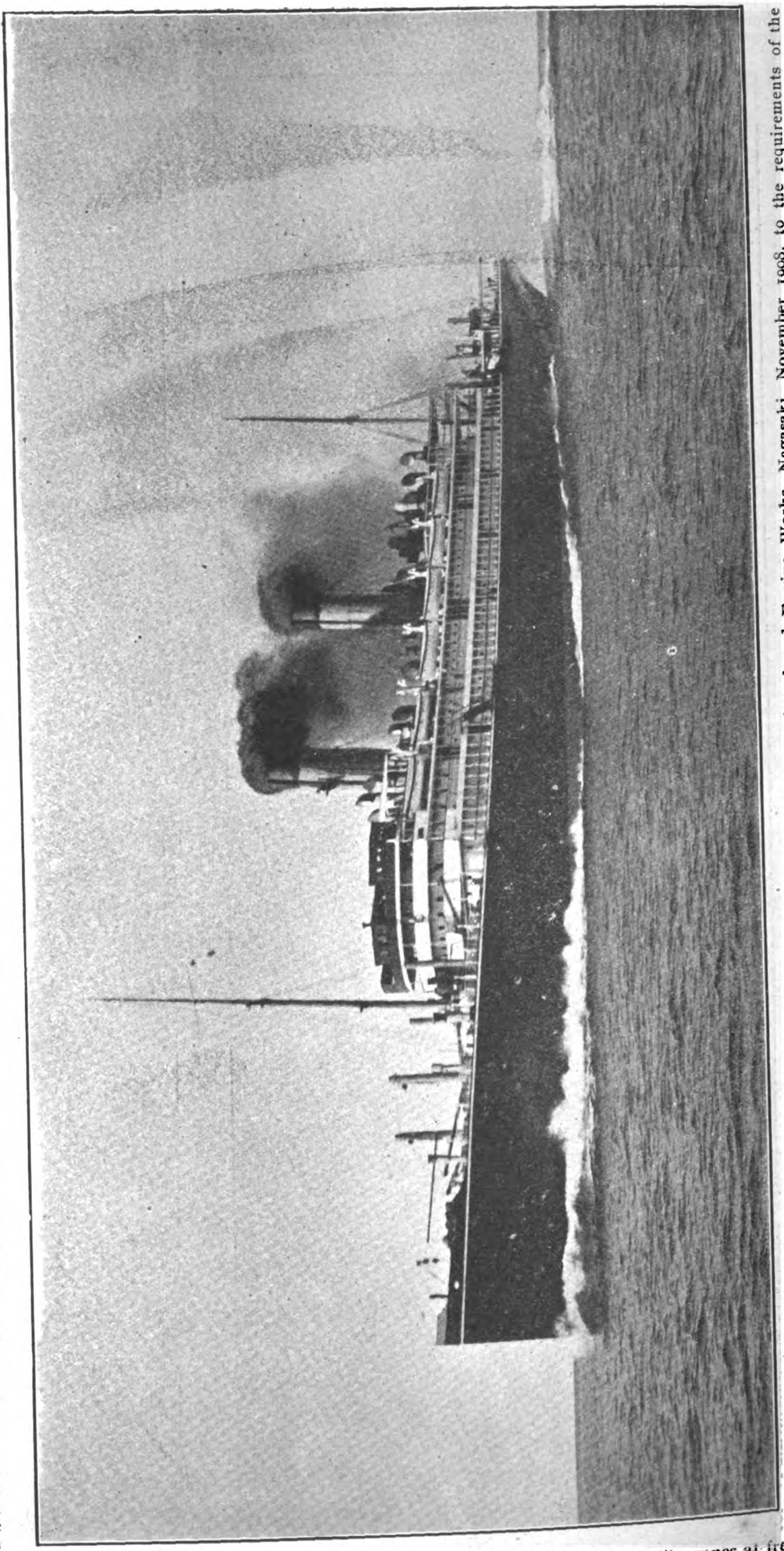
A system of telephonic communication is in use throughout the works, so that, vast as is the establishment, its organization overcomes any disadvantages of distance. There is a regular system of storing materials, so that various sorts and dimensions are readily accessible.

SHIPBUILDING DEPARTMENT.

Building Berths and Launching Ground.—In describing the works, it may be more interesting to review the departments and plants in the order of their use and importance in the building of the ship rather than to adopt an itinerary method.

The works have seven berths, viz.:—

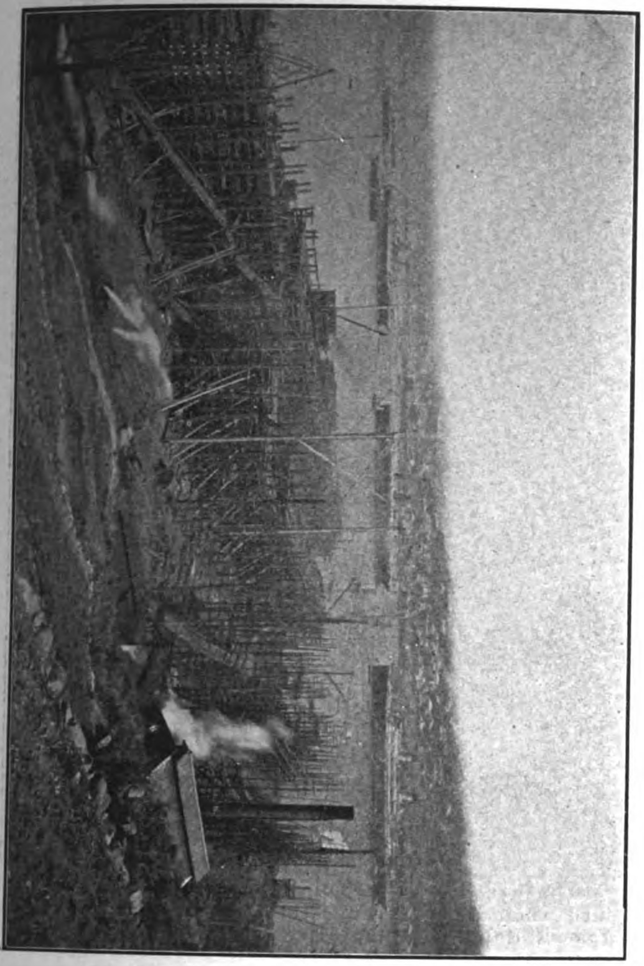
No. 1 Berth for vessels up to 680 ft., No. 2 Berth for vessels up to 700 ft., No. 3 Berth for vessels up to 580 ft., No. 4 Berth for vessels up to 460 ft., No. 5 Berth for vessels up to 340 ft., No. 6 Berth for vessels up to 300 ft., No. 7 Berth for two vessels up to 240 ft.



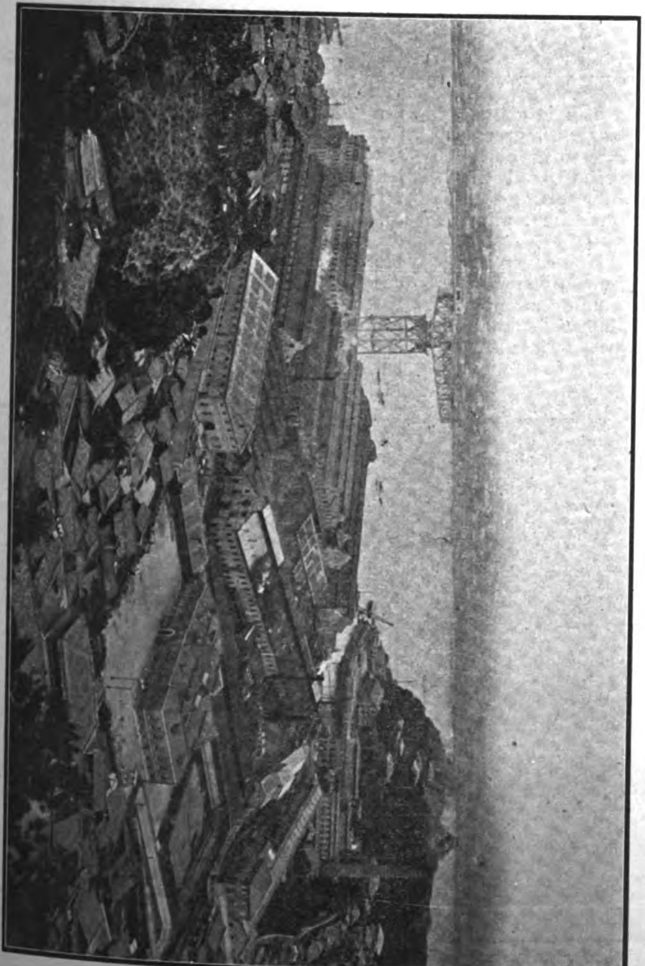
TRIPLE SCREW TURBINE STEAMER "CHIYO-MARU."—Built and engined by Mitsu Bishi Dockyard and Engine Works, Nagasaki, November 1908, to the requirements of the Imp. Japanese Government Rules and Lloyd 100 A-1.—Length, 550 feet 0"; Breadth, 63 feet 0"; Depth, 38 feet 6"; Gross tonnage, 13500 tons; Displacement, 18725 tons; Engines, Parsons' Three Shaft Steam Turbines; Indicated horse power, 16850 H. P.; Speed, 21 knots; Shipowners, Messrs. Toyo Kisen Kaisha, Tokio.—(This photo was taken on her full speed trials which took place on 13th Oct. 1908.)

Several of these have been constructed with a view of supporting the concentrated weight of modern warships.

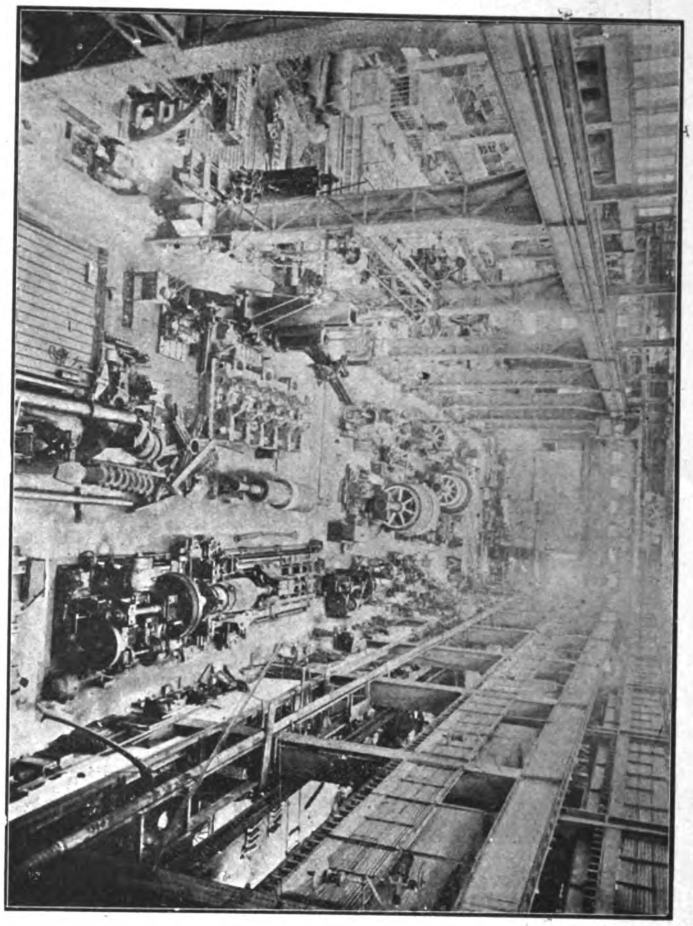
There being spacious water at the end of the building berths only a small quantity of drags and checks are required for launching the largest vessels. The berths are well equipped with powerful jib cranes at frequent intervals, lifting weights up to three tons on board during construction. There are several locomotive cranes throughout the yard, ranging from five to three tons. These are also used for stocking ships' plates and angles, etc., from the lights, and for subsequently lifting



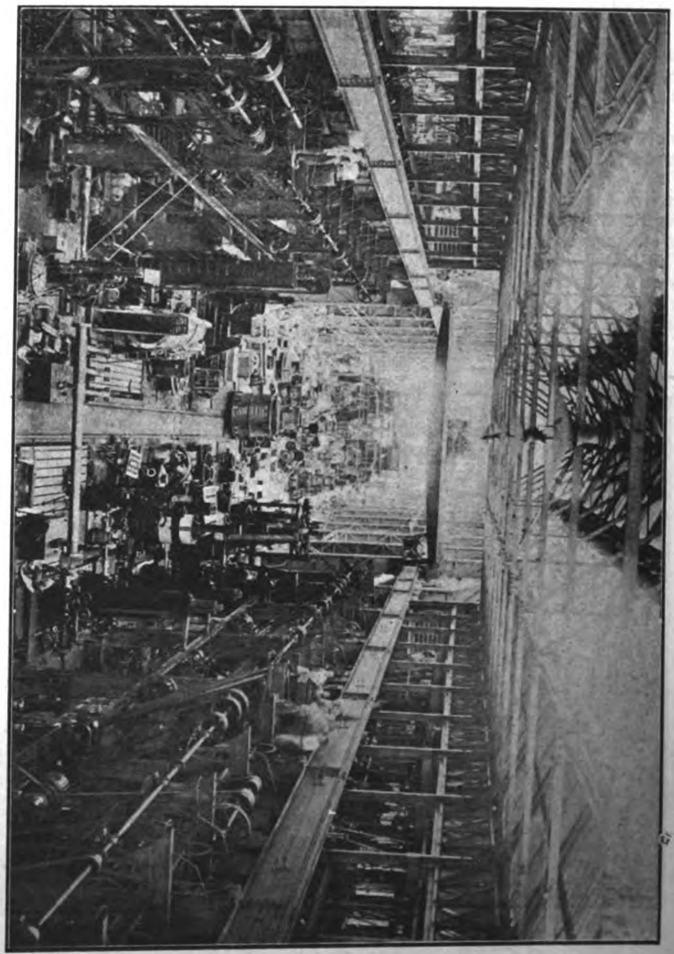
TATEGAMI SHIPYARDS OF THE MITSU BISHI COMPANY AT NAGASAKI



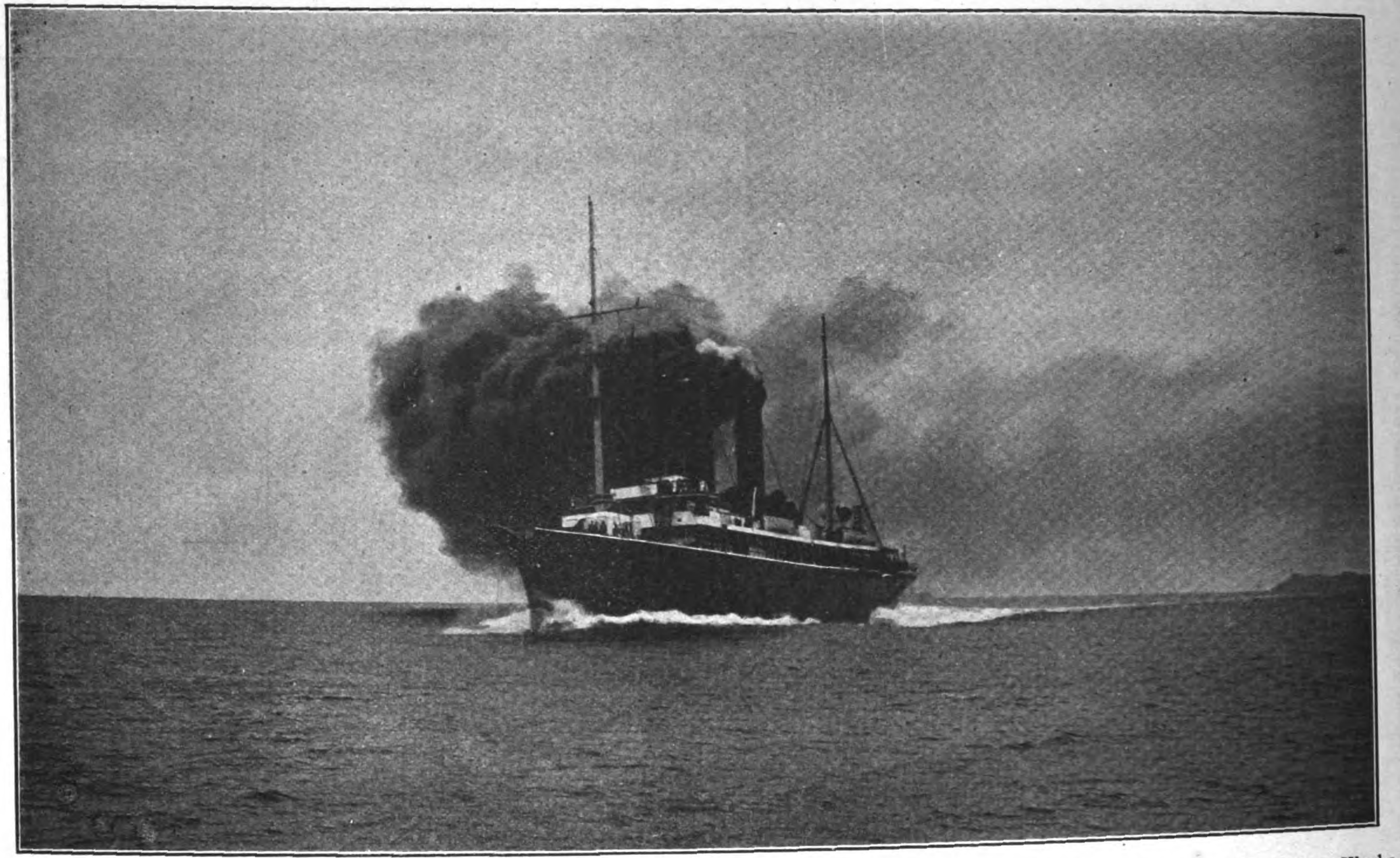
150 TON CRANE AND AKONOURA ENGINE WORKS OF THE MITSU BISHI COMPANY OF NAGASAKI



TURBINE SHOPS OF THE MITSU BISHI COMPANY AT NAGASAKI



MACHINE AND ERECTING SHOPS OF THE MITSU BISHI COMPANY AT NAGASAKI



IMPERIAL JAPANESE VOLUNTEER FLEET STEAMER "SAKURA-MARU."—Built and engined by Mitsu Bishi Dockyard and Engine Works, Nagasaki, October 1908, to the requirements of the Imp. Japanese Government Rules.—Length, 335 feet 0"; Breadth, 43 feet 0"; Depth, 31 feet 6"; Gross tonnage, 3200 tons; Displacement, 3880 tons; Engines, Parsons' Three Shaft Steam Turbines; Boilers, Miyabara's Water Tube Boilers (6); I. H. P., 8500; Speed, 21 knots.; Shipowners, Imperial Japanese Marine Association; Armaments, 2 6-in. guns, 6 12-pounders; Wireless Telegraph on fore mast; 2 search lights, each 20". (This photo was taken on her full speed trials which took place on 26th September, 1908)

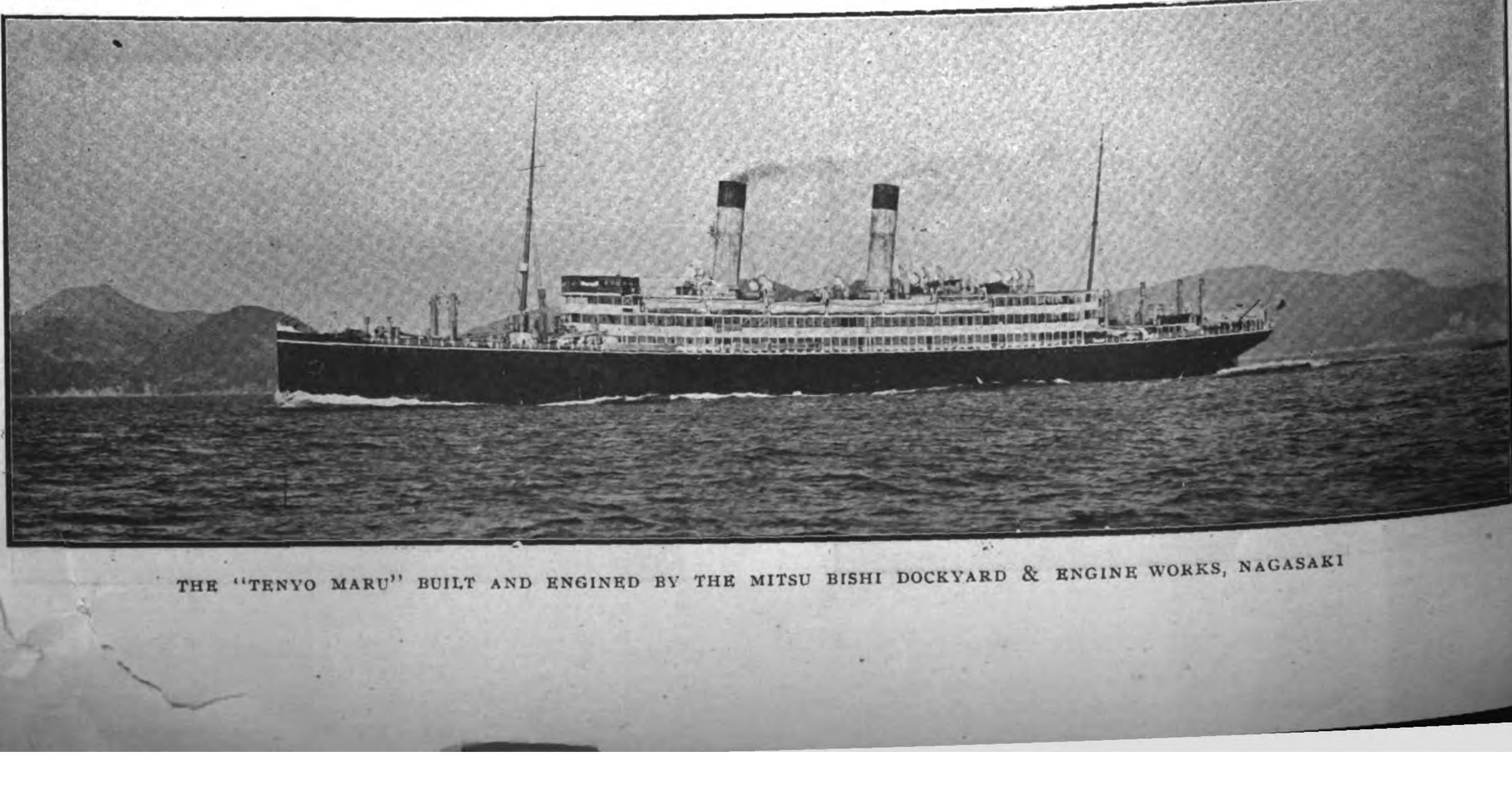
them from the racks and passing them to the trucks for conveyance to the platers' sheds, etc.

To facilitate the conveyance of materials there are over two and a half miles of rails in the yard.

Ship-Platers and Fitters' Department.—Dealing with the separate departments, one naturally begins with the moulding loft, where the work of construction is begun in the case of all ships. The length of this loft is 380 ft., and its width is 70 ft., the roof being of light steel principals with corrugated iron on the purlins, and ample daylight being admitted by glazed top and sides. The space below the loft is partly used as a scribe board and partly as a platers' machine shop.

In the frame bending shop, which is about 140 ft. square, there are two angle furnaces, each 66 ft. long, one plate furnace 30 ft. long, and two angle bevelling machines, with about 4,800 sq. ft. of cast iron blocks for setting the frames, as well as the scribe boards for laying them out.

The platers' machine shops, which cover an area of over 54,070 sq. ft., are equipped with 14 punching and shearing machines, ranging up to tools which shear 1½ in. plate and punch 1½ in. holes in the same thickness, while the gap is 36 in. enabling plates 6 ft. wide to be worked on. There is one hydraulic manhole punch capable of working holes 28 in. by 20 in. There is a large hydraulic flanging machine for setting plates for the keel and garboard strake as well as for stiffening flanges in bulkheads, which is capable of dealing with plates up to 24 ft. long, and up to the thickness of 1 in. There are three sets of bending rollers dealing with plates up to 25 ft. long. The planing machines number eight, and are all of considerable capacity. For straightening plates there is one mangle with solid steel rollers, taking plates 6 ft. wide and 1 in. thick. There are also plate scarphing, joggling, hydraulic bar cutting and other machines. There are



THE "TENYO MARU" BUILT AND ENGINED BY THE MITSU BISHI DOCKYARD & ENGINE WORKS, NAGASAKI

nine countersink drilling machines. Almost all of the tools in this shop are of British make, and the majority of them are directly driven by electric motors.

The beam bending shed is 90 ft. long by 35 ft. wide, and in it there are one beam bending and punching machine, two beam bending machines, one beam bending and angle cutting machine, one angle and channel cutting machine, two cold iron saws, etc., all operated by electricity.

The ironworkers' shed is on the south side of the yard, and contiguous to the building berths. It is 85 ft. long by 65 ft. wide, and contains one angle cutting and plate and angle planing machine, one countersink drilling machine, one plate bending and straightening machine, two plate straightening and flattening machines, two punching and shearing machines, etc.

The blacksmithy is 262 ft. long by 40 ft. wide. In it there are 35 smith fires, the blast being supplied by three Root's blowers. There are ten steam hammers ranging up to 20 cwt., and one 5-cwt. steam striker; also three rivet-making machines, the largest of which is capable of turning out three tons per ten hours.

The angle smith shop, 175 ft. long and 40 ft. wide, contains 28 fires with two centrifugal blast fans, driven by electricity.

The galvanising shop is adjacent to the blacksmith shop. The building is 100 ft long. and 40 ft. wide. There are five zinc baths, the largest being 22 ft. by 2 ft. 2 in. by 5 ft., one refining furnace, and four water baths.

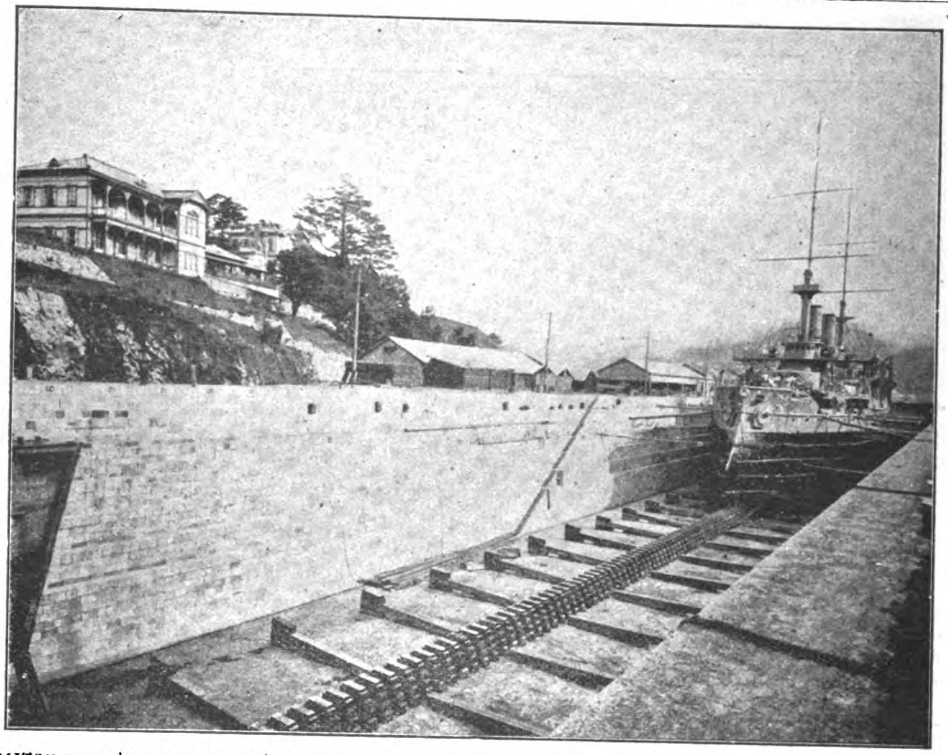
The machine shop is placed contiguous to the building berths. The shop is 140 ft. long by 60 ft. wide. There are fourteen drilling machines of various types; also the same number of lathes of numerous kinds, boring and turning machines; shaping, slotting, milling and surface planing machines; cold iron band sawing machines, Solber patent screwing machine, screw cutting machines, bolt and nut screwing machines, lag screwing machine, and emery grinding machines, etc. All the machinery in this shop is driven by two electric motors, each of 40 b. h. p.

Woodworking Department.—As can readily be imagined, in an establishment which turns out first-class passenger steamers the woodworking department is very extensive.

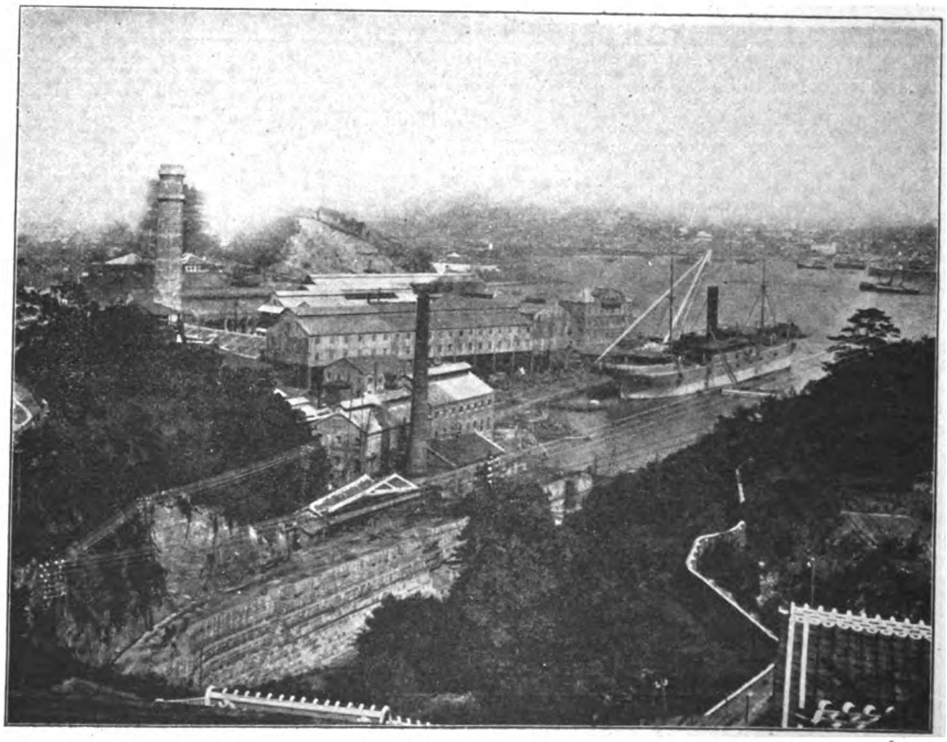
The whole timber department occupies about five acres of ground, about one-third of which is covered in with drying sheds. The timber for the joinery department is accommodated in sheds covering 3,800 square yards. The buildings for deck stowage cover 1,760 square yards.

The saw mill is situated at the extreme north end of the shipyard. The building is a light wooden structure measuring about 100 ft. long by 70 ft. broad. The log department is fitted with three vertical saw frames. In the resawing and dressing of the wood, the principal machines used are two four-side planing machines, one circular saw, endless band sawing machine, reciprocating cross cut saw and dowel making machine, etc. In the saw room there are two saw sharpening machines and one band saw sharpening machine. The majority of the machinery in the mill is driven by electricity.

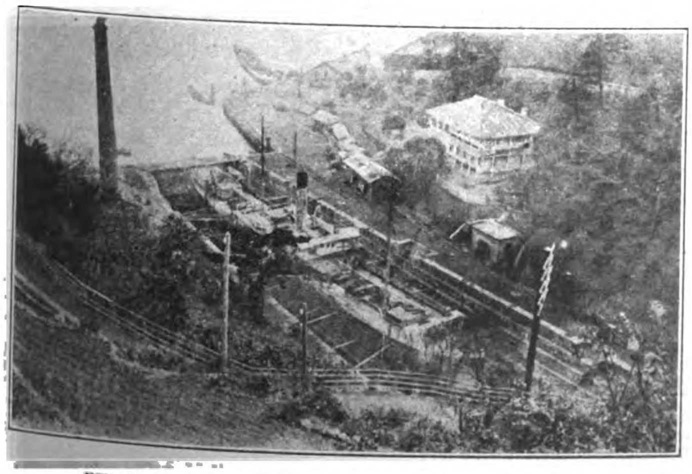
The joiners, cabinet makers and polishers are accommodated in a two-story building situated at the side of No. 1 Dock. It covers a working space of 80,440 sq. ft. The collection of wood working tools is complete and represent-



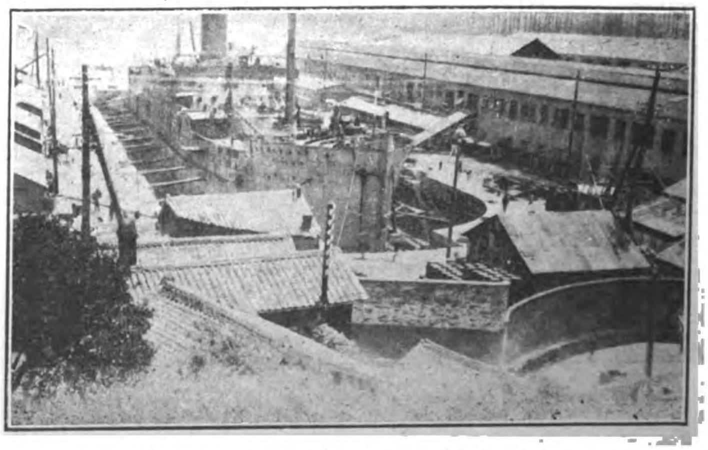
MITSU BISHI'S NO. 3 DOCK (714 FEET ON BLOCKS) WITH H. I. J. M. WARSHIP "IKI" ON THE STOCKS



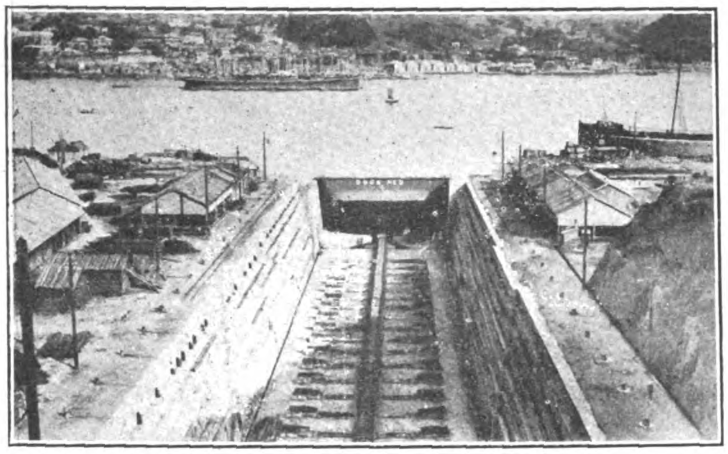
ENGINE WORKS OF THE MITSU BISHI DOCKYARD AND ENGINE WORKS, NAGASAKI, SHOWING 100 TON SHEERLEGS WITH WHICH THE STEAMER "HITACHI MARU," 7,500 TONS GROSS, BUILT AT ITS PLANT, IS BEING EQUIPPED



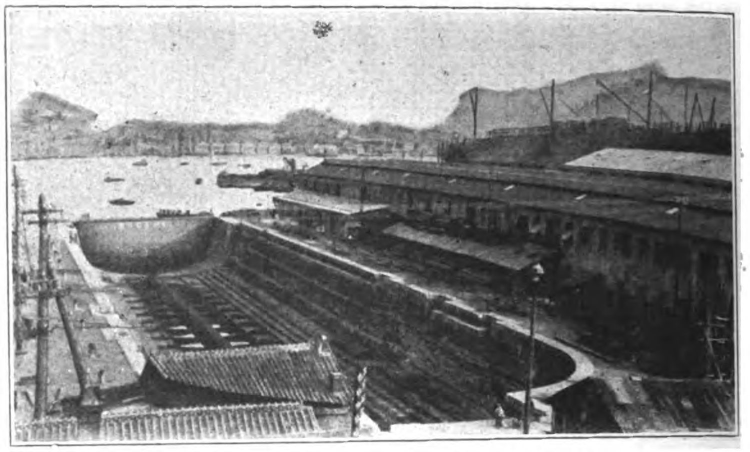
THE NO. 2 DOCK OF MITSU BISHI CO., NAGASAKI



THE NO. 1 DOCK OF THE MITSU BISHI CO.



DOCK NO. 3 MITSU BISHI CO.



THE NO. 1 DOCK OF THE MITSU BISHI CO.

ative of the best British practice, including circular saw bench, three endless band saws, scroller fret saw, planing and thicknessing machine; power and hand feed planing machine, three planing and jointing machines, scraping machine, eight moulding machines of various types, dove-tailing machine, five sand-papering machines of different types, buffing machine, two tennoning machines, five morticing machines, rounding machine, two wood turning lathes, wall drilling machine and emery grinding machine, etc. The machinery is driven by four electric motors of 146 total b. h. p.

The carpenters' shops on the other side of No. 1 Dock cover an area of 18,750 sq. ft. and contain planing, moulding and drilling machines; also endless band saw, all driven by electricity.

GRAVING DOCKS AND SLIP.

There are three graving docks, all constructed of granite, and one slip. No. 1 Dock is nearest to the shipyard; then No. 3 and No. 2. The slip is at Kosuge. It may be mentioned here that No. 1 Dock was constructed by the former owner, but was lengthened by the present proprietors in 1895. The following are the principal dimensions of the docks:—

	Feet	*Ins.*
No. 1 Dock.		
Length on keel blocks	510	0
Breadth at entrance on top	89	0
Breadth at entrance on bottom	77	0
Depth of water on blocks at ordinary spring tide	26	6
No. 2 Dock.		
Length on keel blocks	350	0
Breadth at entrance on top	66	0
Breadth at entrance on bottom	53	0
Depth of water on blocks at ordinary spring tide	24	0
No. 3 Dock.		
Length on keel blocks	714	0
Breadth at entrance on top	96	7
Breadth at entrance on bottom	88	7
Depth of water on blocks at ordinary spring tide	34	6

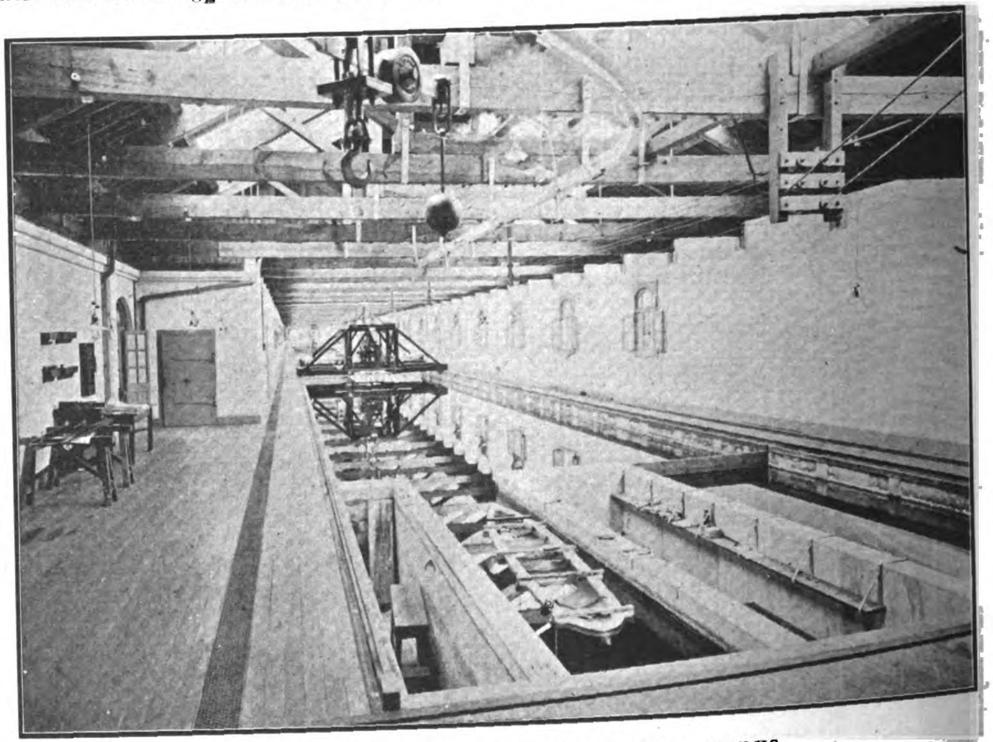
The patent slip is capable of lifting vessels up to 1,000 tons gross. The length of slipway rail is 750 ft., with width 30 ft.

ENGINEERING DEPARTMENT.

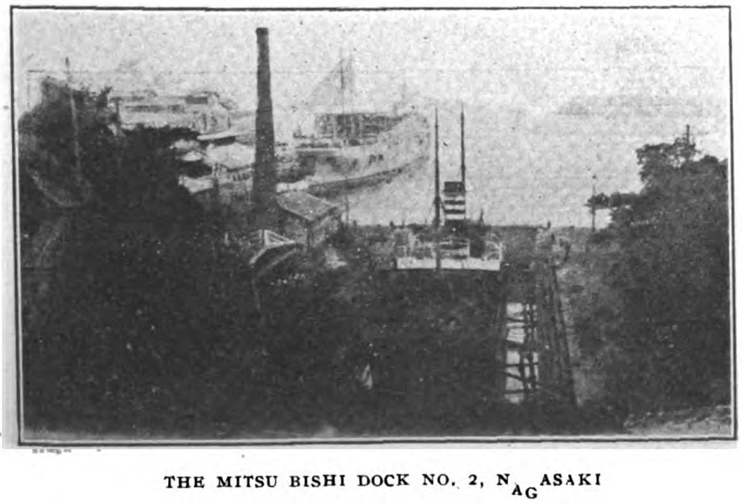
We may now turn to the engineering department, which is arranged at the northern part of the works.

Machine Shops.—Machine shops, which cover an area of about 23,150 sq. ft., contain 124 lathes, three turning and boring machines, five screwing machines, five cutting-off machines, one nut tapping machine, one bolt turning machine, one stud machine, nine planing machines, seven shaping machines, six slotting machines, one keyway cutter, 32 drilling machines three centering machines, one cylinder boring machine, three boring machines, two oil groove cutting machines, 15 milling machines, one nut side facing machine, two band sawing machines, one circular sawing machine, and 16 grinding machines.

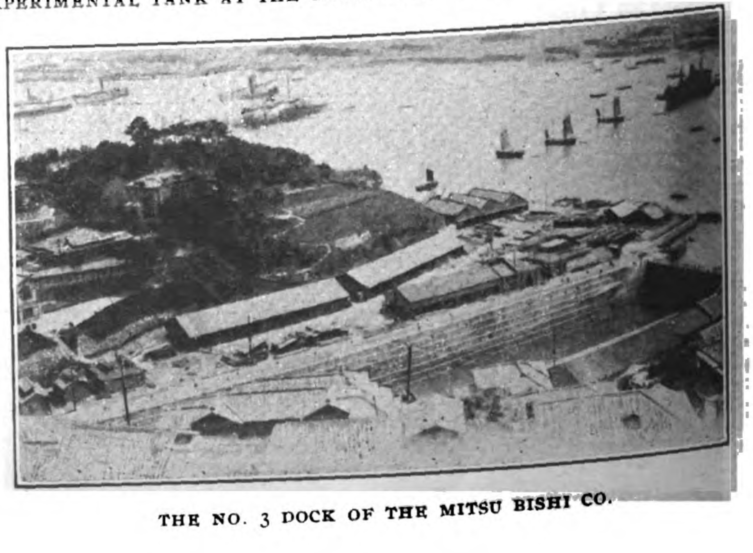
Of the above, special mention should be made of an electrically driven quadruple geared crank shaft turning lathe, having a height of centres 54 in., length of bed 42 ft., and admitting between centres 27 ft. 3 in., two treble geared shafting lathes, each having a height of centres 20 in. and length of bed 36 ft. 6 in., and admitting between centres 28 ft. (these, having



EXPERIMENTAL TANK AT THE MITSU BISHI WORKS

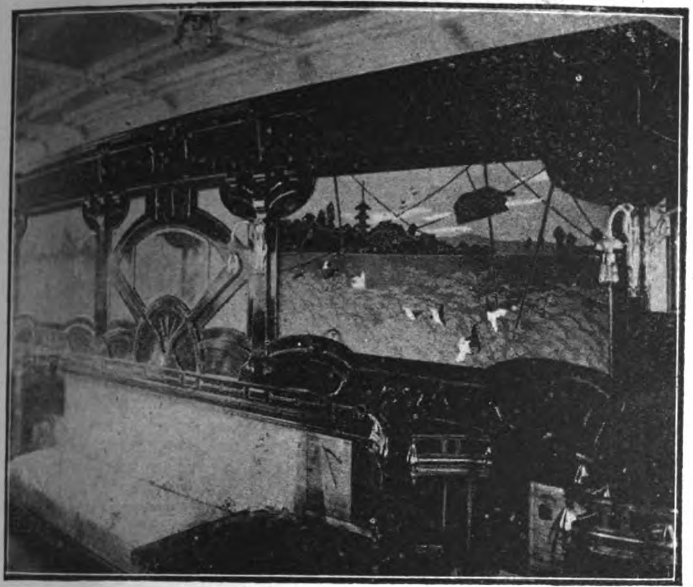


THE MITSU BISHI DOCK NO. 2, NAGASAKI

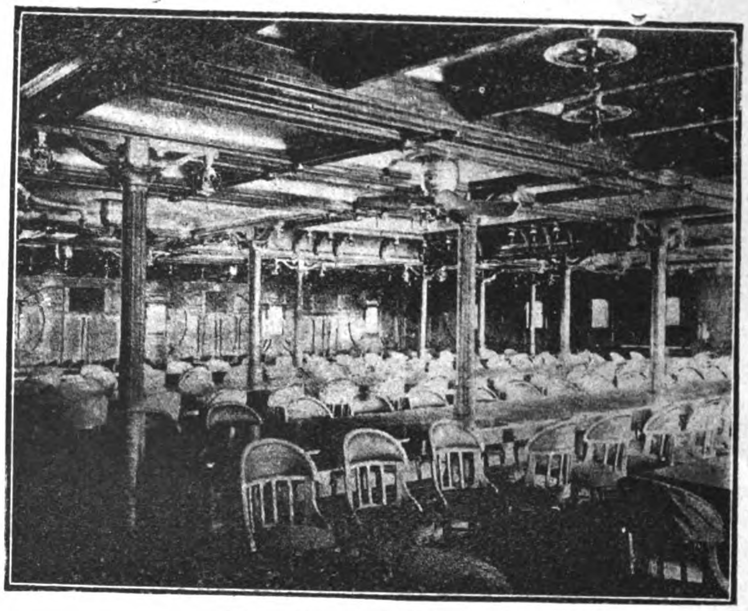


THE NO. 3 DOCK OF THE MITSU BISHI CO.

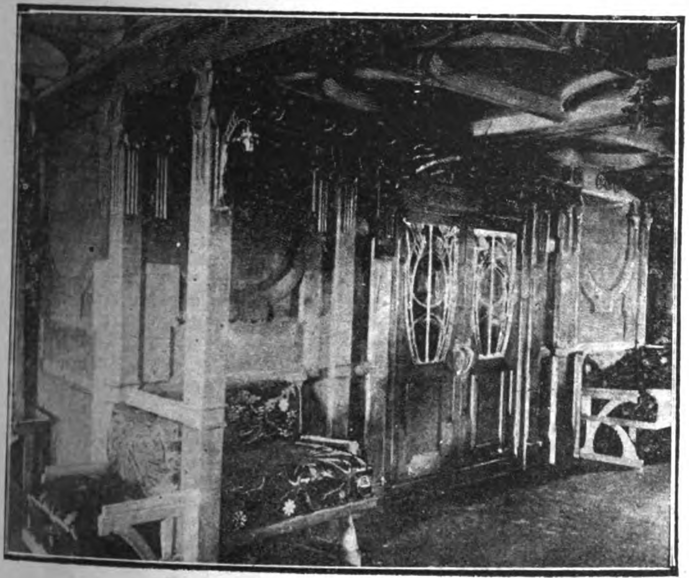
INTERIOR VIEWS OF S. S. TENYO MARU



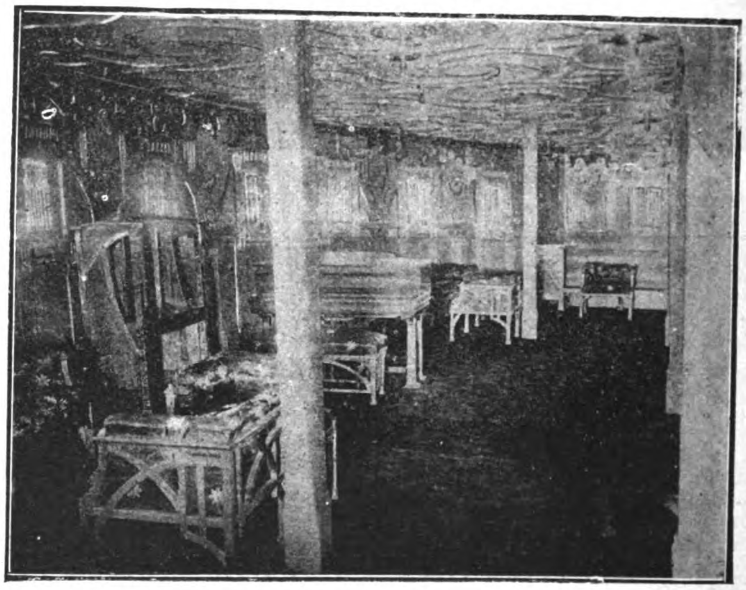
LOUNGE



1ST CLASS DINING SALOON

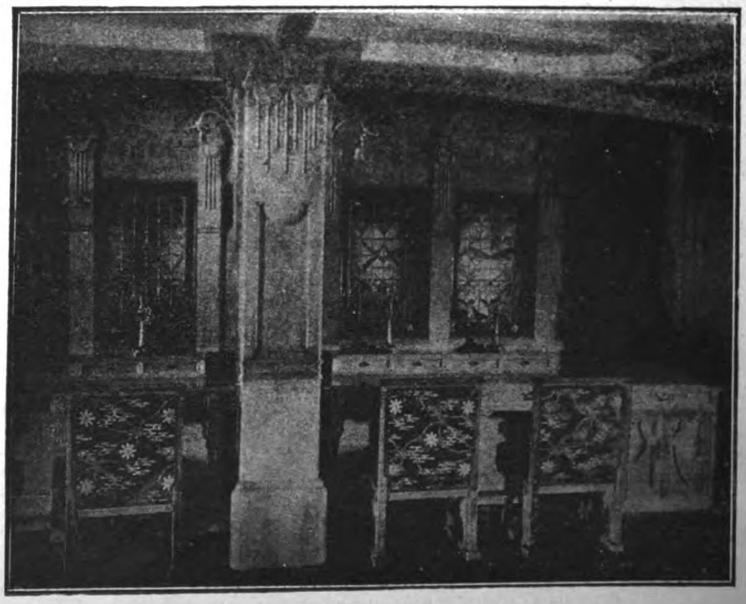


READING ROOM, TENYO MARU

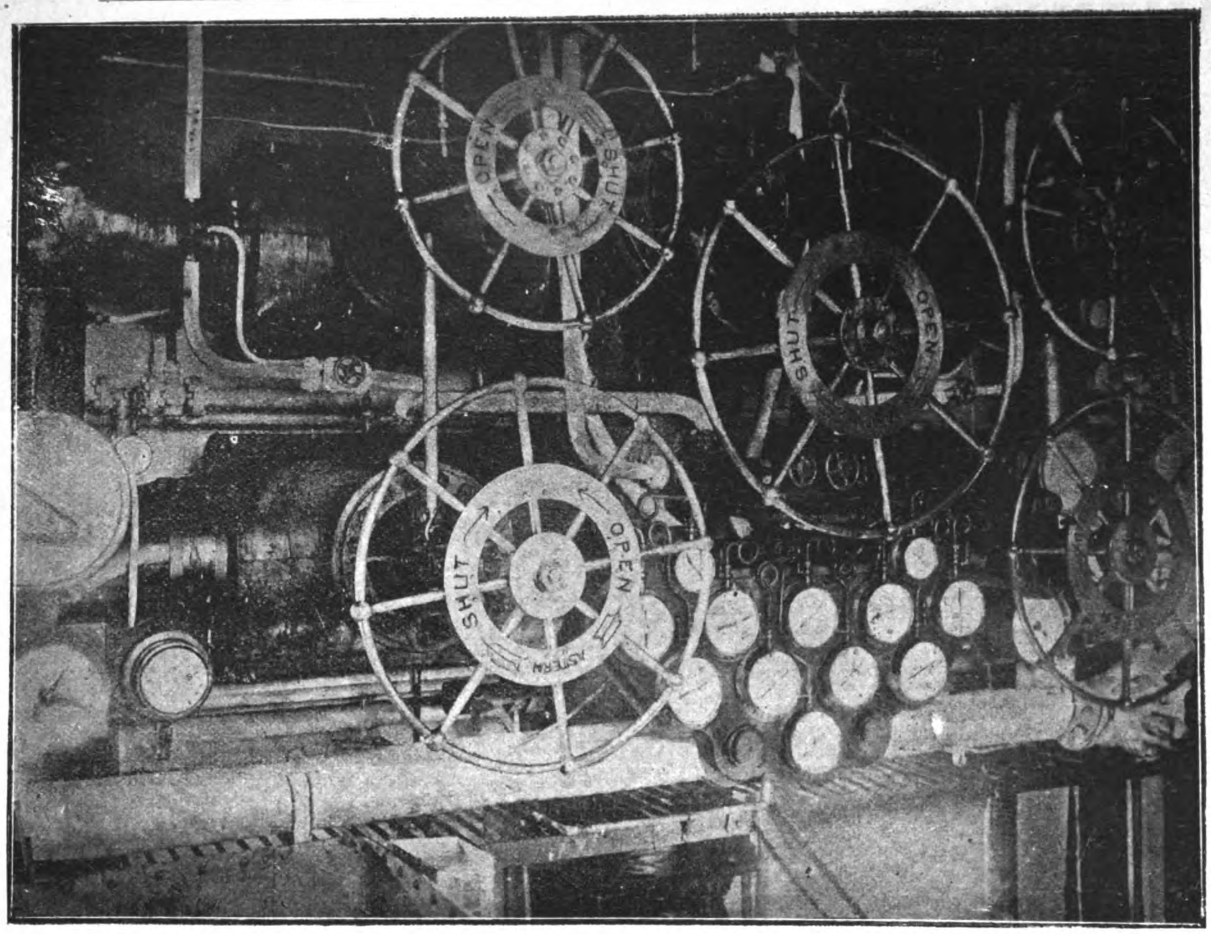


DRAWING ROOM

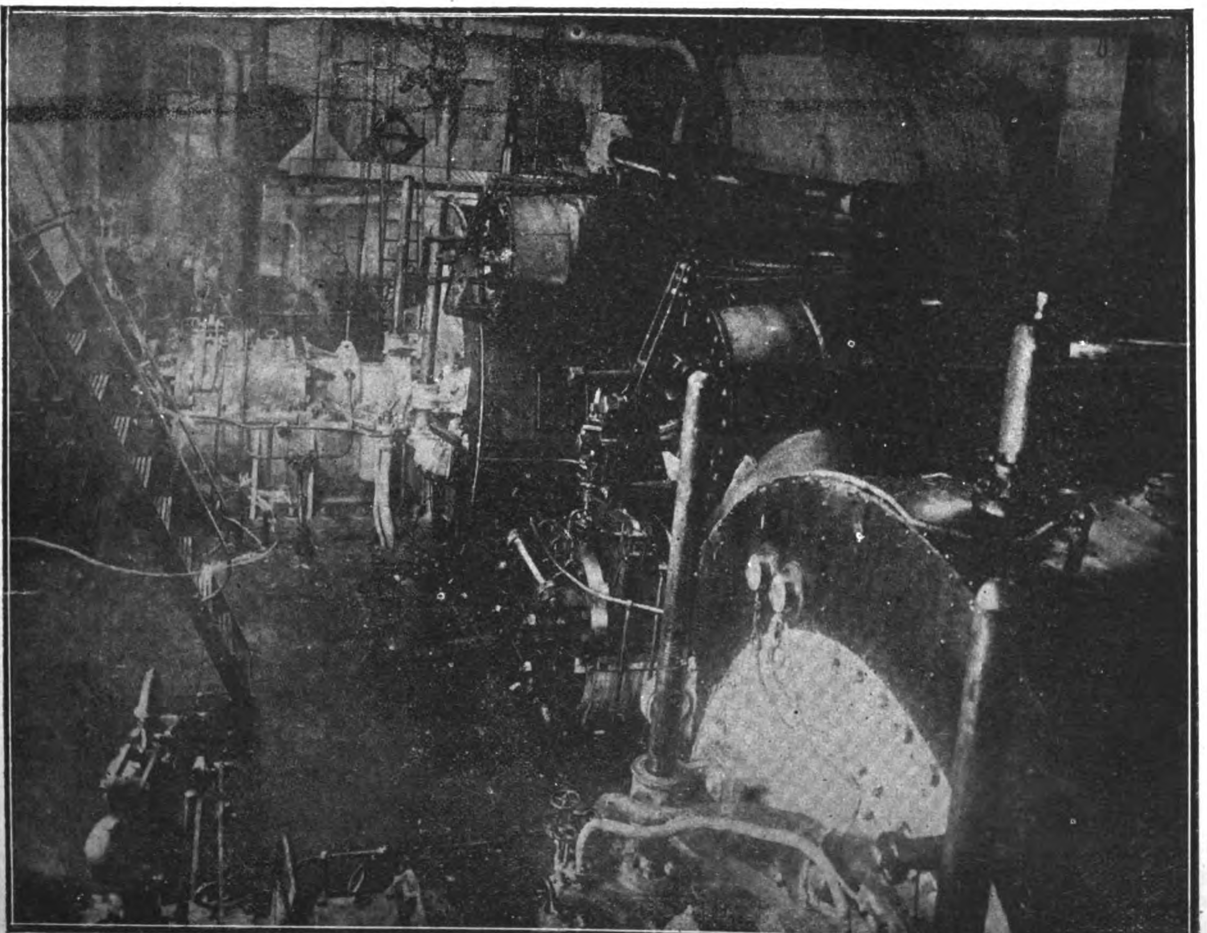
SMOKING ROOM



READING ROOM



VIEW OF ENGINE ROOM, TENYO MARU



ANOTHER VIEW OF ENGINE ROOM, TENYO MARU

a common centre line when combined together, are capable of turning up to 68 ft. 6 in.); one electrically driven vertical cylinder boring machine, capable of boring cylinders up to 100 in. in diameter; one electrically driven double-headed universal horizontal drilling, boring tapping, studding and milling machine, commanding 10 ft. vertically and 20 ft. horizontally, with spindle $5\frac{1}{2}$ in. in diameter; also one horizontal and vertical planing machine, having a horizontal stroke of 21 ft. and a vertical stroke of 18 ft., driven by 25 b. h. p. motor. The machine shop is equipped with one 20-ton, one 15-ton and three 5-ton electric overhead travelling cranes.

Turbine Shop.—The turbine shop, which is 243 ft. by 102 ft., contains four lathes, one turning and boring mill, two planing machines, one slotting machine, one turbine machine, one turbine blade cutting machine, four drilling machines, one turbine cylinder boring machine, one turbine blade nicking machine, one turbine packing strip cutting machine, one special dovetail milling machine, one special milling device, five turbine blade tipping machines. Special features amongst the above machinery are one large electrically driven quadruple gear double bed lathe for turbine rotor turning, having a height of centres 68 in., which may be raised to 79 in. by using a lever, and length of bed 51 ft., admitting between centres 36 ft.; one electrically driven pit planing machine, capable of planing 36 ft. in length, 14 ft. 6 in. in width and 7 ft. 6 in. in height; one electrically driven turbine cylinder boring machine, to bore up to 13 ft.; and one electrically driven powerful slotting machine, having a stroke of 48 in.

The machinery in this shop is all driven by electricity. There are two 50-ton and one 60-ton electric overhead travelling cranes in the shop.

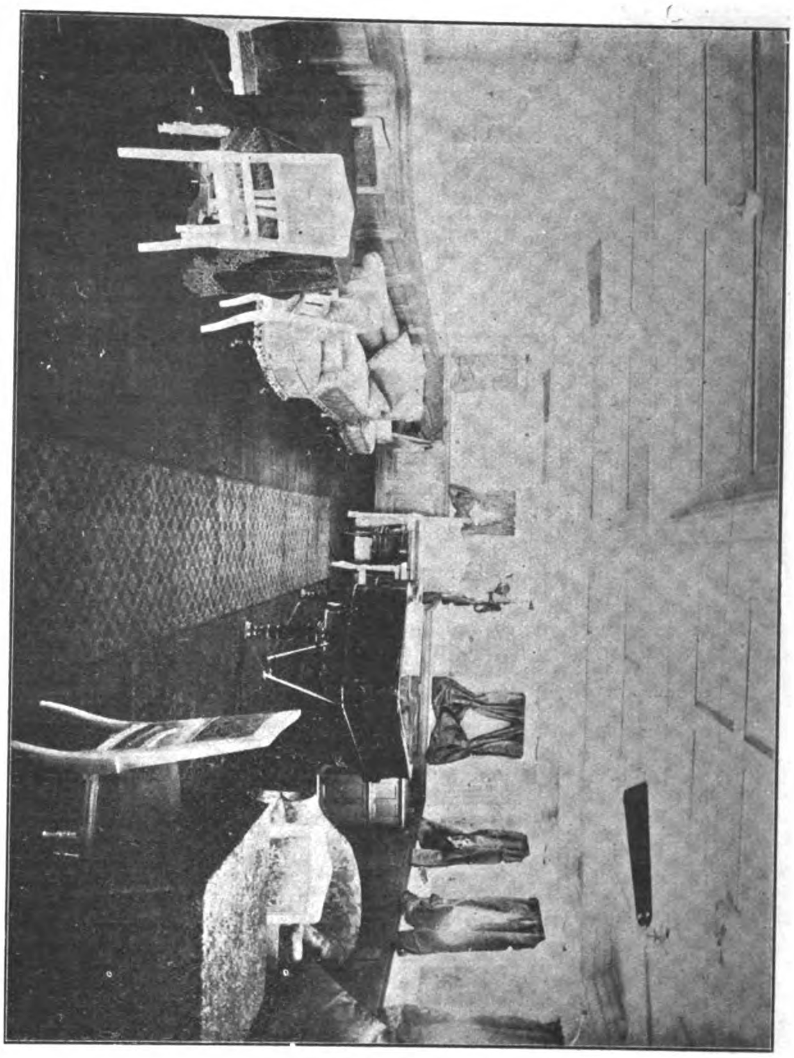
Electing Shop.—Electing Shop and Machine Shop.—The building is 67 ft. 11 in. by 116 ft. 2 in., and is very lofty. There are three main bays, which are occupied respectively as electric shop, electing shop, and fitting shop. The electing shop has sufficient space to erect three twin sets of 8,000 i. h. p. triple expansion engines simultaneously, and is equipped with one 30-ton and one 20-ton electric overhead travelling cranes. The Fitting Shop has one 10-ton crane of the same type.

The water testing and shrunk-on work shop, which is 80 ft. by 130 ft., is equipped with a complete set of pumps, gears for water testing and shrunk-on work, and a 20-ton electric overhead travelling crane, and is always in readiness to carry out water testing and shrunk-on work.

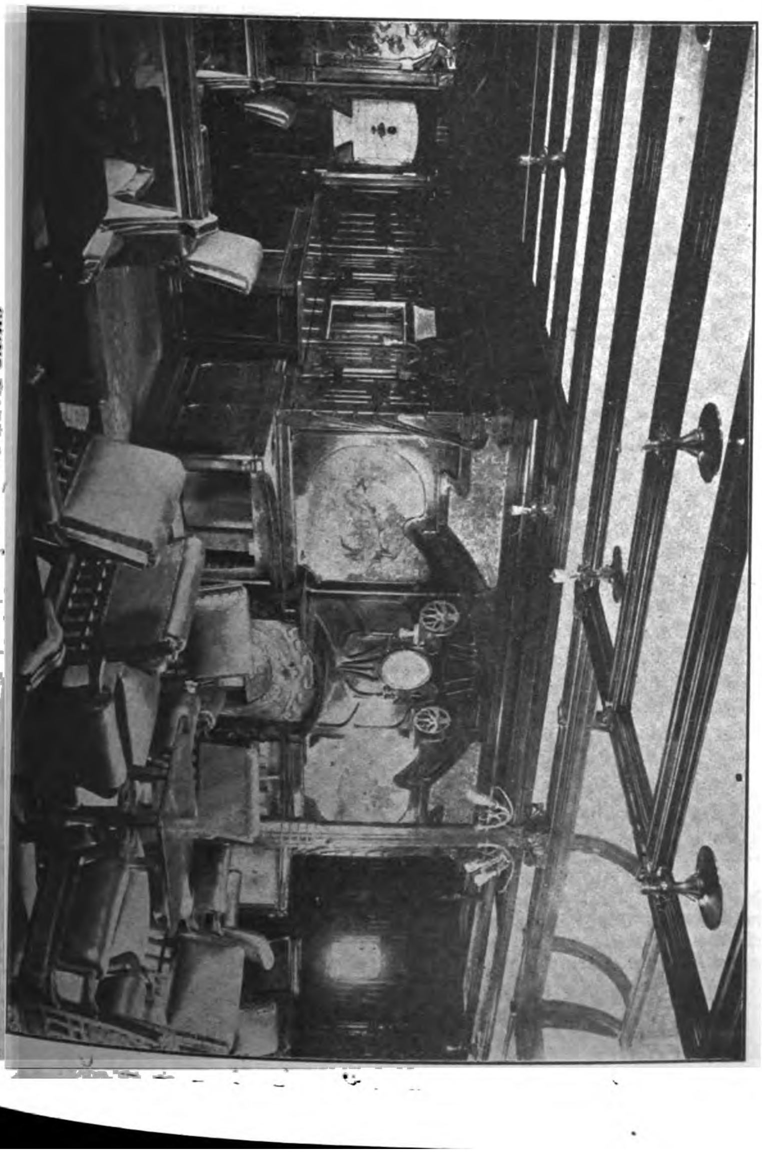
Boiler Shops.—The boiler shops adjoin the turbine shop. The buildings cover an area of 53,282 sq. ft. of ground, and are divided into four sheds, one for machine work, one for boiler construction, one for hydraulic riveting, and one for flanging. There are several very powerful tools, notably one 125-ton hydraulic riveter with 40-ton hydraulic crane and 8 ft. gap; one 150-ton hydraulic flanging machine with 4 ft. gap; one vertical plate bending roller, to deal with a plate 11 ft. 6 in. wide and 2 in. thick; one electrically driven boiler shell drilling machine, which can take one double-ended boiler up to 16 ft. in diameter and 18 ft. in length or two single-ended boilers each 16 ft. in diameter and 12 ft. 6 in. in length; one 2-spindle boiler shell drilling machine, to deal with boilers up to 16 ft. in diameter and 18 ft. in length; one 4-spindle boiler shell drilling machine, to deal with boilers up to 16 ft. in diameter and 23 ft. 6 in. in length; one electrically driven lever punching and shearing machine with angle cutter, punches $1\frac{1}{2}$ inch hole through $1\frac{1}{2}$ in. plate, shears $1\frac{1}{2}$ in. plate, and cuts angles 6 in. by 6 in. by 1 in., with punch gap 36 in. and shear gap 33 in.; one edge planing machine, capable of planing plates up to 30 ft. horizontally.

Besides the above, special features of this shop are: one large 30-ton portable hydraulic riveter with 7-ft. gap; one oval and round hole cutting and marine boiler flange and flue turning machine, to take boiler end plates from 7 ft. 6 in. to 17 ft. in diameter; and one portable electrically driven drilling and boring machine. For conveyance, the shop is equipped with four 40-ton and one 7-ton electric overhead travelling cranes, two 5-ton hydraulic wall cranes, and 11 hand and wall cranes ranging from 1-ton to 5-ton lift.

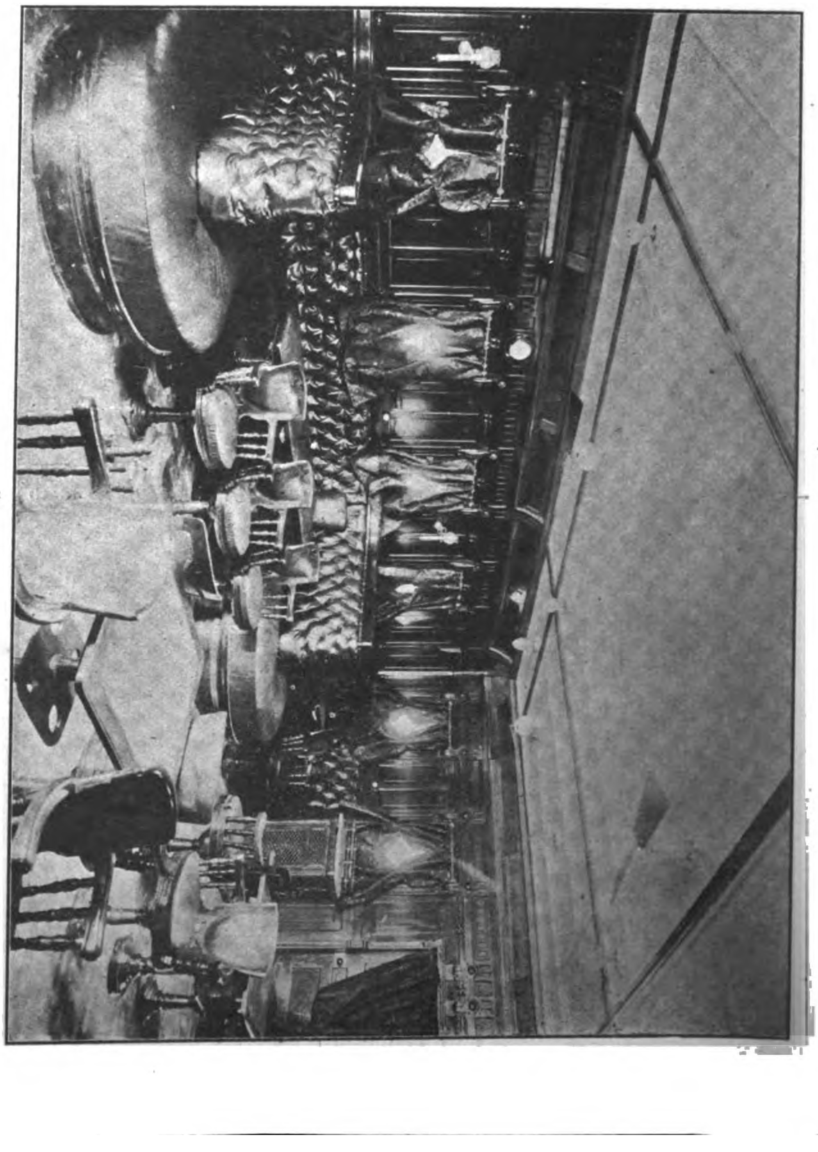
DINING SALOON, CHIYO MARU



SOCIAL HALL, ATSUTA MARU



CHIYO MARU SMOKING-ROOM



SMOKING ROOM, ATSUTA MARU

Smith's Shop.—The engine works smith shop, which is 375 ft. by 60 ft., is a light steel structure with 23 single hearths, five double hearths and seven forges arranged in rows on either side of the building, and with nine steam hammers, ranging from 1¼ tons to 7 tons, arranged in centre line. There are 5-ton, 10-ton and 20-ton air furnaces. The shop is equipped with 12 cranes ranging from 1½ tons to 20 tons. There is also one steam driven plate shearing machine.

Copper Smith Shop.—The copper smith shop, a temporary building of 144 ft. long by 72 ft. wide, is equipped with one hydraulic pipe bending machine, one upright drilling machine, one horizontal redial drilling and tapping machine, one flanging, rolling, straightening and circular cutting machine, one punching machine, one capstan lathe, one hack saw one air hammer, one plate bending roll, one pipe threading machine and one shearing machine. There are 12 hearths, the blast being supplied by Root's blower with 31 b. h. p. electric motor and capable of supplying 640 cubic ft. of air per minute.

Foundry.—The foundry is situated to the north of the machine shops. It consists of two main parts: iron and steel foundry and brass foundry. The iron and steel foundry is 310 ft. long by 102 ft. wide. The equipment includes a 2-ton Siemen's steel gas furnace, four cupolas with a casting capacity of 50 tons, one annealing furnace and three drying furnaces, each 20 ft. long and 16 ft. wide, and one sand mill. Two 15-ton and one 30-ton electric overhead travelling cranes and 14 3-ton radial cranes are distributed conveniently. There are six moulding pits, the two largest being 25 ft. by 30 ft. by 7 ft., and 20 ft. by 20 ft. by 12 ft.

The brass foundry is 100 ft. long by 102 ft. wide, containing two Stone's manganese air furnaces of 8-ton and 5-ton capacity, with moulding pit of 12 ft. by 12 ft. by 7 ft. on iron and steel foundry side, so that the heavy overhead cranes in the iron and steel foundry may be utilized for this pit. Six brass crucibles of forced draft and four of natural draft, each of 200 lbs., and two drying ovens. There are eight radial cranes distributed over the foundry, each of 3 tons capacity. At the corner of the Brass Foundry is the Core Shop.

The foundries are completely self contained in every sense, the moulding boxes and plates, core bars and core irons, etc., being all made there. Adjoining the foundries there are the requisite stores for metal, sand, furnace coal, coke, etc.

The pattern shop, which is a brick building, 180 ft. long by 70 ft. wide, is equipped with one circular and one band saw, one planing machine and four wood lathes, all driven by electricity. The first floor is used for storing the patterns; there is also at the back a spacious pattern store for large old patterns.

RIGGING AND SAIL LOFT.

The rigging and sail loft is a two story wooden building, 100 ft. by 50 ft The ground floor is occupied by the riggers, where all rigging ropes, blocks, tackles and other materials required by them are prepared. The first floor is entirely used by sail makers.

ELECTRIC SHOP.

The electric shop comprises one wing of the erecting shop, the ground, first and second floors, covering a working area of about 22,200 sq. ft., for production of all kinds of electrical machinery and fittings, especially Parsons' turbo-generators.

There are over 50 machines of the most improved and latest type, capable of undertaking both marine and land work. There is also an electro-plating department in this shop.

GIANT CRANE.

On the jetty, for shipping engine and boilers, etc., from the engine works, there is a 150-ton hammer-head type electric giant crane, designed by Messrs. Applebys Ltd., of Glasgow and London. It consists of a square tower, 136 ft. 3½ in. in height and 40 ft. square at the base, carrying a large roller path on top, upon which a horizontal jib, having a total length of 239 ft. 9¾ in. is supported. The long arm of jib has a total radius of 156 ft. 6 in. The jib is fitted with slewing gear to revolve it in either direction, and has racking gear and separate lifting motions for the main and auxiliary hoists.

The speed of the various motions are as follows: Main lift, 150 tons at 6 ft. per minute; auxiliary lift, 50 tons at 18 ft. per minute; racking, 150 tons at 30 ft. per minute; slewing, 150 tons one revolution in eight minutes. The total height of lift provided for is 171 ft. 3½ ins., that is to say, 141 ft. 3½ ins. above and 30 ft. below quay level. The total height from the quay level to the top of jib at the centre line of the tower measures 178 ft. 5½ ins. The racking and lifting machinery is placed in a steel-placed house at the tail end of the jib, and assists in counterbalancing the crane. The slewing gear is placed in a steel-plated house over the circular rack at the back end. The operator's cabin of steel plating, containing controller and resistance is placed on the centre line of girders of the jib, and is provided with projecting windows so that a clear view is obtained of the load at all times.

It is connected to the machinery house by speaking tubes, and by telephone to the ground.

The works are also provided with a 30-ton floating sheerlegs.

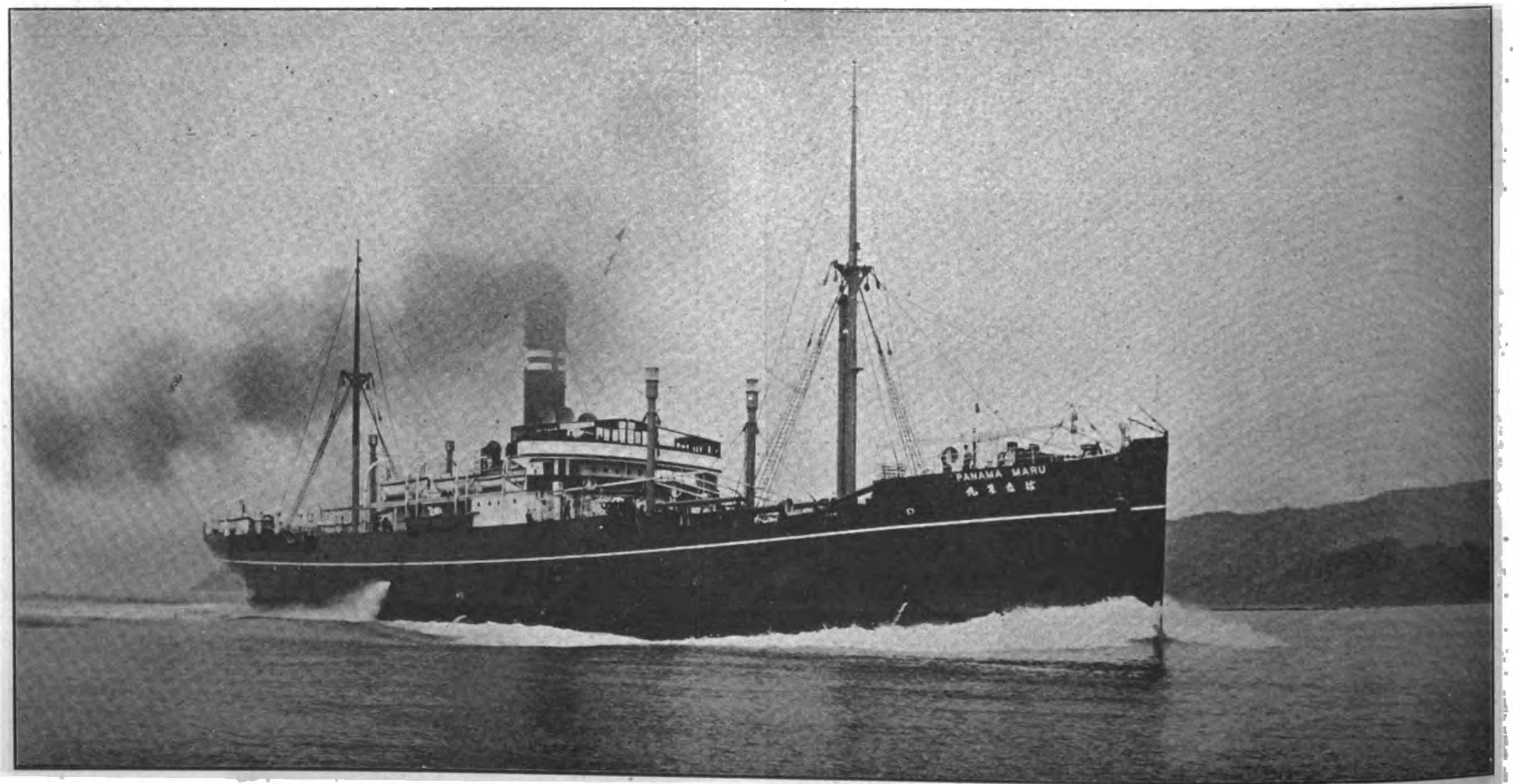
SALVAGE DEPARTMENT.

The works own the salvage steamer *Oura Maru* of 716 tons and 12 knots speed, built especially for the purpose, and fitted with one 18 in. and three 12 in. centrifugal pumps, one 8 in. and one 4 in. special pumps, with all necessary gear of the most powerful description, being always ready with an experienced staff of workmen and divers to undertake salvage work at short notice.

EXPERIMENTAL TANK.

The comparatively recent addition of a ship model experimental tank to the works is but further evidence of progressive character of the management of the concern, and its utility is proved by the fact that since the tank was completed about a year and a half ago, it has been kept fully employed in testing models of ships past, present and projective, and of screw propellers. It is a noteworthy fact that there are only three properly equipped experimental tanks in the world belonging to private shipbuilding firms. The first is that of Messrs Denny, at Dumbarton, the second, that of Messrs. John Brown & Co., at Clydebank, while the third is that now mentioned.

The arrangement and design of this great marine laboratory was entirely placed in the hands of Mr. Archibald Denny, of Dumbarton,



S. S. PANAMA-MARU.—First of three sister-ships being built at the Mitsu Bishi Dockyard & Engine Works, Nagasaki, to the order of the Osaka Shosen Kaisha for its American Service.—Principal Dimensions:—Length, 400′ 0″; Breadth, 51′ 0″; Depth, 32′ 6″; Speed attained at her trials, 15 knots. Type of Engines:—1 set Triple Expansion Engines; Boilers, 4 Single Ended Scotch Boilers fitted with Howden's Forced Draft. Passenger Accommodation:—1st Class 8, 3rd Class, 180.

and is practically a reproduction of the Clydebank tank, with the improvements evolved from experience since the construction of that tank.

Therefore, it is rather interesting to know that the only three private tanks in existence are in one way or another related to each other.

The waterway extends for 430 ft., of which 380 ft. is deep, varying from 12 ft. 6 in. at the north end to 12 ft. at the south end. This fall of 6 in. is gradual, and is for the purpose of drainage when emptying. The breadth is uniformly 20 ft. At the north end there are wet and dry docks. Of the wet docks, one is for storing models, and the other, placed between dry docks, is used for loading and trimming purposes. The towing truck can be run over the centre dry dock and the dynamometer and propeller gears examined from it. The latter must be raised to clear the dock sill. Ballast bags and spare parts are stowed in both dry docks. At the south end there is a sloping beach, 25 ft. long, to assist in breaking up the waves formed by the passage of a model through the water. A recess, however, is left up the middle, to prevent screws or models being run aground. The basin, which is rectangular in cross section, is formed of concrete and puddled clay backing.

The building is of brick, and, besides containing the tank proper, provides accommodation for a drawing office and superintendent's office, with the necessary fireproof record room, etc. In addition to the usual workshops necessary for tank work, there is a well-equipped mechanics' shop. Thus wood and metal work of any kind can be prepared, divulging nothing about the nature of the research work carried on within the walls of the tank.

As it is necessary to keep the temperature of the tank at or about a uniform degree, a complete system of hot-water piping is installed, and the heat is controlled at the calorifiers, of which there are two at the south end, and one at the north end of the building.

The offices and shops are heated on the same system. Light is admitted to the tank by windows on both sides and from the roof, most of which is glazed, while a complete system of electric lighting is installed throughout the building. The models used are generally about 12 ft., although exceptions are made according to the nature of the experiments required.

Like the Clydebank tank, the tank carriage is electrically driven. Current is supplied from the central power station, but, as it would be too irregular if applied direct, it is passed through a motor generator into secondary batteries, from which it is again discharged through the motor generator at a suitable and regular voltage, and delivered to the tank.

The trolley wiring is on the ward Leonard system. The tank carriage with its apparatus, and the model cutting machine and other accessories for the tank work were constructed and supplied by Messrs. Kelso & Co., Glasgow.

TESTING HOUSE AND CHEMICAL LABORATORY.

The works is installed with a Buckton's 50-ton testing machine and a 100-ton chain testing machine; also a well appointed chemical laboratory for the analytical examination of materials.

POWER PLANT.

Electric Plant.—An interesting item in the arrangement of such a large establishment is the system of generating and distributing power. Electricity is used on an extensive scale, not only for the lighting of workshops, sheds, the interiors of ships under construction, and of the yard generally, but also for the driving of the machine tools.

The central power house at Akunoura is fitted with two 500 k. w. turbo alternators direct coupled to Parsons' turbines one 500 k.w. direct current generator coupled to Willans' patent central valve engine, two 100 k. w. direct current dynamos coupled to the same type of engines, two 225 k. w. direct current dynamos coupled to a McIntosh, Seymour & Co.'s vertical cross compound engine, and 300 k. w. direct current dynamo coupled to three-phase induction motor; also two 25 k. w. dynamos coupled to one three-phase induction motor and used for ship lighting, and 100 k. w. booster or motor generator which is used for charging the secondary batteries, having a capacity of 3,000 ampere hours. The steam is supplied by seven Babcock & Wilcox boilers, which also serve as destructors, being used for disposing of the sawdust, shavings, etc., from the various wood-working shops, and the rubbish collected from the interiors of ships under construction.

The sub-station at Tategami shipyard is fitted with two 200 k. w. rotary converters and six 75 k. w. transformers, which convert from 3,450 volts alternating current to 250 volts direct current.

There are in the works about 260 arc lamps of 193,500 watts, and 2,800 incandescent lamps of 16 candle power. The arc lamps are used principally for outside illumination, and in the interior of the larger sheds and shops. The incandescent lamps are used in all the wood-working departments and offices, and for all bench work. They are also used for the internal lighting of ships during construction.

Electricity is largely used for machine tool driving, the power utilized in motors amounting in all to about 4,300 b. h. p. There are over 200 motors in use, varying in power from 200 b. h. p. downwards. In the first place, there are a number of high speed electric overhead travelling cranes in the machine and erecting shops, turbine shops and boiler shops, the largest being 60 tons. A large number of motors are applied to machines in machine shops, turbine shops and boiler shops; also to general shipyard work, such as shop driving, punches, shears, bending, cutting, planing and joggling machines, and to the machines in joiners' shops. Motors are also applied to the lighter class of work, for the purpose of driving portable drills, deck planers and ventilating fans on board ships under construction.

Hydraulic Pressure.—A hydraulic pressure system is installed throughout the shipyard, and is used for actuating the powerful flanging machine and manhole punching machine, several portable punches and riveters, and a number of cranes, etc. The pressure for this system is 1,500 lbs. per square inch. There is also a complete hydraulic installation throughout the engine and boiler shops, which is used for actuating the flanging machine and portable and fixed riveting machines, cranes and lifts. The pressure for this system is 1,200 lbs. per square inch.

Pneumatic Plant.—The pneumatic plant consists of one horizontal steam driven Rand Corliss air compressor, capable of delivering 593 cubic ft. of free air per minute, and two Ingersoll Rand's horizontal electrically driven two-stage air compressors, each capable of delivering not less than 215 cubic ft. of free air per minute, all having a terminal pressure of 100 lbs. per square inch. They are used for the lighter class of work in riveting, drilling, caulking and chipping, etc.

SCHOOL.

The works has its own school in the premises, having accommodation for three classes, totalling 150 boys, where they receive all the necessary elementary education to fit them for various trades and to make good workmen of them. The institution was organized by the goodwill of Baron Iwasaki, on the ground that an elementary, but thorough and sound, technical education is of the utmost importance to make good workmen, that being the main source of raising the industrial standard of the country.

The school is a fine brick building covering about 12,500 sq. ft., with a spacious recreation ground. The basement contains four large mess rooms, two cloak rooms, game lockers, lavatories and scullery. The first floor contains the hall, four class rooms, each with accommodation for 50 boys, one drawing class room, science class room, instrument and apparatus room, and instructors' retiring room and office. Large central spaces, leading to different rooms, both on the basement and first floor, so designed that the boys do not suffer from lack of recreation ground in rainy weather. The institution is open free to the general public, and, after going through the school curriculum, the boys are at liberty either to enter the works as apprentices or to take another course in life.

HOSPITAL.

A fine hospital, having accommodation for 50 patients, is also part of the works equipment. The appointment is perfect, and it is staffed with a number of experienced surgeons and physicians. Here injured employes receive surgical and medical treatment at the company's expense. The employes of the works have the privilege of free consultation, and of obtaining medicines of the very best kind at cost price. The hospital is fitted with an X-ray room and apparatus.

CLUB HOUSE.

The comfort of the employes is never overlooked by the firm, and, to provide for this, there is a large club house outside the Akunoura Works. This Club House is maintained entirely by the firm and is open to all the official staff, each paying only his own actual expenditure. There is, on the ground floor, a large billiard room with refreshment bar and three billiard tables. On the first floor there is a large library and reading room with over 1,500 volumes on all the engineering subjects and mostly of English publication.

PENSION AND SAVINGS BANK.

Pension and savings bank system, with other benevolent schemes, are in existence, to secure the welfare and to encourage thrift amongst the employes. A particularly noteworthy feature in connection with the workmen is styled "The Workmen's Protection Scheme," and has been in force since the end of 1897, with very satisfactory results. The scheme is based on the principle of an insurance system, and comprises three sections, viz.: "Injury," "Pension" and "Sick, Marriage, Birth and Death." For "Injury," the compensation extended to the workmen varies from £5 to £300, according to class and rate of wages to which they belong and to the nature of the injury, and is applied to the families of those who die or are incapacitated through injury received on duty. For "Pension" each employe deposits in the fund a certain proportion of his wage, to which the employers contribute a like amount. The pension granted from this fund to the workmen retiring from old age or other legitimate reason varies considerably, according to the grade and time of service; for example, the pension for those of ten years' standing varies from £9 to £70, according to grade, and for those of 25 years' standing from £40 to £300.

For "Sick, Marriage, Birth and Death," each employe also deposits a certain proportion of his wage, to which the employers contribute a like sum. The benefit accruing to the workmen by this fund varies from 2½*d.* to 2*s.* per day for four months for sickness, 14*s.* to £5 for marriage expenses, 4*s.* to £5 for birth or death of near relatives, and 10*s.* for conscription.

HONORS.

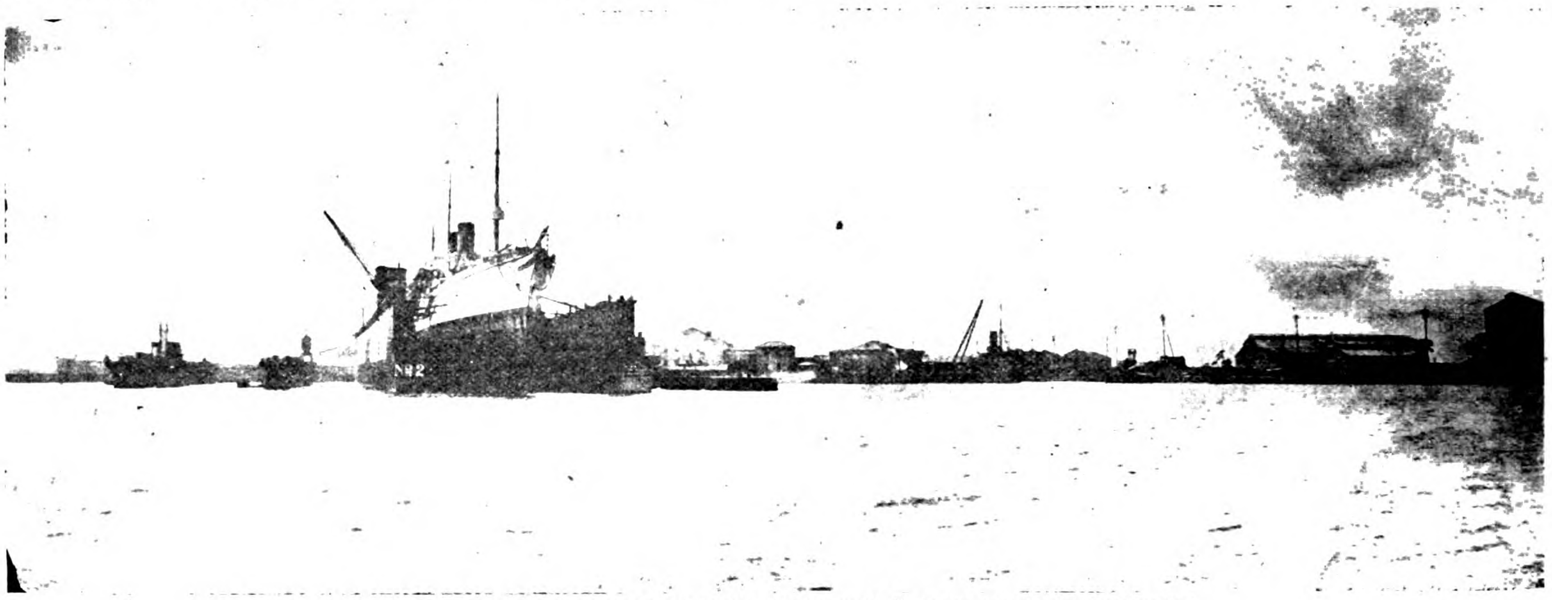
Gold Medals of Honor were awarded to the works at the 5th National Industrial Exhibition held at Osaka in 1903, and at the Tokyo Industrial Exposition held in 1907.

TUNG TAI TSEUNG KEE & CO.

This firm was started by Mr. Choi Chik Nam, in 1897, for the purpose of building and repairing steam launches, river craft, etc. Two workshops, one at Yaumati, and the other at Praya East, Wanchai, afford employment for five hundred workmen. The firm holds contracts from the French Government at Saigon, and is entrusted with the execution of repairs for the Indo-China, the Hamburg-Amerika, and the Japanese lines of steamers. Upwards of a hundred steam launches have been built by this firm for Manila. One launch was 140 feet in length, and fitted with triple-expansion engines. The proprietor, Mr. Lan Fat, received his education in Hongkong, and was afterwards apprenticed as draughtsman to Messrs. Fenwick & Co. for nine years. He was then for nearly two years engineer to Messrs. Marty & Co., until, in 1895, he joined Messrs. Tung Tai Tseung Kee & Co. as manager. In this position he remained for ten years, when he purchased the business.

THE MITSU BISHI DOCKYARD AND WORKS AT KOBE

The Mitsu-Bishi Dockyard and Engine Works at Wada Point, Kobe, were inaugurated on the 8th August, 1905, as another advance by the Mitsu-Bishi Company in their enterprise of Shipbuilding and Engineering. Prior to this date, important preparations for reclaiming the land, constructing a breakwater, and other work had been done. A floating dock of 7,000 tons lifting power, built at the Company's Nagasaki Works, was towed into the basin, and two years later the works stood as one of the most prosperous concerns in the Japanese Empire. To provide for the rapidly increasing business, and extension on a large scale became a matter of urgent necessity, and, before the second anniversary of the works, the keel blocks of a floating dock of 12,000 tons lifting capacity were laid down, and additional permanent steel buildings for workshops were in course of construction.



GENERAL VIEW OF THE MITSU BISHI DOCKYARD & ENGINE WORKS AT KOBE

The No. 2 Floating Dock was launched in November, 1908, and on the 8th December the S. S. *Mishima Maru*, one of the new European Liners of the Nippon Yusen Kaisha Line, 8,600 tons gross, was the first vessel docked. The works are now fully equipped with the latest machine tools and appliances, powerful enough to construct vessels up to 10,000 gross tonnage.

The works, which are situated on the western shore of the harbour of Kobe, just northward of the Wada-Misaki Lighthouse at the entrance of the port, have been laid out on an extensive scale. They cover an area of about 82 acres, and provide room for further extensions. The sea frontage of the works is more than 5,000 ft. long, a part of which has been reserved for shipbuilding berths suitable for the simultaneous construction of seven vessels of over 500 ft. in length.

To the north of the building berths is a basin having an area of about 14 acres, protected by a breakwater of masonry work 1,000 ft. long, leaving an opening for entrance from the north. This opening is naturally sheltered by the shore of Hyogo, which lies at a distance of little over half a mile.

Alongside the basin, a masonry quay wall was constructed for the purpose of mooring vessels under repair, or under equipment with new machinery. A 100-ton steel tripod sheerlegs, by Day, Summers & Co., Southampton, has been recently erected on the foundation laid on the quay wall. There are four strong mooring buoys outside the breakwater, forming a safe deep water anchorage, and, as the establishment is connected with the Wada branch line of the Imperial Government Railway, the works occupy a unique position in this harbour in regard to communication by land and sea.

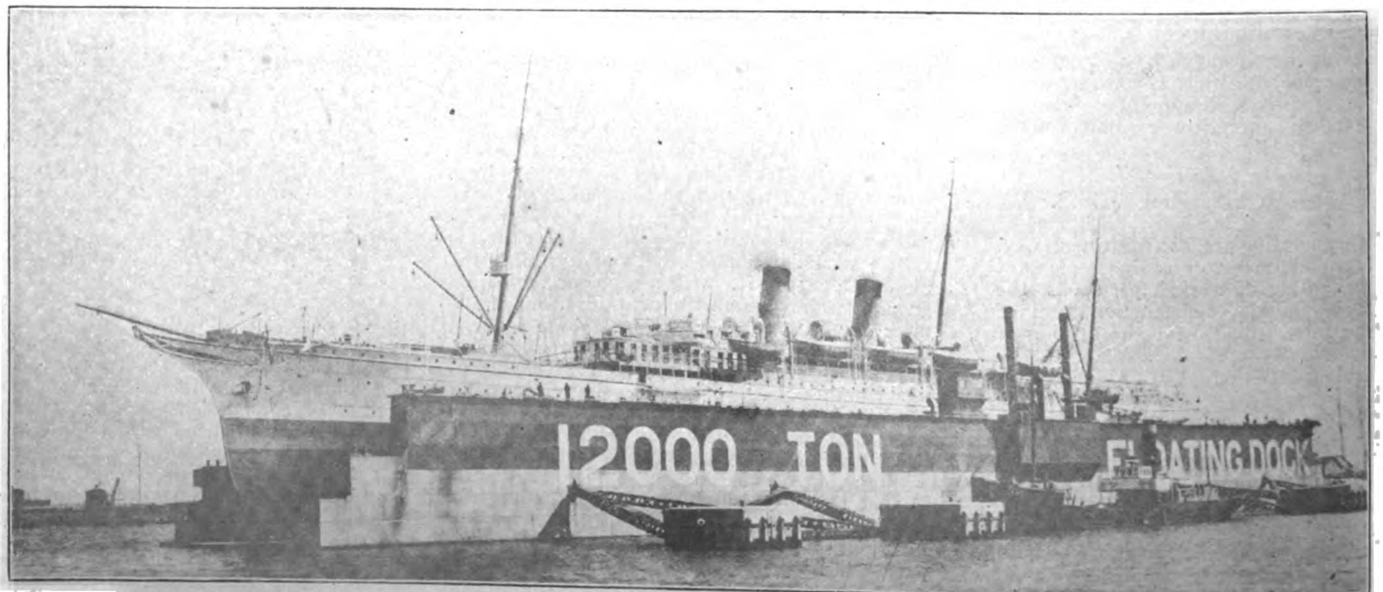
The following are the principal workshops, equipped with electric power and light, each connected by rails which are again connected with the Government railway lines. The dimensions given below against the various machine tools and machinery installed in the respective shops indicate their maximum capacities.:

Machine and Erecting Shops.—28,000 sq. ft., 41 lathes: 15 ft. diameter by 25 ft. 6 in. between centres; 4 planing machines: 18 ft. horizontally by 21 ft. vertically; 12 drilling machines: radial arm, 7 ft.; 6 slotting machines: stroke 9 ft.; 6 shaping machines: stroke 2 ft.; 5 screwing machines: 4 in. diameter by 7 ft. long; 4 milling machines: 15 in. high by 7 ft. wide; 2 cold metal cutting machines, to cut 18 in. deep; 2 electric overhead travelling cranes, to lift 15 tons.

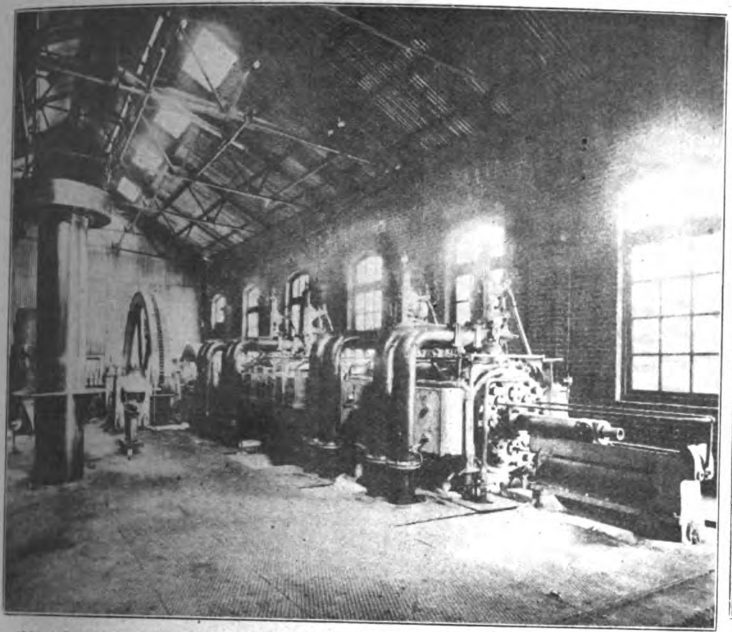
Blacksmith Shop.—15,900 sq. ft.—1,600 ton hydraulic forging press; 6 1-ton steam hammers; 1 gas furnace; 30 forges.

Shipyard Machine Shops.—22,250 sq. ft.—5 punching and shearing machines: to punch 1½ in. holes through 1½ in. thick, and shear 1½ in. thick; 1 beam and angle bending and shearing machine, for 14 in. beams; 2 planing machines: 28 ft. by 2 in. thick; 2 5-ft. radial drilling machines; 4 radial countersunk drilling machines; 1 set plate bending rollers, for plates 25 ft. long by 1¼ in. thick; 1 set plate straightening rollers, for plates 6 ft. long by 1¼ in. thick; 1 hydraulic keel plate bending machine, for plates 25 ft. long by 1¼ in. thick; 1 hydraulic manhole punching and joggling machine, to punch holes 30 in. by 20 in.; 1 frame bevelling machine, for bevelling angles up to 7 in.; 1 portable pneumatic plant, for working pneumatic hammers, drills, etc.; 1 electric overhead travelling crane, to lift 3 tons.

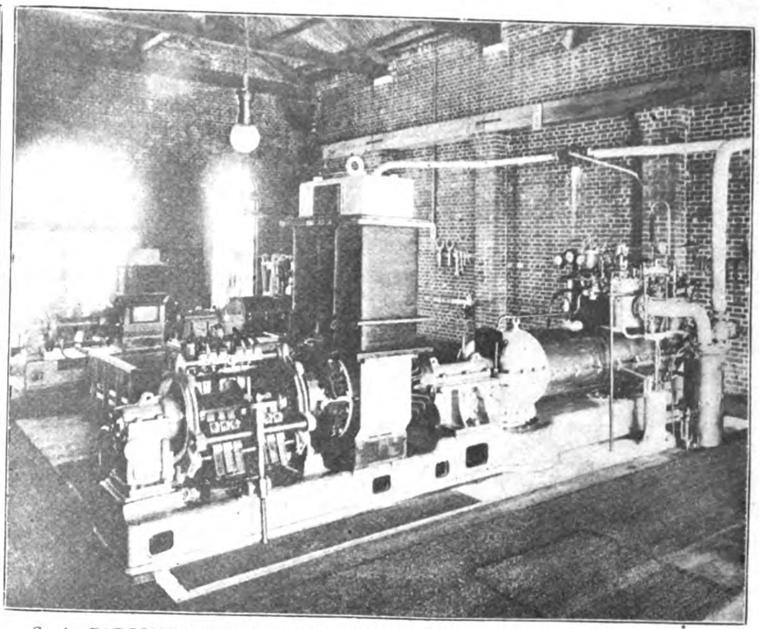
Boiler Shop.—28,750 sq. ft.—6 drilling machines, for boilers 20 ft. diameter by 24 ft. long;



THE NO. 2 FLOATING DOCK OF THE MITSU BISHI CO. AT KOBE. LIFTING CAPACITY, 12,000 TONS. R. M. S. "EMPRESS OF CHINA" IN DOCK

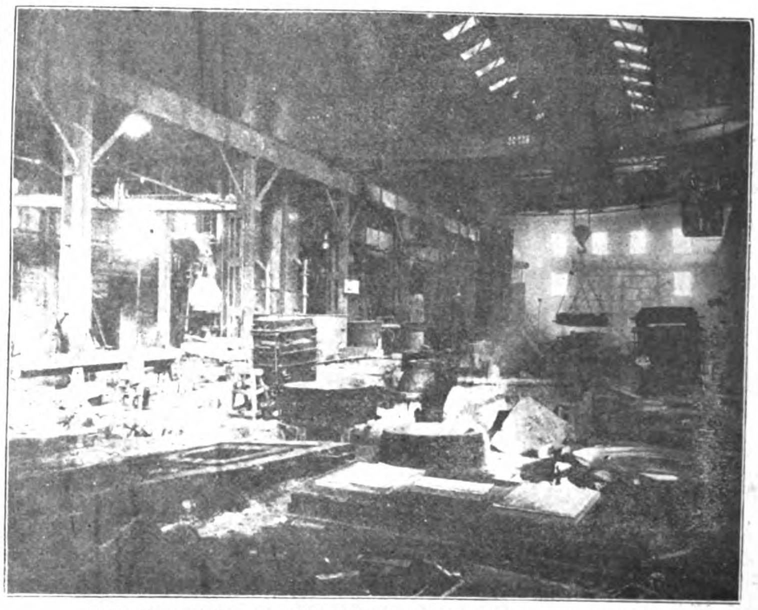


NO. 2 POWER HOUSE AT THE KOBE WORKS OF THE MITSU BISHI CO., 450 B. H. P. COCKERILL TYPE GAS ENGINE

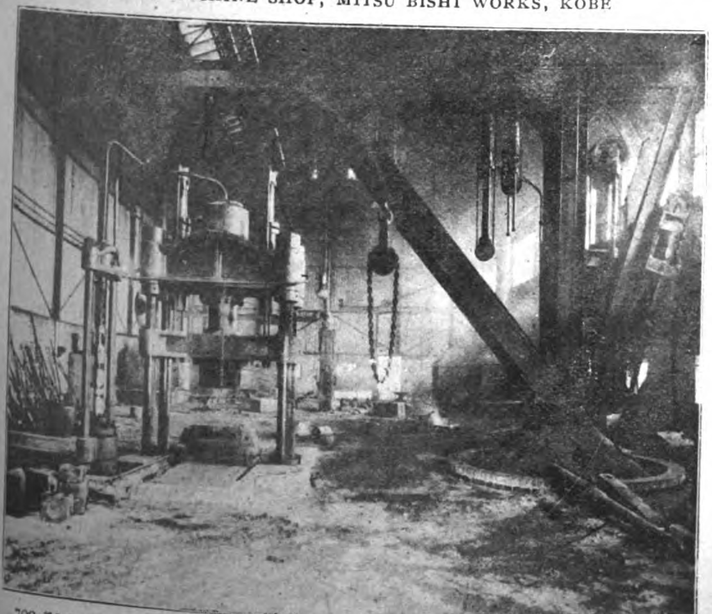


C. A. PARSONS PATENT TURBO-GENERATORS, MANUFACTURED UNDER LICENSE BY THE MITSU BISHI CO.

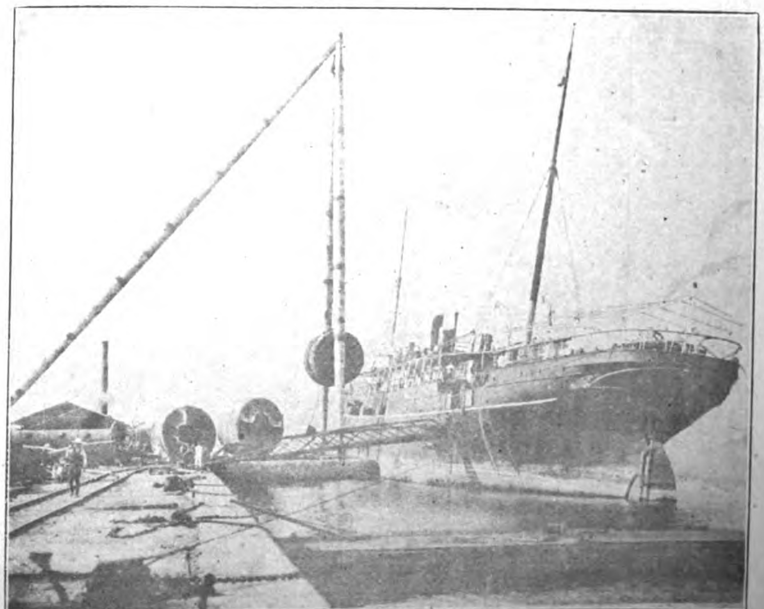
NO. I MACHINE SHOP, MITSU BISHI WORKS, KOBE



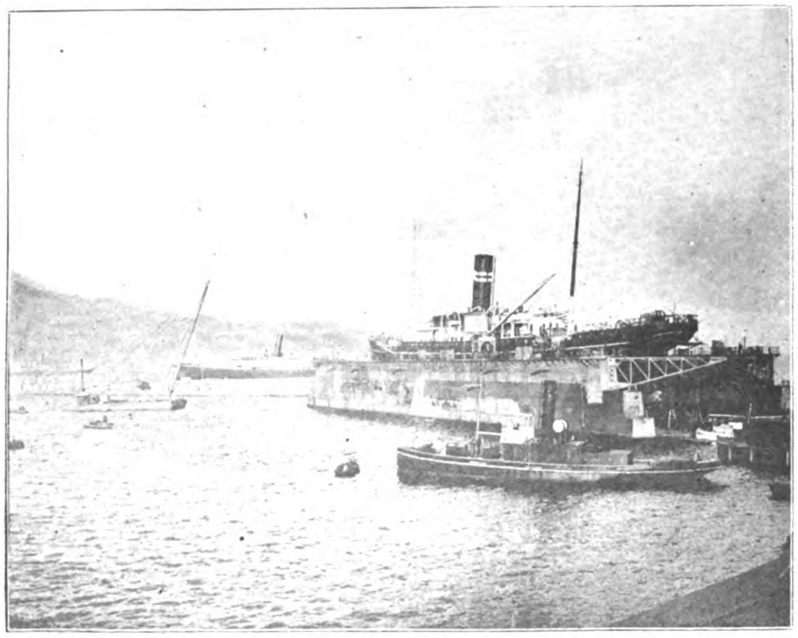
THE FOUNDRY OF THE MITSU BISHI WORKS AT KOBE



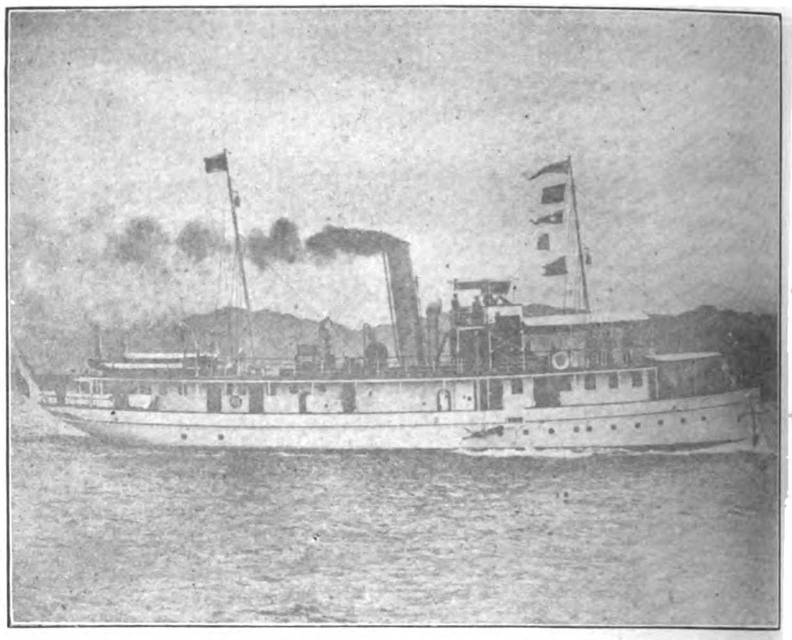
700-TON HYDRAULIC FORGE PRESS IN BLACKSMITH DEPARTMENT OF THE MITSU BISHI WORKS AT KOBE



100-TON STEEL TRIPOD SHEERLEGS LIFTING A BOILER FROM S. S. "TAICHU MARU" AT THE KOBE WORKS OF THE MITSU BISHI CO.



NO. I FLOATING DOCK OF THE MITSU BISHI CO. AT KOBE, 7000 TONS LIFTING CAPACITY



TWIN SCREW STEAM YACHT "MONIJI MARU" 100' × 20' × 10' DEPTH, BUILT BY THE MITSU BISHI WORKS AT KOBE

2 rollers, for bending plates 13 ft. by 2 in. thick; 1 punching and shearing machine, to punch 1½ in. holes through plates 1½ in. thick and shear plates 1½ in. thick; 3 hydraulic riveters, gap 13 ft. 6 in. and 160 tons pressure on rivet; 1 hydraulic plate flanging machine, 150 tons pressure on plate; 1 annealing furnace, 25 ft. by 18 ft.; 3 electric overhead travelling cranes, to lift 50 tons.

Brass Foundry.—120 ft. by 90 ft.—15 crucibles, capable of casting 5,000 lbs at single charge; 2 electric overhead travelling cranes, to lift 3 tons.

Joiner and Carpenter Shops.—10,875 sq. ft.
Pattern Shop.—100 ft. by 70 ft.
Copper Smith Shop.—165 ft. by 40 ft.
Saw Mill.—190 ft. by 35 ft.
Bending Shop.—50 ft. by 60 ft.
Mould Loft.—165 ft. by 50 ft.

Iron Foundry.—180 ft. by 120 ft.—4 cupolas, 10 tons per hour; 3 drying stoves, 27 ft. by 16 ft. by 15 ft.; 3 moulding pits, 20 ft. by 20 ft. by 18 ft.; 3 electric overhead travelling cranes, to lift 30 tons.

Electrical Machinery Shops.—16,800 sq. ft.—3 power presses, 3 ft. 7 in.; 3 notching presses, diameter, 40 in.; 2 field coil winding machines, 2 ft. 9½ in.; 3 squaring shears, for squaring sheets up to 42 in.; 2 circular shearing machines, diameter 3 ft.; 4 milling machines, 36 in. by 9 in. by 20 in.; 1 slotting machine, 8 in. stroke; 1 shaping machine, 28 in. stroke; 12 lathes: 12 in. centres; 3 drilling machines: 23 in.; 3 portable electric drills; 1 vacuum impregnating tank, diameter 4 ft. 6 in. by 8 ft.; 2 portable cranes and hoists, to lift 2 tons.

Power Houses.—Electricity is used for power and lighting purposes in the workshops and offices. There are two generators in No. 1 power house, one of 100 k. w. and one of 150 k. w. capacity, driven by C. A. Parsons' steam turbines. In No. 2 power house, there is a 450 B.H.P. "Cockerill" gas engine, driving 1-300 k. w. generator, built at the works. Gas is supplied by a "Mond" gas producer of 800 B.H.P. capacity, which also supplies gas to the furnace in the blacksmith shop.

No. 1 Floating Dock.—No. 1 Floating Dock, the first built in Japan, was constructed at the Company's Nagasaki Works. It is securely moored inside the basin, and the advantages are: First, a ship can be docked at any state of the tide. Secondly, docking can be done more easily and in a shorter time than in a granite dock, as paint dries more quickly. Thirdly, the dock itself is practically on the same level as the workshops, so greater facility is afforded for conveyance of materials to the ship. The dock is very popular, and for the five years and a half ending Feb. 7th, 1911, 352 vessels were docked, of an aggregate tonnage of 838,889 tons.

The following are the particulars of the dock: —Type—sectional pontoon, designed by Messrs. Clark & Standfield, of London; length on blocks, 387 ft. 6½ in.; length over all, 412 ft. 6½ in.; breadth over pontoons, 85 ft.; breadth inside rollers, 60 ft.; maximum length of ship taken in, 460 ft.; maximum beam of ship taken in, 56 ft.; maximum draft of ship taken in, 22 ft.; lifting power, 7,000 tons; time occupied in pumping out, for lifting a ship of 7,000 tons gross, 2½ hours.

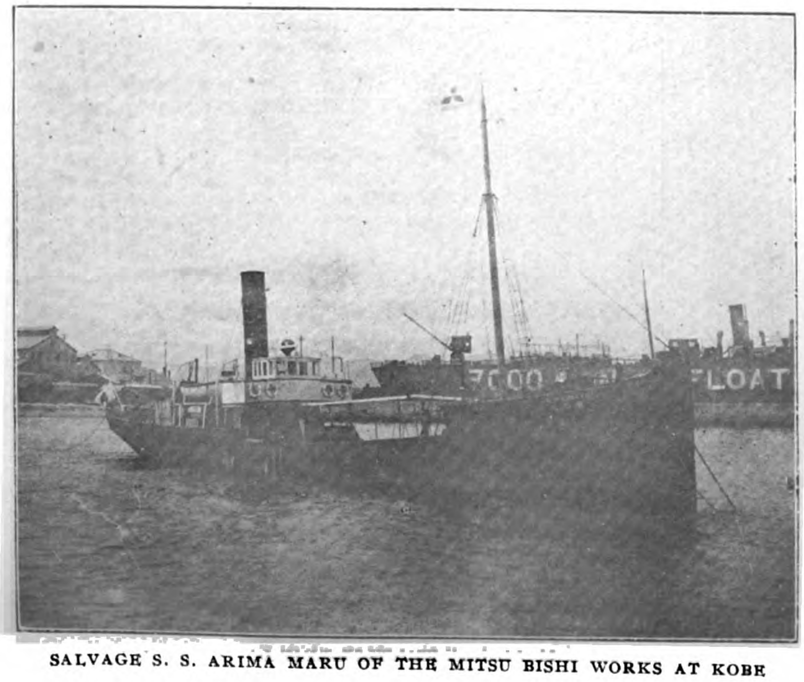
No. 2 Floating Dock.—No. 2 Dock was built at this shipyard, mostly from materials made at the Imperial Steel Works, in Kyushu, Japan. It is moored in the basin alongside the No. 1 Dock. During 2 years ending the 7th Dec., 1910, 92 vessels were docked, aggregating 306,638 tons gross.

The particulars of the dock are as follows:—Type—sectional pontoon, designed by Messrs Clark & Standfield, of London, same as for No. 1 Dock; length on blocks, 505 ft. 11-16 in.; length over all, 532 ft. 6 in.; breadth over pontoons, 100 ft. 11-16 in.; breadth inside rollers, 70 ft.; maximum length of ship taken in, 580 ft.; maximum beam of ship taken in, 66 ft.; maximum draft of ship taken in, 26 ft.; lifting power, 12,000 tons; time occupied in pumping out, for lifting a ship of 12,000 tons gross 4 hours.

Manufactures.—In addition to building and repairing vessels and their equipments, the works is adapted for making the following: land type boilers, engines, hoisting machines, dredgers, steel girders, steel buildings, pipes and pillars and various alloys. Electrical machinery with accessories is also manufactured and repaired. The works is one of the leading electrical factories in the country, its workmanship is of the highest class, and a bright future is promised for it

Floating Sheerlegs and Salvage Plant.—Attached to the works is a floating sheerlegs, of 40 tons working load, built at the Nagasaki Works, and the salvage steamer *Arima Maru*, with powerful pumps of 2,000 tons capacity per hour, completes the equipment of the works

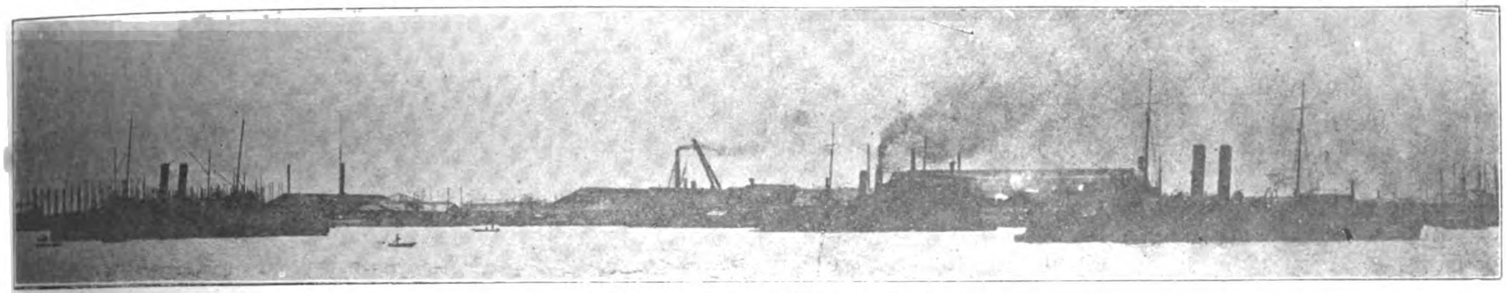
Pension and Savings Bank, Hospitals, etc.—In connection with these works are similar benevolent institutions for the welfare and encouragement of employees as at the works at Nagasaki. Gold medals of honor were awarded to the works at the Tokyo Industrial Exposition, 1907, and the Nagoya Industrial. 1910.



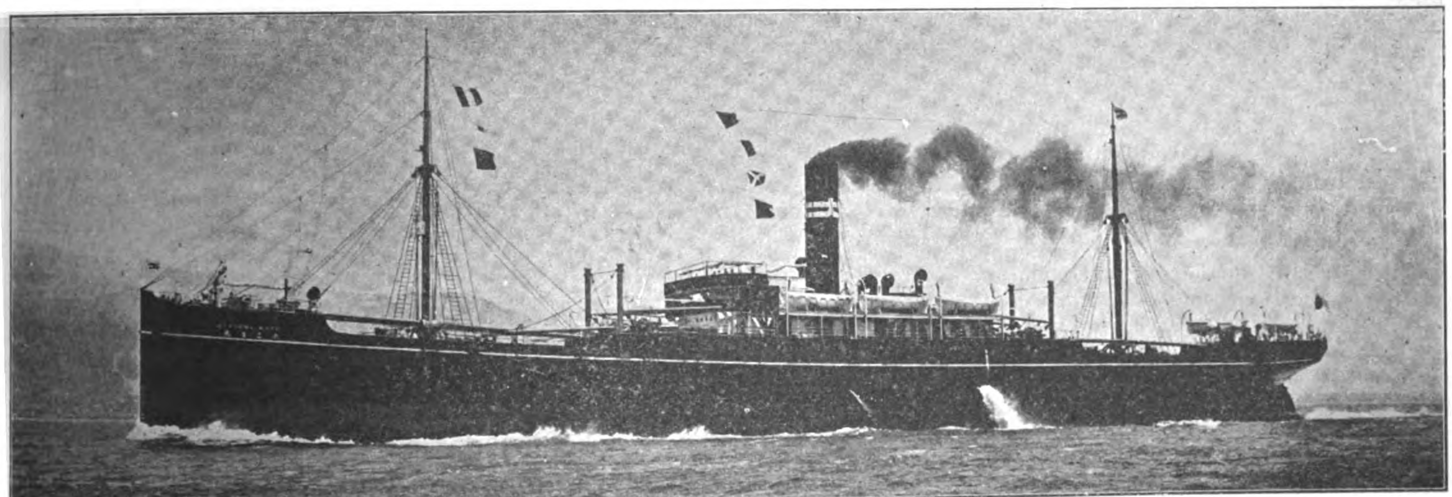
SALVAGE S. S. ARIMA MARU OF THE MITSU BISHI WORKS AT KOBE

THE KAWASAKI DOCKYARD COMPANY, LTD.

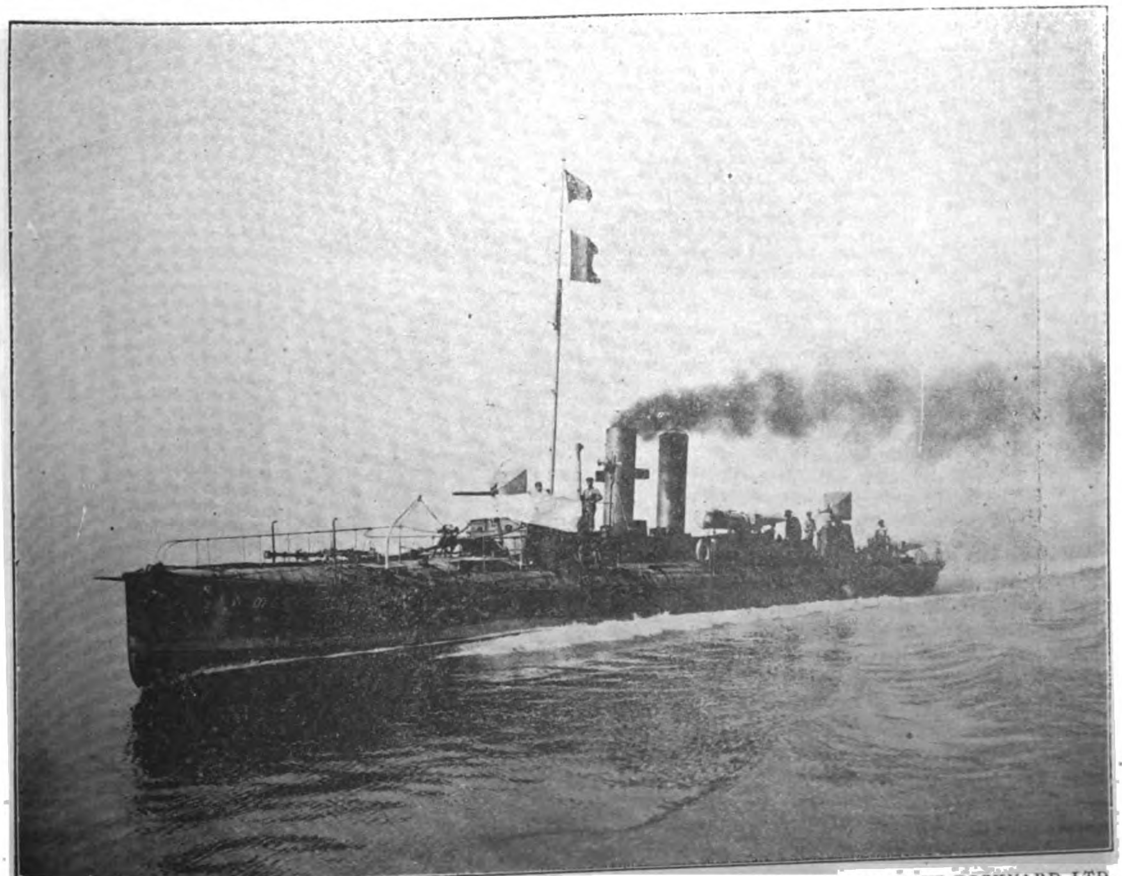
The Company was organized with a capital of two million yen in October, 1896, in Kobe. The origin of the Company, however, can be traced as far back as the early part of the 70's, and it can be said to be the pioneer of the Japanese shipbuilding industry. With Messrs. Kojiro Matsukata (President) and Yoshitaro Kawasaki (Vice President) at the head of the Board of Directors, the Company began to expand steadily year by year, and at present (December, 1910) it occupies more than 104 acres of ground in all, and 206 buildings for offices, workshops and godowns stand thereon. The ground area actually covered by the main works of the company in Kawasaki Cho, Kobe, is 47 acres, which are occupied by 198 buildings of various sizes. The area of the Hiogo Branch is 25.6 acres, that of the Shanghai Branch 13 acres, that of the ice works in Hiroshima 1.3 acres and that of the Dairen Branch 13.1 acres, while there are 4.4 acres besides the foregoing occupied by the residences of the company's officers.



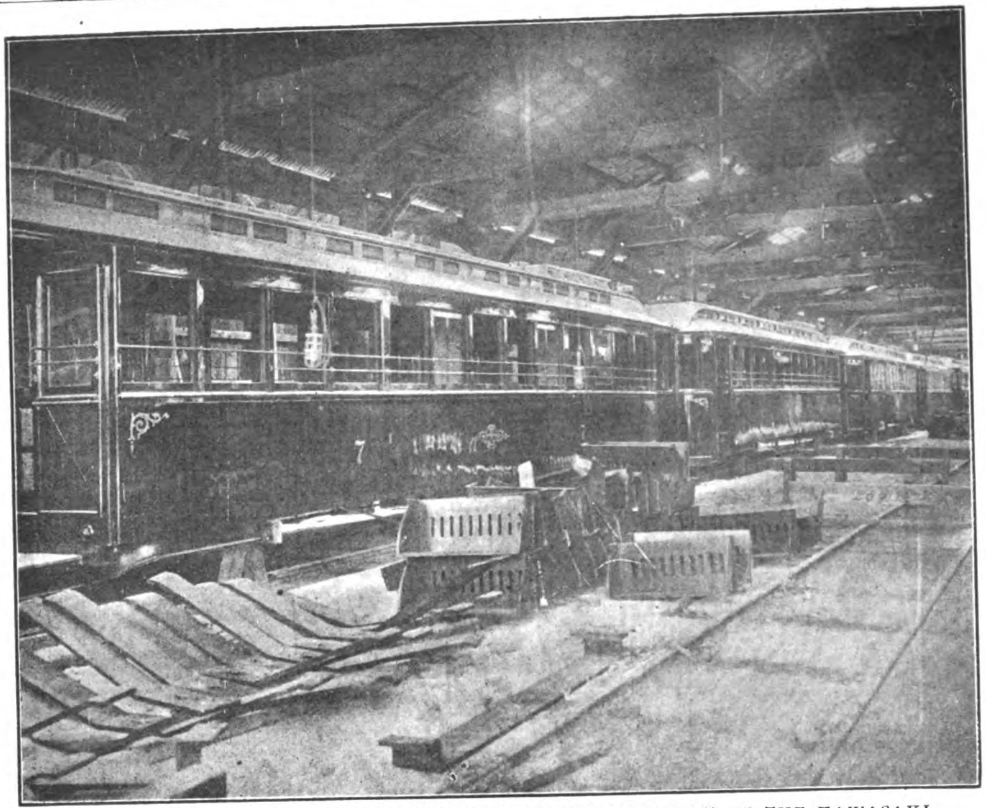
FRONTAGE OF THE KAWASAKI DOCKYARD AT KOBE



S. S. "TACOMA MARU," OF THE OSAKA SHOSEN KAISHA BUILT AND ENGINED BY THE KAWASAKI DOCKYARD LTD.



ONE OF THREE TORPEDO BOATS BUILT FOR THE ROYAL SIAMESE NAVY BY THE KAWASAKI DOCKYARD LTD.



CARRIAGES FOR THE HIOGO ELECTRIC TRAMWAY CO., BUILT BY THE KAWASAKI DOCKYARD, LTD.

The Company had to increase its capital several times, and it amounted to ten million yen, divided in 200,000 shares, in November, 1906. The total paid-up capital at present is 6,400,000 yen and that of the reserve funds 1,510,000 yen

Kobe; Shanghai Branch (re-opening of which is under consideration), Pootung, Shanghai.

Ordinarilly the company has been carrying the business relating to the building and repairs of all kinds of ships and machinery, iron and bronze castings and repairs of all descriptions; of machinery, tools, locomotives and rolling stock, rails, etc., for railways and electric tramways, bridge girders and spans, arms, weapons, power machinery and industrial and mining machinery of every description,and gas and water pipes. It also undertakes salvage operations and towing, ice manufacture and all kinds of building and construction works.

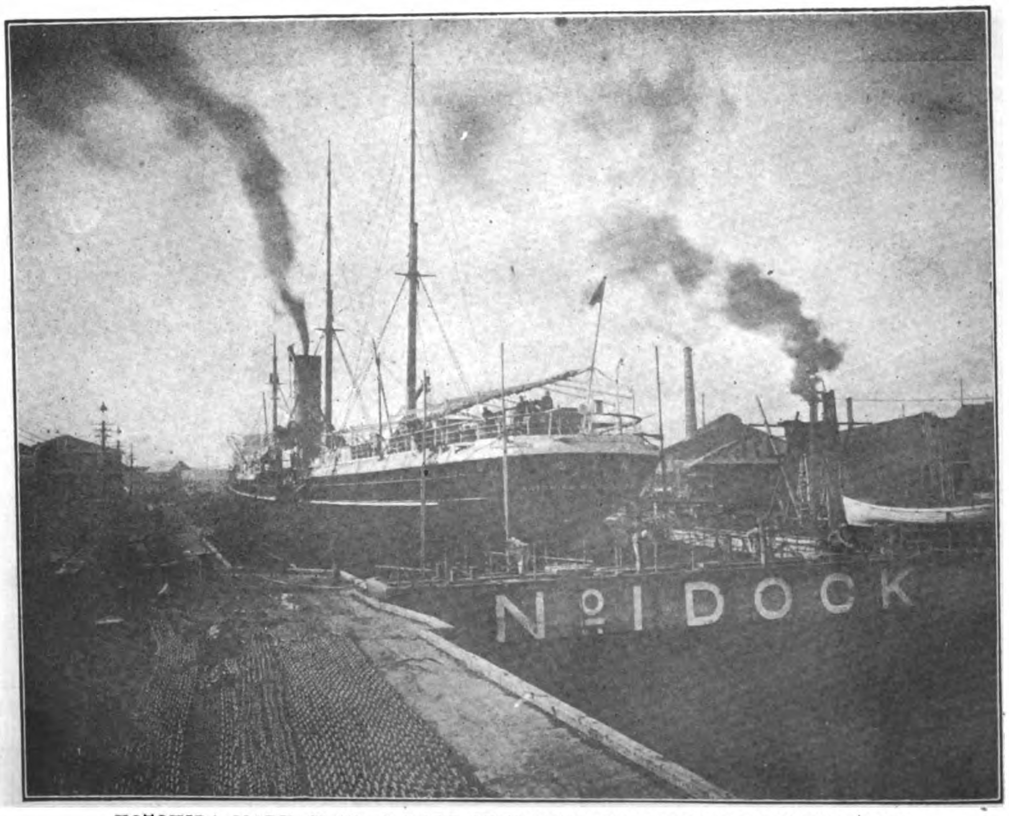
The Hiogo Branch was inaugurated in July, 1907, and the steel casting, sawyers' works, and the construction of railway locomotives, electric tram carriages, bridges and girders of all descriptions have been carried on there.

The Dairen Branch was opened in July, 1908. There is one graving dock of 381′ 0″ length, capable of accommodating a vessel up to 3,000 tons. Repairs to vessels trading to and from or in North China coasts are undertaken. The works have already received a good deal of orders for machinery for factories and other land purposes and are well patronized by the general public.

Patent Rights.—The company having purchased the following patent right, now possesses the sole right to make and sell them in Japanese Empire, and in China and Siam in some cases:

Curtis Marine Steam Turbine, Cantilever Framed Steamship, Schmidt's Superheater for Marine & Locomotive Uses, General Electric Co.'s Electric Locomotive equipment and fittings, Weir's Uniflux Condenser, Miyabara's Water Tube Boiler, Aetonia Process of Casting, Monel Metal (Agency).

Dry Docks and Slipways.—The Company owns two dry docks and two patent slipways, their respective dimensions being as given below:



KOTOHIRA MARU IN NO. I DOCK OF THE KAWASAKI DOCKYARD AT KOBE

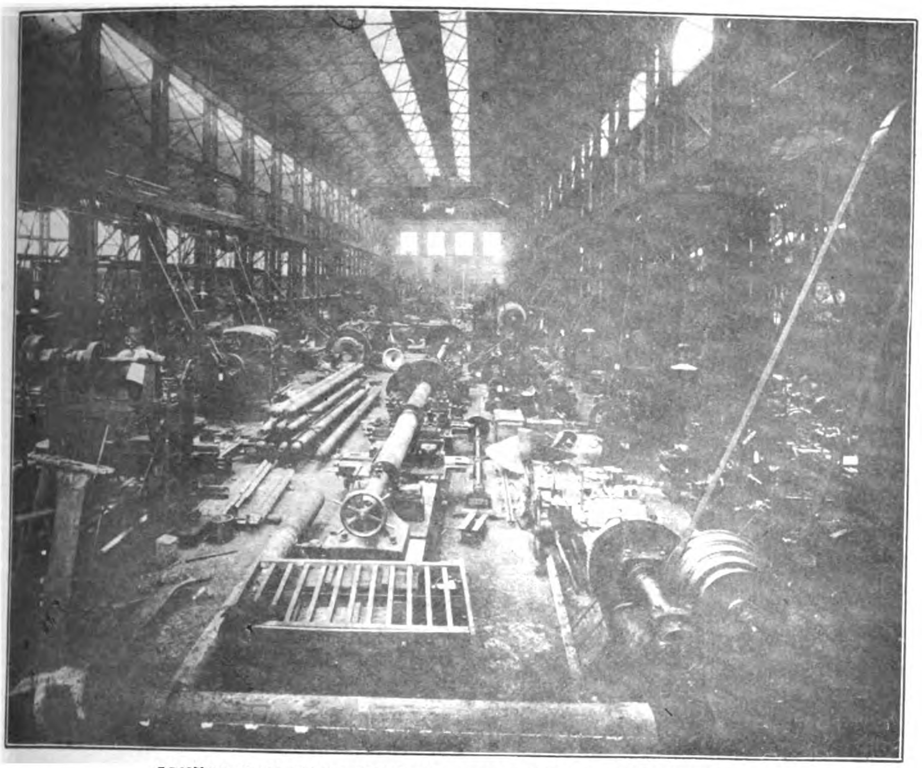
At the present moment the Company has its offices as mentioned below:

Main Offices and Works, Higashi Kawasaki-cho; Kobe; Hiogo Branch, Higashi Shiriike, Hiogo, Kobe; Dairen Branch, Hama-cho, Dairen (Dalny); Ice Works, Hiroshima near

but it now undertakes the following works:

Construction, manufacture and repairs of battleships, cruisers, torpedo-boats, destroyers, submarine boats, merchant steamships, dredgers, trawlers and vessels of any description; steel, iron and bronze castings, boilers and all kinds

No. 1 Graving Dock (Kobe).—Extreme length, 425′ 0″; length on blocks, 377′ 0″; width of entrance on top, 63′ 6″; width of entrance at bottom, 51′ 7″; water on blocks at spring tide 24′ 6″,



CENTER BAY MACHINE SHOP, KAWASAKI DOCYARD LTD.

No. 2 Graving Dock (Dairen).—Length, 381′ 1″; width of entrance on top, 49′ 2″; width of entrance at bottom, 48′ 0″; depth over sill, 23′ 3″.

No. 3 Patent Slipway.—Length, 280′ 0″.

No. 4 Patent Slipway.—Length, 180′ 0″.

Shipbuilding Stocks.—The shipbuilding stocks at present are as follows:

No. 1 for vessels up to 4,000 tons (gross and displacement).

No. 2 for vessels up to 6,000 tons (gross and displacement).

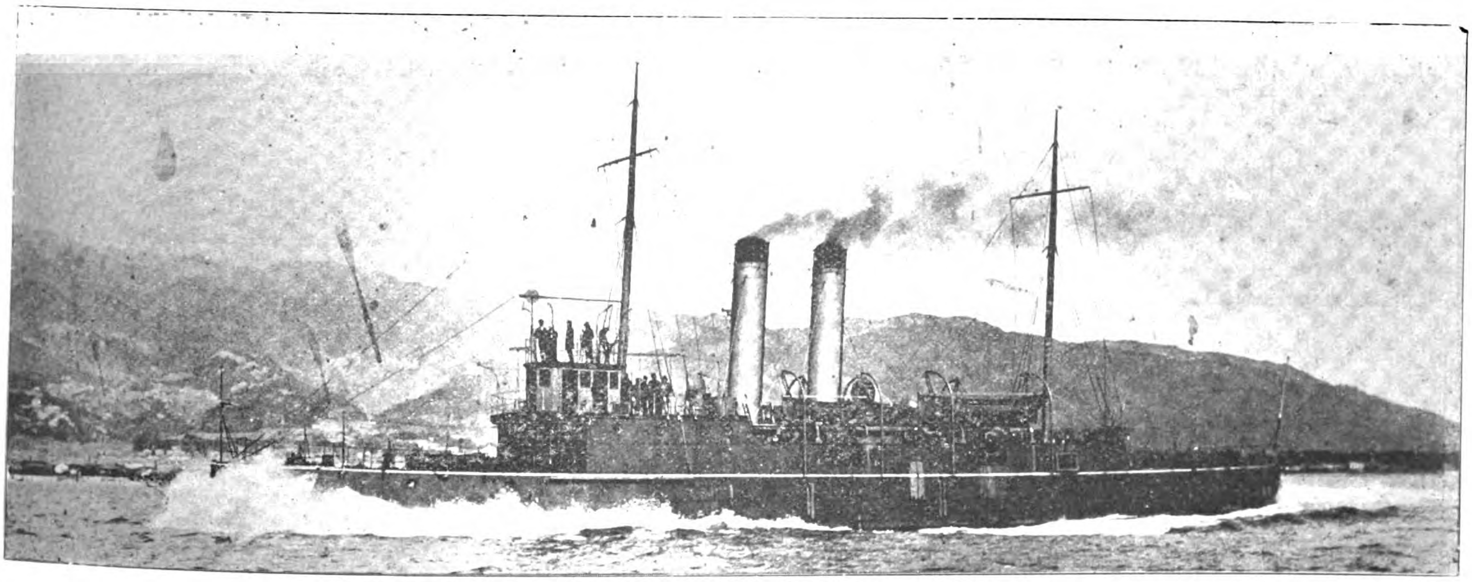
No. 3 for vessels up to 20,000 tons (gross and displacement).

No. 4 for vessels up to 30,000 tons (gross and displacement). To be fitted with gantry crane shortly.

No. 5 for vessels up to 3,000 tons (gross and displacement).

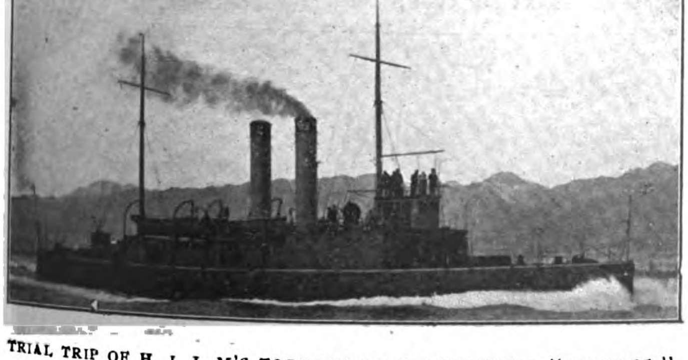
The stocks are equipped with nine 3-ton and seven 8-ton derrick posts with electric winches. Besides the foregoing stocks several temporary stocks for vessels of smaller descriptions are available.

Transport Service.—There are 4 miles of railway tracks in the Main Works alone, to facilitate the conveyance of materials, and three locomotive cranes of 3-5 ton lifting capacity, besides two portable hand cranes, are employed on the tracks. The railway in the Hiogo Branch is connected with the State Railway at Hiogo Station.



H. I. C. M.'S RIVER GUNBOAT "KIANG-YUAN"

Built at Kobe, 1905, by the Kawasaki Dockyard Company for the Viceroy of the Liang Kiang at Nanking. Displacement: 565 Tons; I. H. P., 487; Speed 14.8 on trial.—One 4.7 quick firing gun, one 3-in. and 3 3-pounders; 4 maxims.



TRIAL TRIP OF H. I. J. M'S TORPEDO-BOAT DESTROYER "ASAKAZE," 1905. SPEED 29.67 KNOTS. ONE OF FIVE SISTER SHIPS BUILT AND ENGINED BY THE KAWASAKI DOCKYARD COMPANY, LTD.

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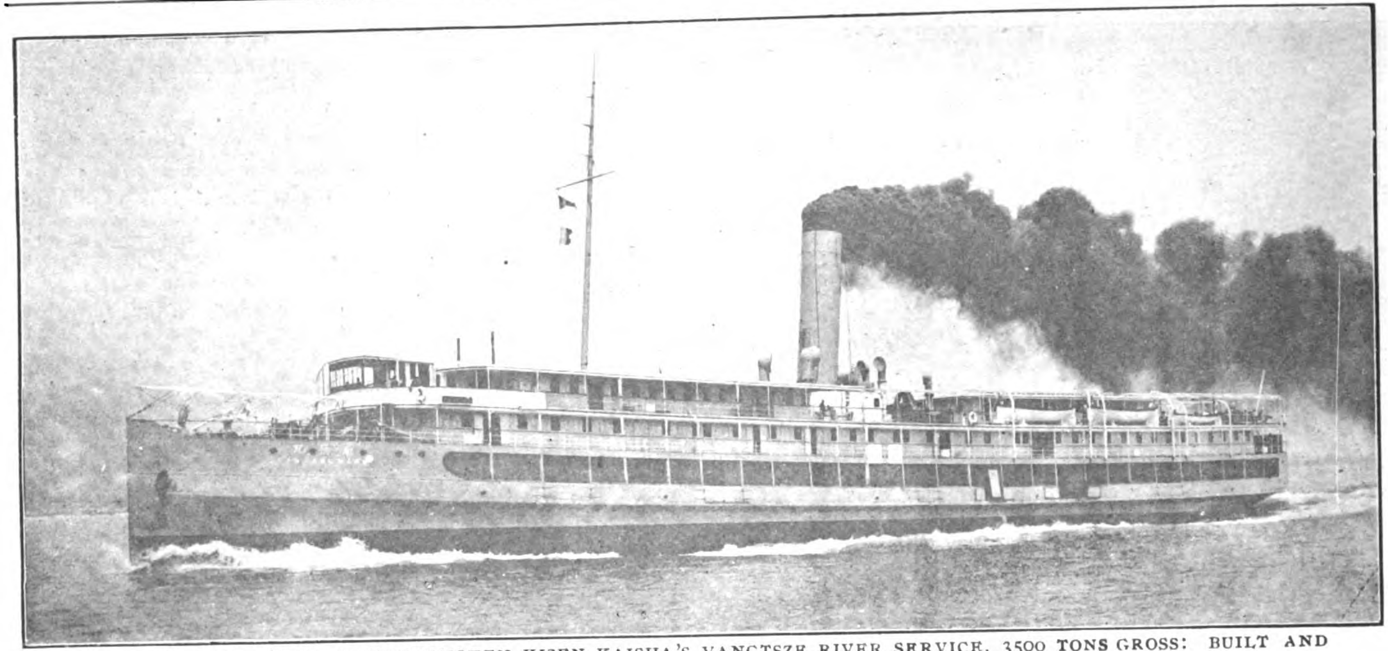
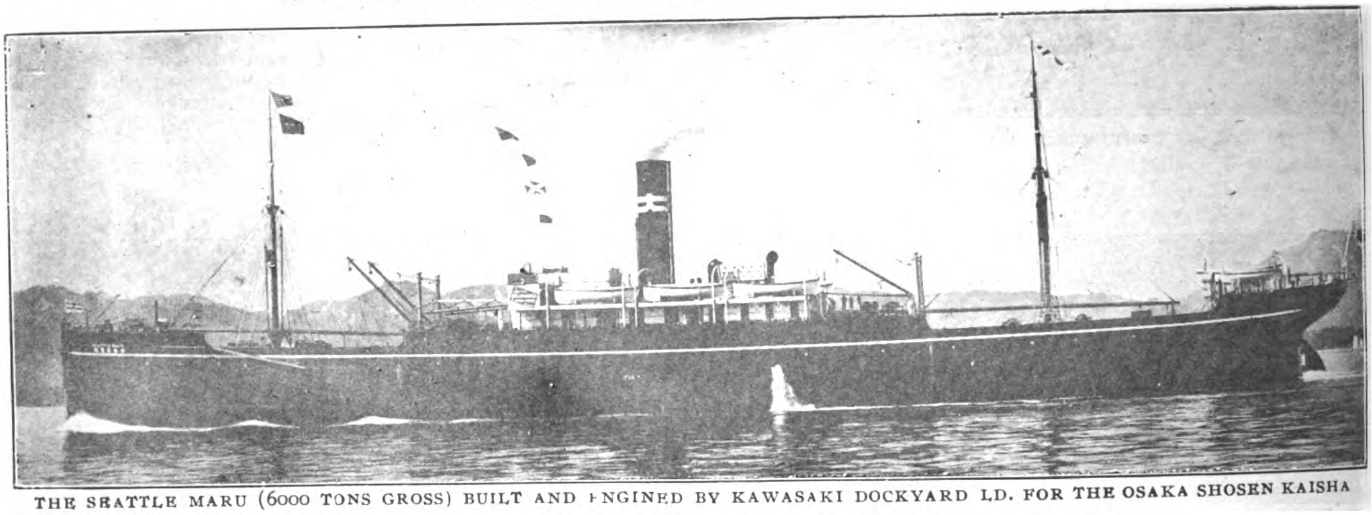
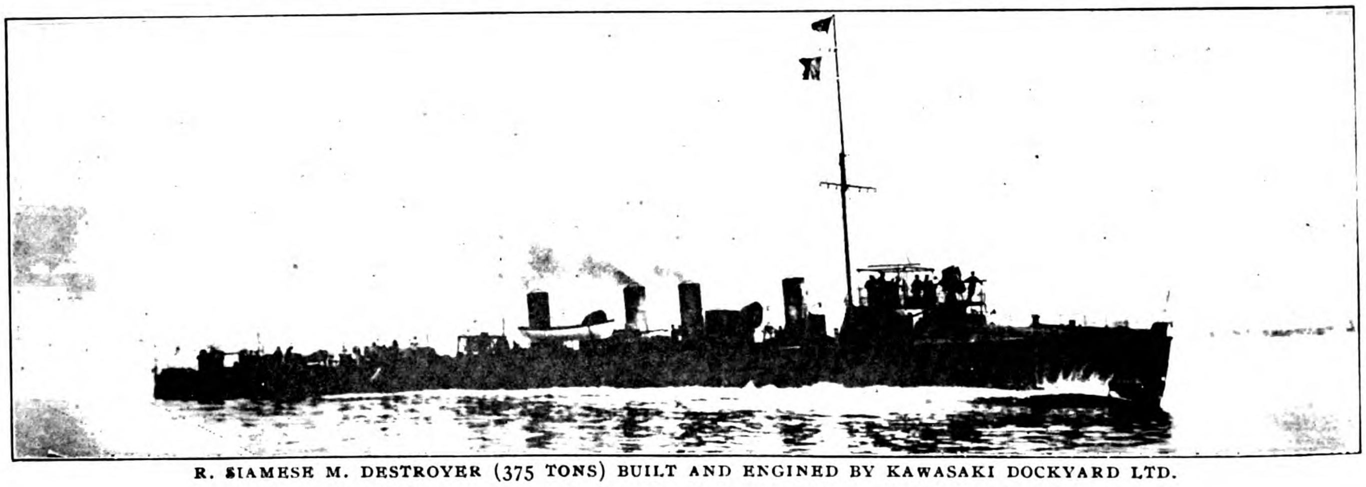


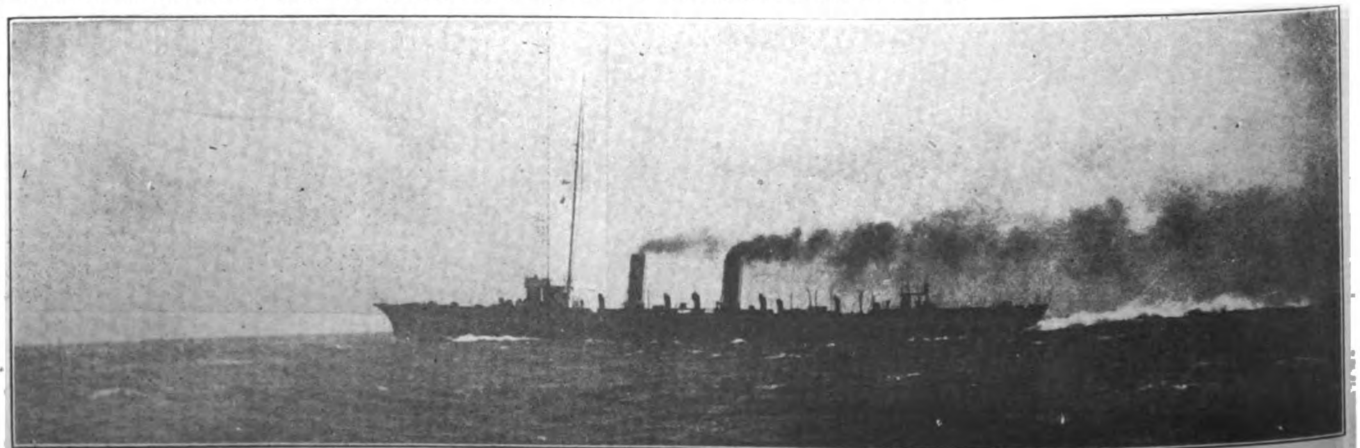
THE NANYANG MARU OF THE NISSHEN KISEN KAISHA'S YANGTSZE RIVER SERVICE, 3500 TONS GROSS: BUILT AND ENGINED BY KAWASAKI DOCKYARD LTD.



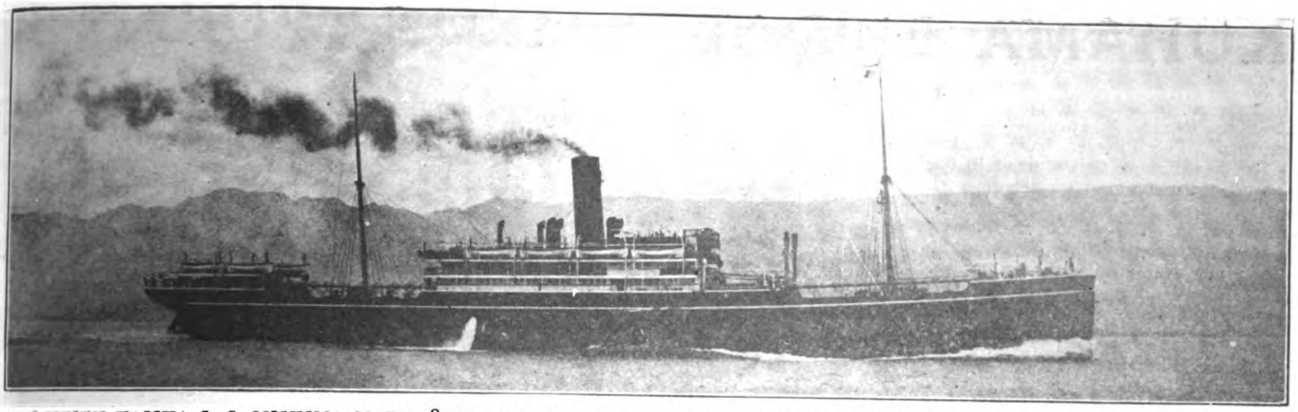
THE SEATTLE MARU (6000 TONS GROSS) BUILT AND ENGINED BY KAWASAKI DOCKYARD LD. FOR THE OSAKA SHOSEN KAISHA



R. SIAMESE M. DESTROYER (375 TONS) BUILT AND ENGINED BY KAWASAKI DOCKYARD LTD.



H. I. J. M. S. "YODO": BUILT AND ENGINED BY KAWASAKI DOCKYARD LTD.



THE NIPPON YUSEN KAISHA S. S. MISHIMA MARU, 8500 TONS GROSS, BUILT AND ENGINED BY THE KAWASAKI DOCKYARD LD.

On the water there are two floating cranes, the capacity of one, which is the largest of the kind in the Far East, being 200 tons and that of the other 20 tons. There are also two wharf cranes and a sheer legs, which is capable of lifting 60 tons.

Work-Shops.—The work-shops, both in the hull and engine departments, are supplied in every respect with the most up-to-date machinery. The number of machines in use at the present time has reached the surprising total of 1,330.

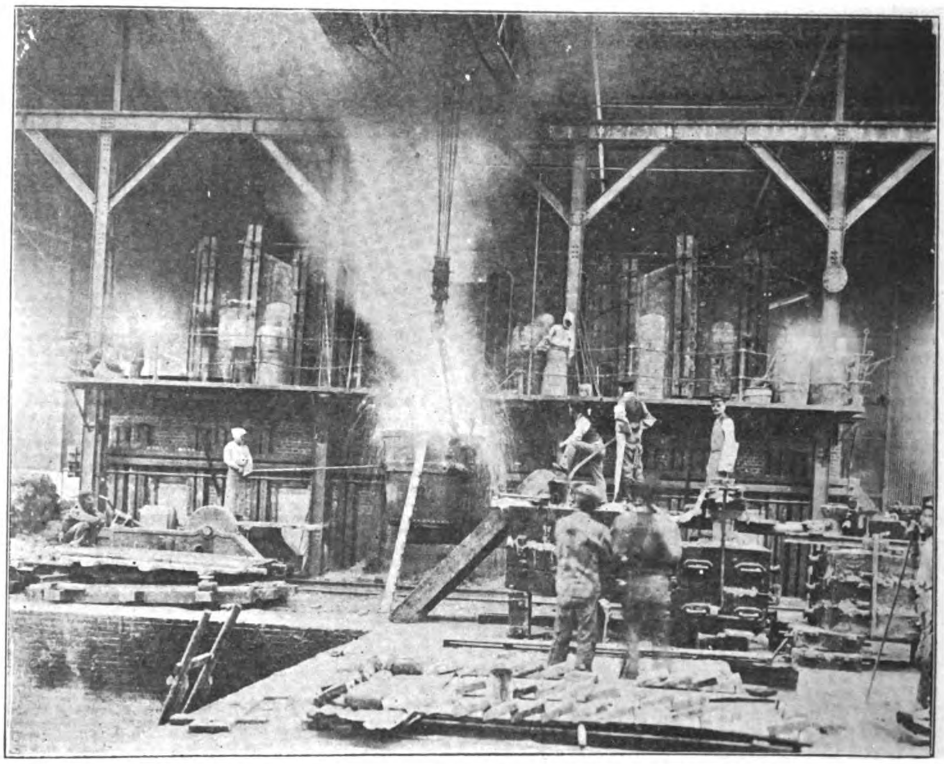
The largest diameter that can be turned on a lathe is 20 feet. The largest vertical planer can plane 16 feet horizontal and 13 feet vertical surface and the longest horizontal planer 24 feet by 8 feet by 6 feet. The largest shaft that can be turned is 80 feet long.

By means of electrically driven portable machine tools, every different part of a piece up to 30 feet by 30 feet can be worked at one time. The maximum over-head travelling crane capacity is 125 tons. The largest steel ingot, which can be cast in one charge is 15 tons.

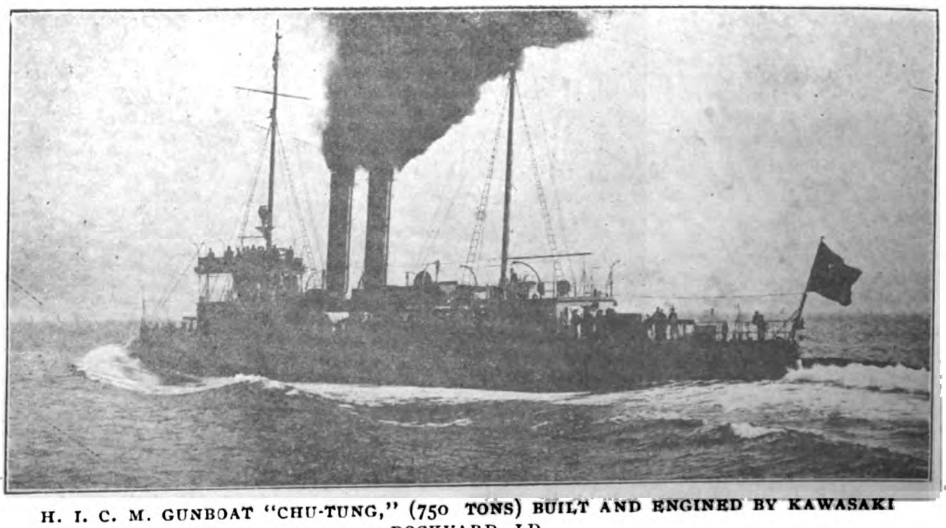
Company's Privilege.—It was the Company's exclusive good fortune to receive orders for warships and machinery from foreign Governments in addition to orders from the Imperial Japanese Government. This fact alone suffices to encourage the Company to do its best in turning out the very best articles and so maintaining the honor which it has so far monopolized, thereby expressing its gratitude for the patronage bestowed on it. Several officers of the Company were decorated by the Japanese Government and foreign Governments in recognition of valuable services rendered.

Principal Output and Works in Hand.—The total number of vessels of all descriptions built and engined by the Company up to the present is 342 and that of engines and boilers, etc., is 2,381, besides 12 railway locomotives and 114 electric tram and railway carriages and a large quantity of bridge girders, gas and water pipes, etc.

The Company is building at present moment one cruiser, one gun-boat, one destroyer and one submarine boat; of these the cruiser and destroyer are to be equipped with turbine engines; two steamships of 6,200 tons and 3,000 tons respectively; six steam trawlers and two sets of turbine engines for a battleship and a cruiser, besides a large number of smaller vessels and various descriptions of machinery and railway rolling stock and other purposes.



MAIN STEEL FURNACE IN THE HIOGO BRANCH OF THE KAWASAKI DOCKYARD



H. I. C. M. GUNBOAT "CHU-TUNG," (750 TONS) BUILT AND ENGINED BY KAWASAKI DOCKYARD, LD.

YOKOHAMA ENGINE & IRON WORKS, LTD.

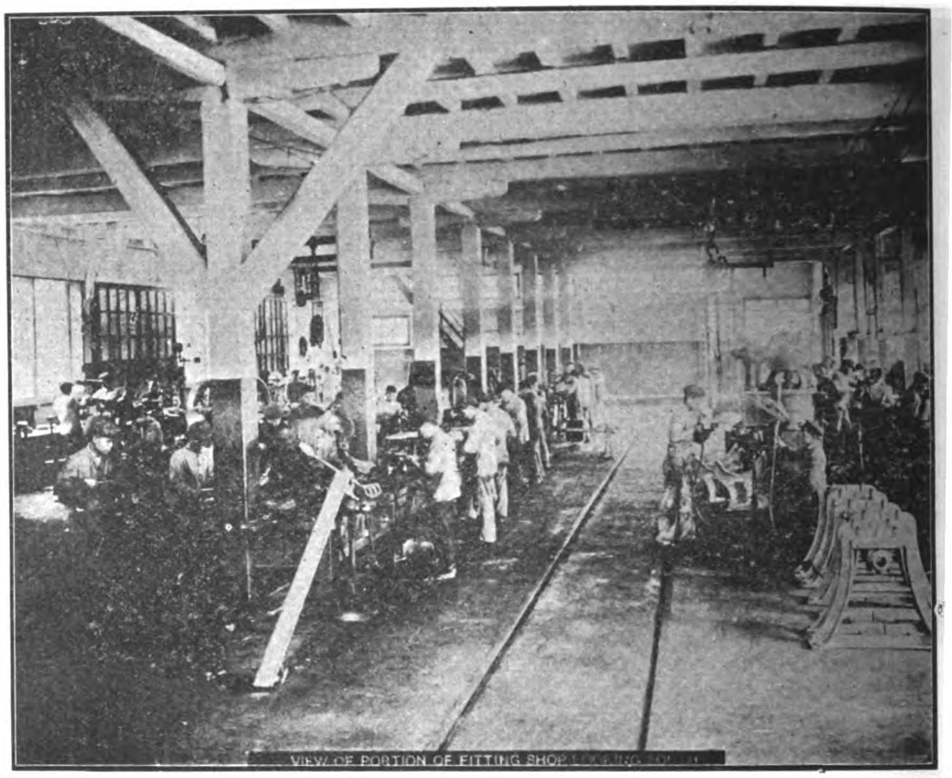
The Yokohama Engine & Iron Works can justly be termed "The Pioneer Iron Works" of Japan. The works were first started in the year 1870 to meet the demand for repair work in ships and steamers, and local work offering. Yokohama was only a small place in those days, and the number and size of ships arriving in the port was very small compared with the present day. Moreover there were no railways or factories, so that their scope was limited. However, as the port grew in importance the local iron works, always kept pace with the times. In 1887 the business was purchased from Messrs. Whitfield & Dowson and Mr. Kildoyle, the proprietors at that time, converted into a limited liability company, and registered with its present title under the Hongkong Ordinance with a capital of Yen 130,000.

For many years after this the company enjoyed unique prosperity, earning handsome dividends for its shareholders, and gaining for itself a reputation for doing high class work in a prompt and most efficient manner.

In 1906 the company bought out a rival concern, the Peterson Engineering Company, which had come into existence in the meantime, the capital being increased to Yen 500,000 at which figure it now stands; the details being as follows:

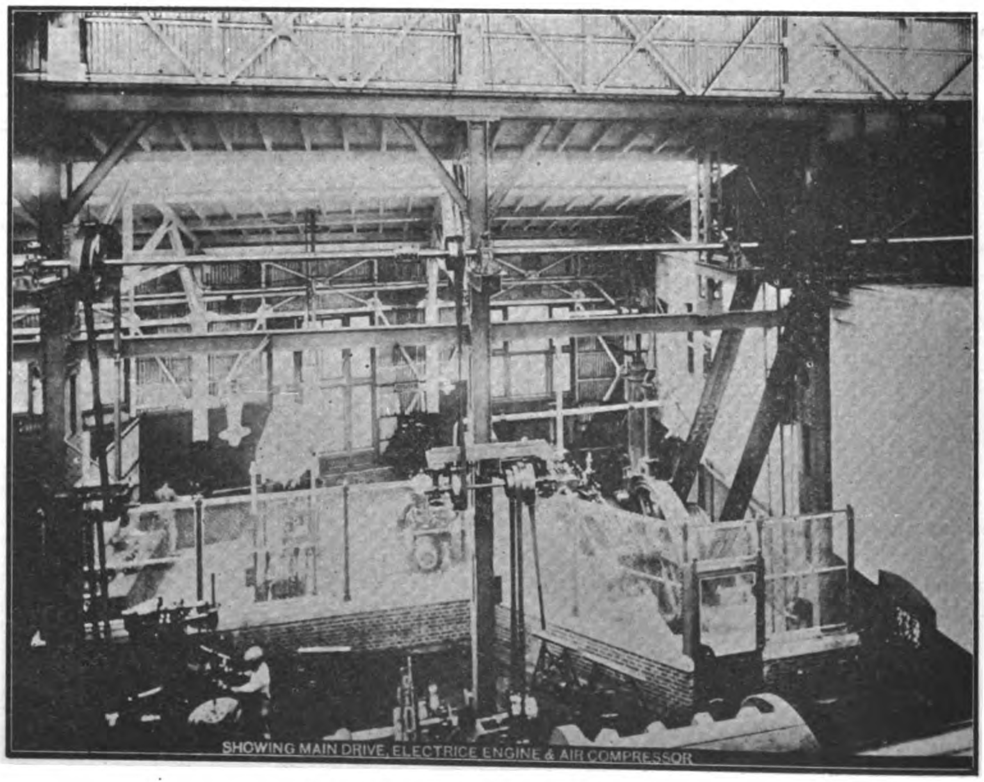
Authorized capital, Yen 500,000; paid up capital, yen 390,000; reserve fund, yen 75,000; loans, yen 120,000.

It is expected that the balance of the unpaid capital (Yen 110,000) will shortly be offered solely to the present shareholders. It is entirely due to the conservative policy of the company in the past, in writing off liberally each year for depreciation, that the capital for such large and efficient works is as low as it stands at present. It is estimated that it would cost double the company's present capital to duplicate the works. At the present moment the total number of men employed is about 500, and it is satisfactory to note that the relations between the management and the men are very cordial, labor troubles being non-existent.

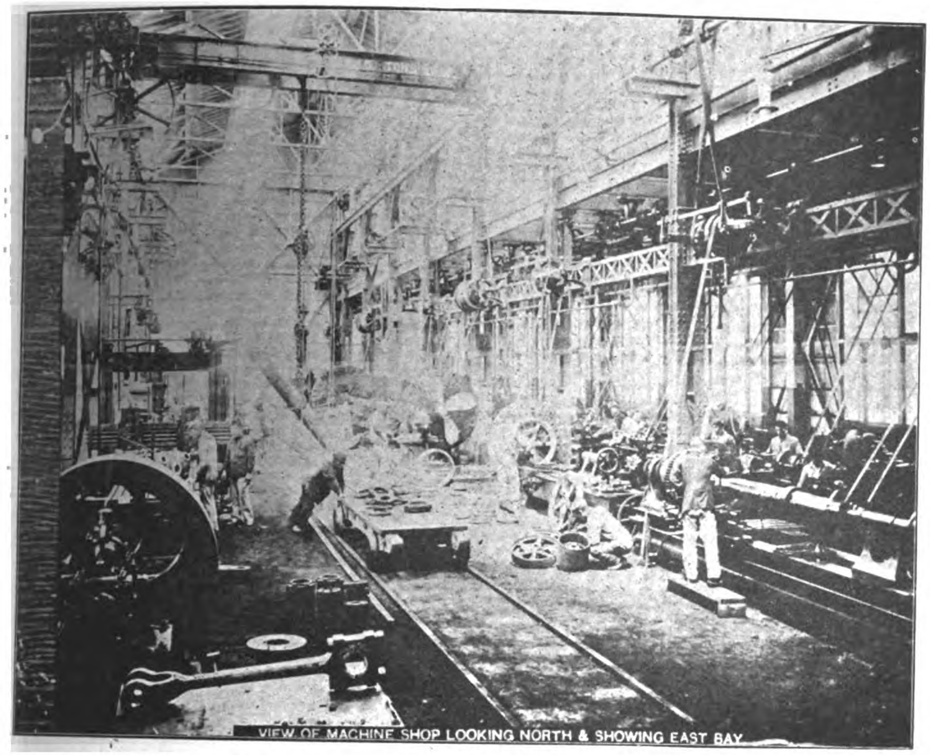


VIEW OF PORTION OF FITTING SHOP, LOOKING SOUTH, YOKOHAMA ENGINE & IRON WORKS

Recently an import department was organized, which, working in conjunction with the department devoted to manufacturing for the local requirements, enables the first to handle extensive contracts, including plant which still has to be manufactured abroad. The firm is agent for several important English manufacturers who appreciate the advantages of having their interests looked after by practical engineers, with extensive work shops at their back, to attend to the small difficulties which of necessity arise when a contract is being executed so far away from the point of manufacture.



YOKOHAMA ENGINE & IRON WORKS



VIEW OF MACHINE SHOP LOOKING NORTH AND SHOWING EAST BAY, YOKOHAMA ENGINE AND IRON WORKS

The situation of the works in the Foreign Settlement, with its extensive water frontage, places the company in a most advantageous position to handle the shipping work of the port, to which for some time its attention was almost entirely devoted. In later years, however, manufacturing has been extensively undertaken and among its manufactures may be mentioned steam engines, boilers, pumps, iron and steel chimneys, air compressors, small steamers and launches, railway appliances, railway freight cars, railway tank cars and a number of other lines too numerous to mention.

It may here be remarked that with its reputation for high quality work the company has enjoyed the patronage and confidence of foreign navies, notably that of the United States, for which a large amount of repair and manufacturing work has been executed, including gun mountings and new gun sights. The Rising Sun Petroleum Company placed contracts for large amounts, including 80 tank cars for use on the railway, and a quantity of iron buildings.

The Yokohama Engine & Iron Works, Ltd., are also approved manufacturers to the Japanese Navy and are frequently favored with contracts to manufacture various classes of machinery to Admiralty specifications. The Japanese naval inspectors have the reputation of being the most critical of any of the world's great naval powers and the fact that the products of the company are very favorably considered by them, is a high tribute to the quality of their productions.

Almost without exception have the manufactures of the company given the greatest satisfaction to buyers, as the rule of the company is to undertake high class work and not to take work at low competitive prices, which preclude the possibility of the high standard of work for which the company has earned such a just reputation.

The company in accordance with its avowed principle of keeping in line with the improvements in other parts of the world, not only has its management and engineering staff of Europeans but also employs European foremen for its various shops, who are recruited from time to time from the ranks of those who have gained experience in similar positions in the shops of the leading manufacturers in the other side of the world. In this respect the company is unique in Japan; but the directors being firm believers in the axiom that "a satisfied customer is the best advertisement," act up to their opinion that this policy although an expensive one brings its reward in the long run.

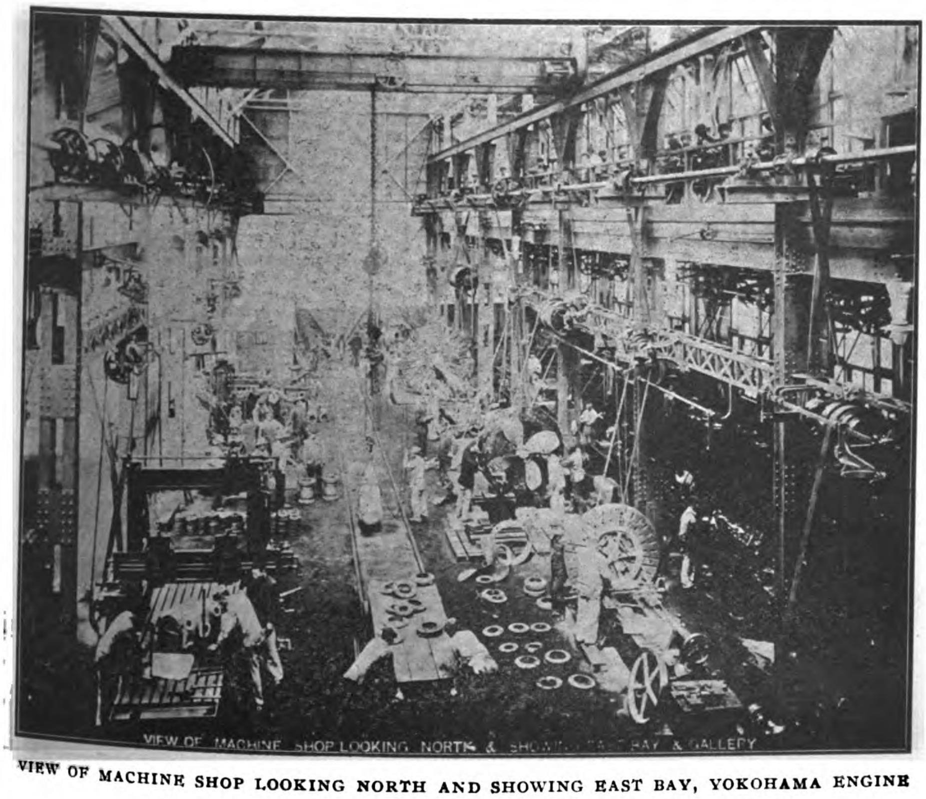
The present works cover nearly 3 acres of ground and the plant has been kept thoroughly up-to-date. The recent extensions have been carried out to the designs of Mr. W. K. Tresizo, the works manager, and comprise a new machine shop 270 feet long by 70 feet wide, with a 15-ton travelling crane. Along the sides of this shop are arranged the numerous large lathes, drilling, planing, shaping, screw cutting and milling machines, while in the gallery are placed all the various smaller machines which go to making a complete plant. The foundry is adapted for castings up to 10 tons having 3 cupolas for iron and 5 furnaces for bronze castings, while latest types of cranes are used for handling heavy weights.

The boiler shops are equipped with modern machines, most of which are direct engine driven, the machines consisting of heavy plate bending rolls, multiple punching machines, punching and shearing machines, cold cutting machine saw, etc., etc., enabling the company to do the heaviest class of work. A powerful air compressing plant has been installed for use with pneumatic rivetting, chipping and caulking tools, the rivet forges being also kept going by compressed air.

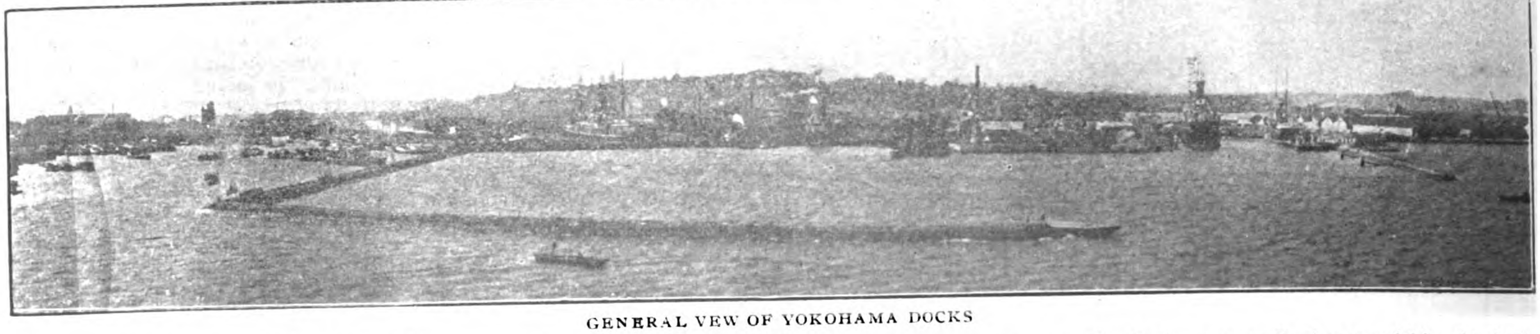
The power plant consists of two 190 H. P. Babcock & Wilcox boilers, driving a large compound horizontal engine besides small engines, and these, with the electric lighting engine and compressor plant, are situated in the most convenient position to produce the utmost efficiency.

On the works grounds conveniently located between the plating shed and the machine shop is a small slip on which the company can repair or build vessels up to about 80 feet in length.

Realizing that increase of customs duties on manufactured machinery, which are to be enforced from July 17th of this year, must result in a large amount of plant which is now imported; being manufactured in Japan, they have made preparations to undertake the manufacture under royalty of machines and appliances on behalf of foreign manufacturers and inventors. Several firms have already concluded arrangements with the Yokohama Engine & Iron Works Ltd., with the intention of maintaining the trade they have previously enjoyed. It is confidently expected that many others will follow suit and that in this direction there will shortly be developed a large and increasing field for the company's operations.



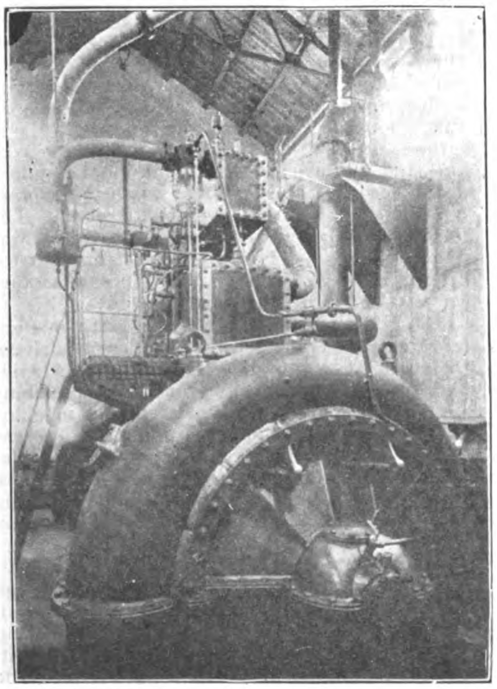
VIEW OF MACHINE SHOP LOOKING NORTH AND SHOWING EAST BAY, YOKOHAMA ENGINE AND IRON WORKS



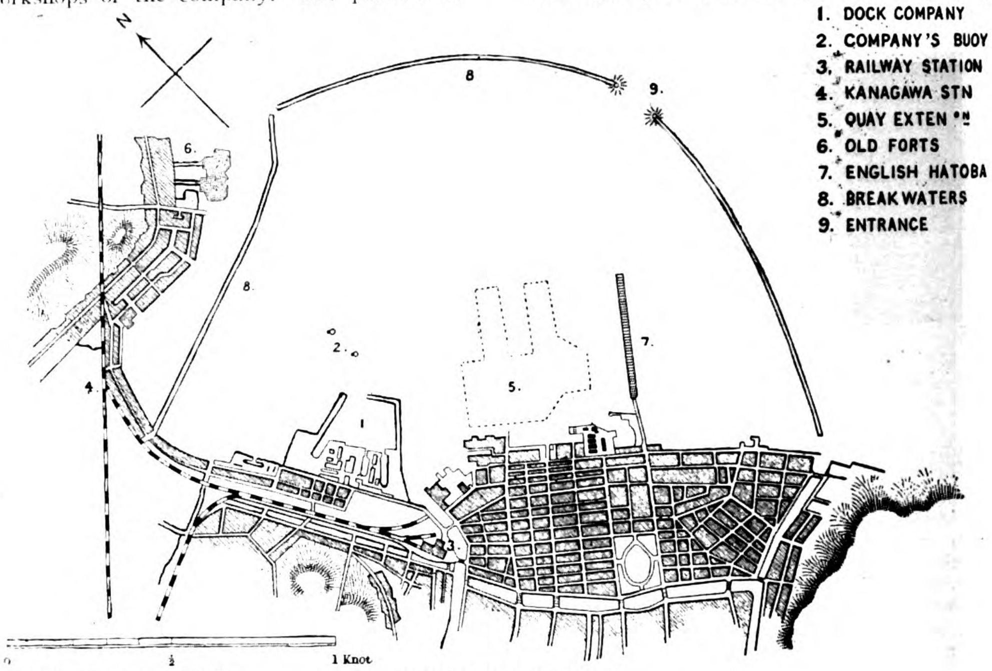
GENERAL VEW OF YOKOHAMA DOCKS

THE YOKOHAMA DOCK CO., LTD.

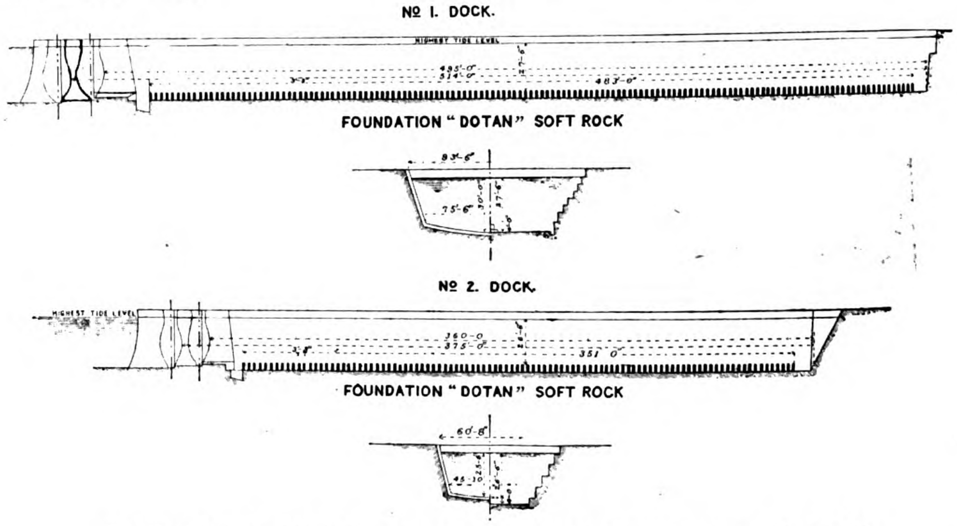
The necessity for dry docking facilities in the port of Yokohama began to be felt about the year 1887 on account of the great increase in the shipping business and the increasing number of vessels flying the Japanese flag and owned in Yokohama and Tokio. Previous to this date the Naval docks at Yokosuka, about eight miles from Yokohama, were available for merchant vessels, more or less by the courtesy of the Navy department. About the year 1887 a plan was formulated by Colonel Palmer, at the request of many influential gentlemen in Yokohama and Tokio and after much discussion and the lapse of several years, a company was formed in 1894 to take over the repair works of the Nippon Yusen Kaisha (Japan Steamship Company) and to build two dry docks. The position for the docks was carefully considered and an excellent site was obtained on very advantageous terms from the Central Government on the understanding that the company undertook to reclaim about 32 acres of the foreshore near the Yokohama railway station and build two dry docks. The capital of the company was fixed at three million yen and a sum of Yen 1,980,000 was called up to build the docks and workshops of the company. The position of the docks was well chosen within the harbor with a solid, though easily worked, rock foundation about 18 to 20 feet below high water level, making it quite unnecessary to have any heavy



CENTRIFUGAL PUMPS FOR THE NEW DRY DOCK OF THE YOKOHAMA DOCK CO. LTD.

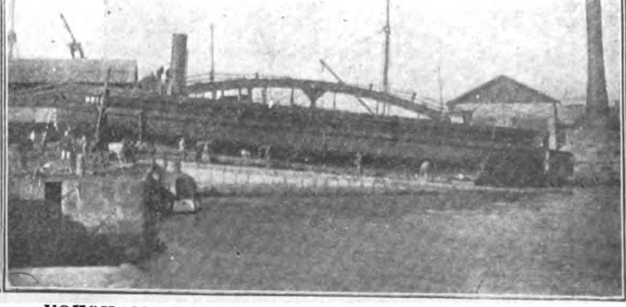


YOKOHAMA HARBOR

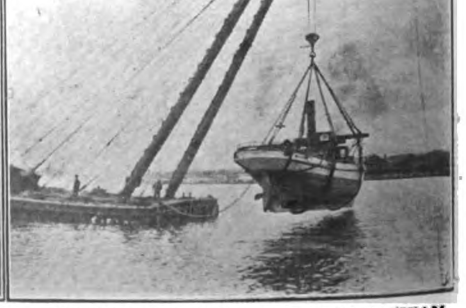


PLAN SHOWING CONSTRUCTION OF YOKOHAMA DOCK COMPANY'S DOCKS

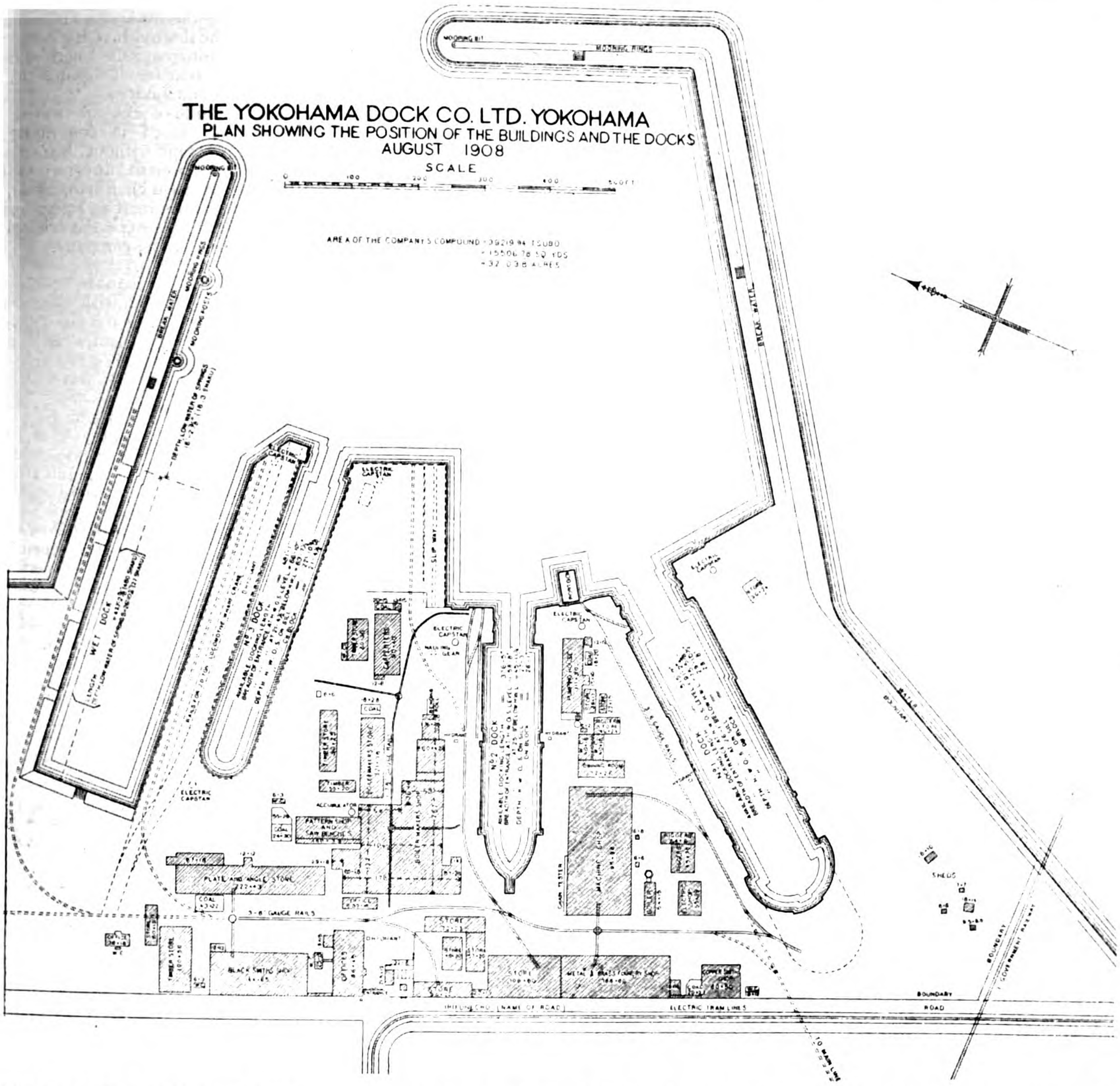
60-TON MOTOR BARGE



YOKOHAMA DOCK COMPANY. LAUNCH OF A 125-TON BARGE ON NEW SLIPWAY

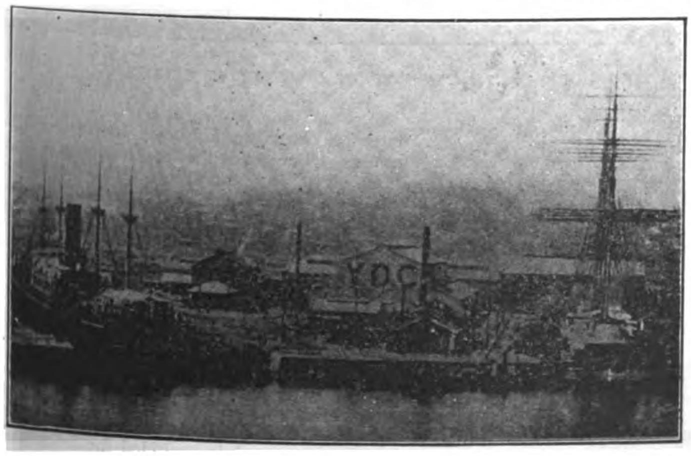


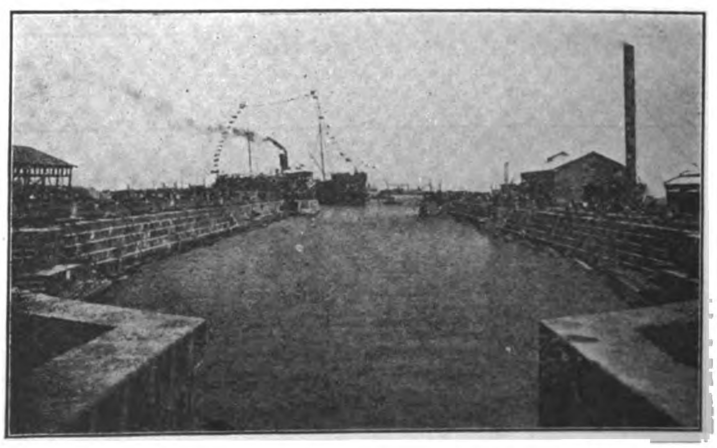
SHEERLEGS LIFTING A 45-TON STEAM LAUNCH

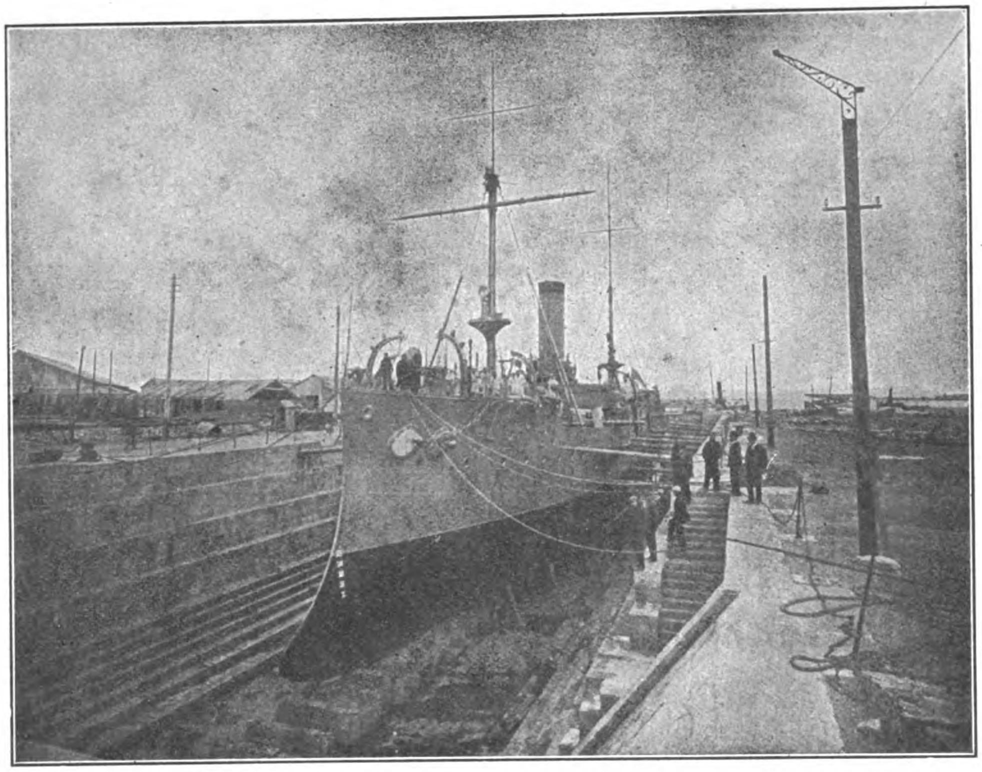


foundations. The two docks were built of hard granite obtained from the neighboring quarries of Idzu. Steel caissons were built for the entrances which can be worked at any state of the tide. The first dock was opened for business by the then President of the company, Baron Kawada, in April, 1897. It has a length, of 376 feet, a breadth at the entrance of 51 feet and a depth on the keel blocks of 26 feet at high water. The second dock was completed and opened in April 1899. It has a length of 584 feet, a breadth of 80 feet at the entrance, and a depth over the keel blocks of 27 feet at high water. The water is pumped out of both docks by a duplicate set of centrifugal pumps made by W. H. Allen Son & Co. of Bedford.

The business of the company during the following years showed such a steady increase and improvement that it was deemed advisable in 1907 to commence the construction of a third dry dock and also a mooring basin to accommodate vessels repairing afloat. The size of the basin is 600 feet long and 180 feet wide and the depth at low water is 27 feet. It is surrounded with concrete walls and was put into use in March 1909. The dry dock was built entirely of concrete of very ample thickness the working faces and entrance only being faced with granite. The available docking length is 485 feet, the width of the entrance 63 feet and the depth of water over the keel blocks is 21 feet. It was completed and put into use in November, 1910. The centrifugal pumping plant for emptying the dock was built by the company, the pumps being of the forced


YOKOHAMA DOCK COMPANY, LTD.—GENERAL VIEW OF WORKS AND DOCKS


YOKOHAMA DOCK COMPANY, LTD.—VIEW OF FIRST SHIP, SAIKIO MARU, ENTERING NO. 2 DOCK, 1897



GRANITE DRY DOCK OF THE KAWASAKI DOCKYARD CO., AT DAIREN

vortex pattern in duplicate, and are capable of drying the dock in 80 minutes.

It is the intention of the company in the near future to increase the length of the largest dock to about 620 feet to enable the larger vessels to be accommodated.

The three docks are served by 6 electric capstans placed in convenient positions for handling ships without their own steam.

Of the present directors of the company, Messrs. Kurusu chairman, Asada, Hara, Kondo, and Hutchinson, it is interesting to note that all except one were the original directors and promoters of the company.

In the year 1910 the business of the Yokohama Chiuo Soko (warehousing company) was acquired and amalgamated with that of the dock company. As the warehouses adjoin the companies mooring basin vessels are able to discharge their cargoes direct into the warehouses saving a considerable sum in lighterage in many cases.

Among the various trades carried on by the company are the following: Engineering in all branches, boilermaking, shiprepairing, constructional steel work, foundry work (castings up to 10 tons), coppersmithing, carpentering, electrical repairs, electroplating, sailmaking and rigging. The company is thus in a position to undertake the entire repairing of ships and their gear. A stock of certified tail shafts, rough turned, are kept to avoid detention as much as possible.

The tools and plant are well up to date. A large air compressor is installed with pipes along the bottom of the docks for pneumatic drills, and an oxy-acetylene plant for cutting and repairing boilers is now being installed.

The company are also owners of two powerful tow boats, six steam launches, and a floating derrick capable of lifting 45 tons over the rail of any steamer.

TSINGTAUER WERFT TSINGTAU (KIAOCHAU)

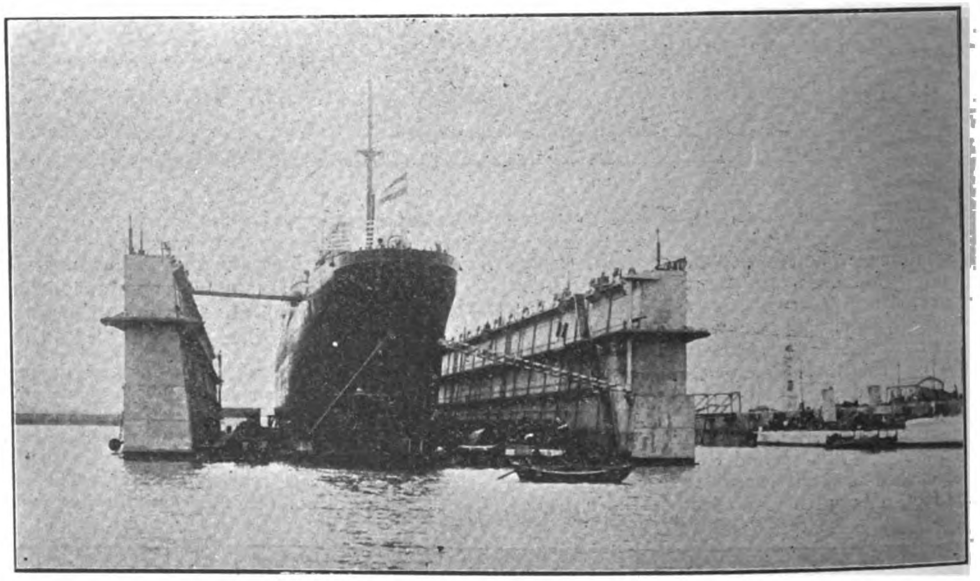
The Tsingtauer Werft was established in 1900 and originally employed only a few hundred men. It was then operated under the name Marine-Werkstatt and executed smaller repairs of the German cruiser fleet in the far East. In 1905 a large floating dock of 16,000 tons lifting capacity was launched in Tsingtau, and moored in the new harbor, where at the same time a modern crane of 150 tons lifting capacity was built. In less than one and one-half years from unpretentious beginnings there gradually grew the present large concern, which employs now an average of 48 European and 1400 Chinese.

The general arrangement of the works may be seen from the accompanying plan, which shows the dock, the crane, the workshops, the coaling depot and the extensive system of railway connections.

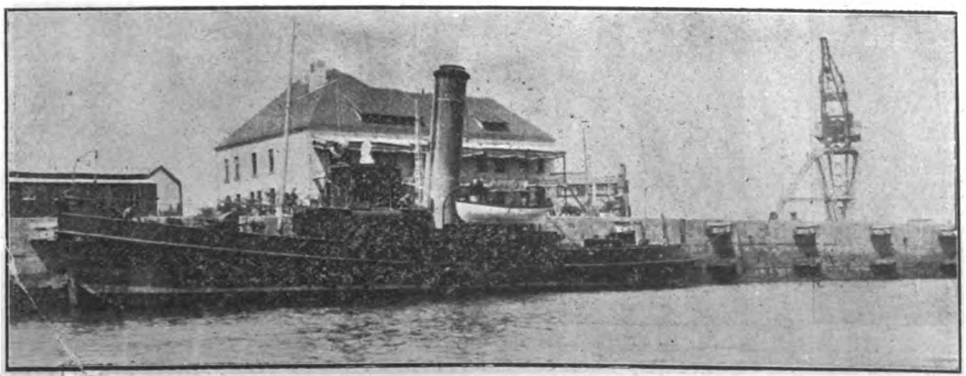
In 1905 the large floating dock, which was built and constructed by the Gutehoffnungshutte, Oberhausen, Germany, was launched and put at once into service.

The dock measures 410 feet in length, 128 feet in breadth outside, 108 feet inside and 33 feet depth over keel blocks.

The dock's lifting capacity is 16,000 tons dead weight and it can accommodate vessels up to 460 feet in length. The dock is equipped



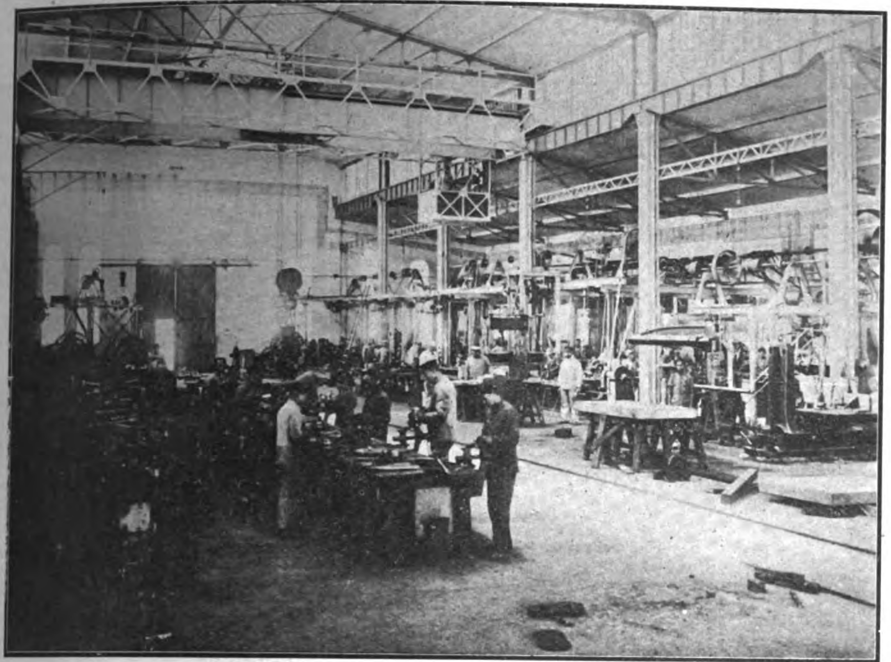
THE FLOATING DOCK OF THE TSINGTAUER WERFT AT TSINGTAU



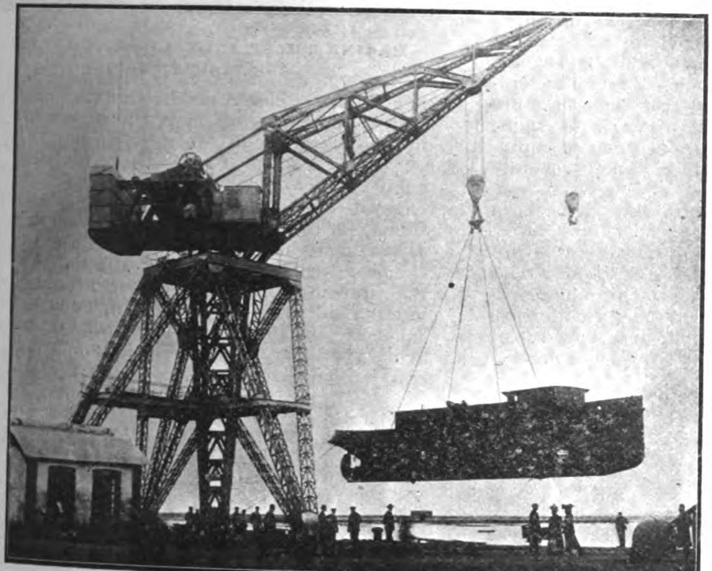
STEAM TENDER BUILT AND ENGINED BY THE TSINGTAUER WERFT

with 10 centrifugal pumps driven by electric motors. The five dock pontoons are divided into eight watertight compartments each. The valves for each compartment are closed and opened by motors mounted on shafts, which run up to the safety deck. Four windlasses, two five pumps and two 20 ton cranes at the ends of the dock are also operated by electricity. The lighting is electric and means are provided to supply the ships in dock with electric light, fresh water and steam heating. The dock is in every respect of modern design and construction and the width is large enough to allow increasing the length up to 660 feet, whenever the demands require it. The passage from the dock to the yard is provided for by means of a wide floating bridge.

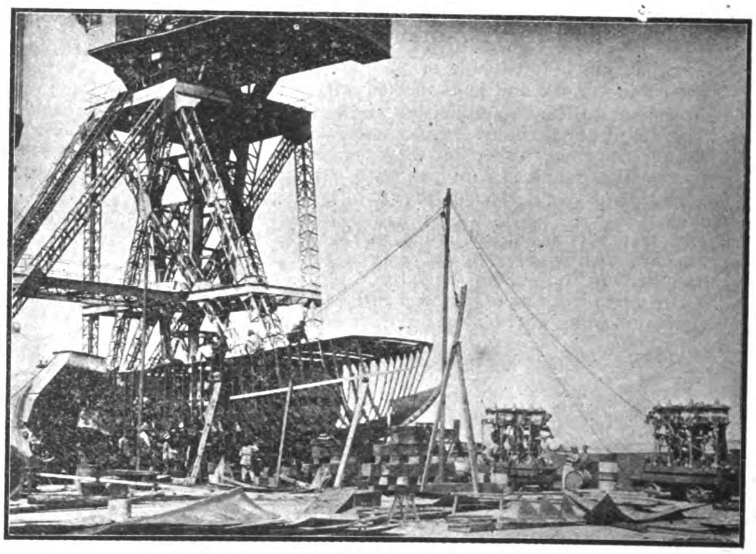
The whole length of the quays is 3,600 feet and at the most convenient point near the



MACHINE SHOP OF THE TSINGTAUER WERFT



THE 150 TON CRANE OF THE TSINGTAUER WERFT



150-TON CRANE OF THE TSINGTAUER WERFT

engine shop the 150 tons crane is erected. The crane is built by the well known German firm of Bechem & Keetmann in Duisburg. It has its own power station where the current from the city works is transformed into 500 volts.

The crane can lift 150 tons with the large tackle at a distance of 40 feet from the quay while with the small tackle 50 tons can be lifted at a distance of 80 feet from the quay.

The crane has often been tried to its utmost lifting capacity i. e. 150 tons. Vessels up to about 160 feet in length are built under the crane and launched at a minimum of cost, transferring them by the crane into the water. It has proved very convenient for lifting boilers, smokestacks, engines, guns, turrets and also steam launches on board of other vessels.

The general offices are situated in the center of the yard being within easy distance of the shops and the main storeroom.

Electricity is used throughout the whole yard for light and power. The current comes from the central station in the city. There are 3 power houses. One for operating the tools in the different shops and supplying electric light. The number of motors in the shops being 60. The second floor of the powerhouse is used for the large accumulator battery, which can supply light for 530 consecutive hours. Another power house is used for transforming the current for the dock motors. A third power house is used for transforming the current for the 150 tons crane.

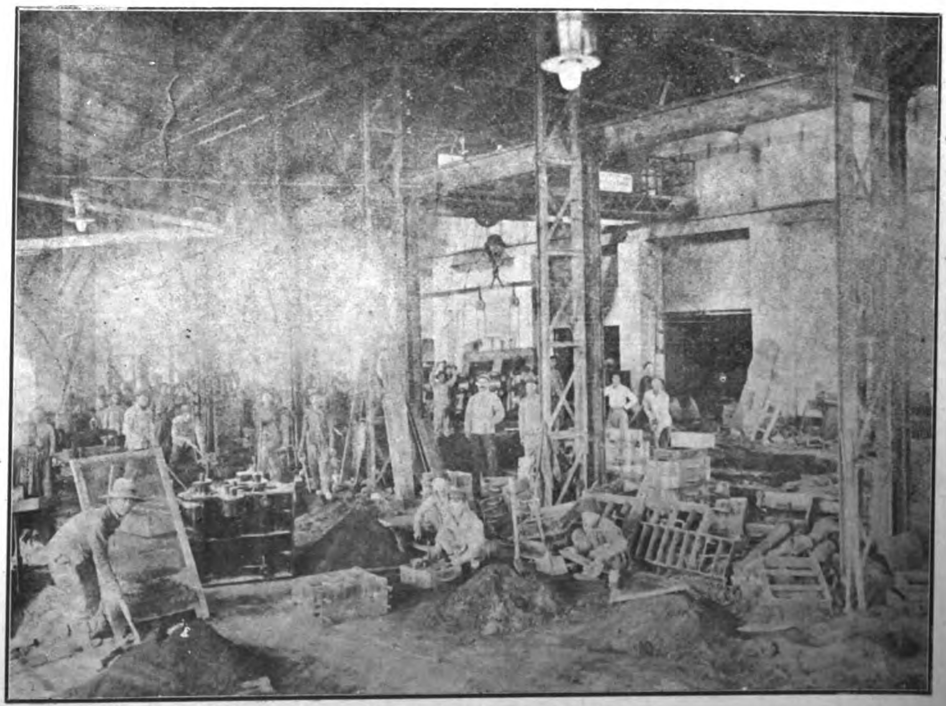
The machine and erecting shop is 160 feet long and 110 feet wide with three bays and is equipped with the newest electrically operated machine tools, constructed in Germany and America. The roof construction provides an ample supply of light in addition to the side and end windows. The center bay, where the heavy tools are located, is provided with a 20 tons travelling crane with a height of 22 feet above the floor. The side bays are used for smaller and medium size tools, for the store room and for the electricians' shop.

The boiler shop is 140 feet long and 70 feet wide and is also equipped with tools for working the largest pieces. The foundry is about 100 feet long and is equipped with two cupolas capable of producing cast iron for pieces up to 5 tons weight. A 5-ton travelling crane is running over the main bay. The brass foundry is in the same building and pieces up to one ton can be cast there.

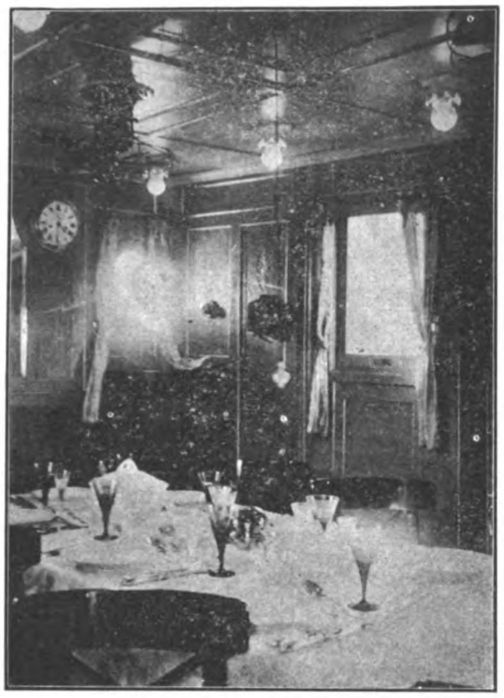
A large drying room is for drying the molds. Near to the foundry are located the pattern makers shop and the well arranged storage for patterns.

The forge and blacksmith shop is equipped with 4 electric hammers and 30 open fires for all kinds of blacksmith work. Outside of this building are the furnaces and the bending slabs for bending the frames for the vessels.

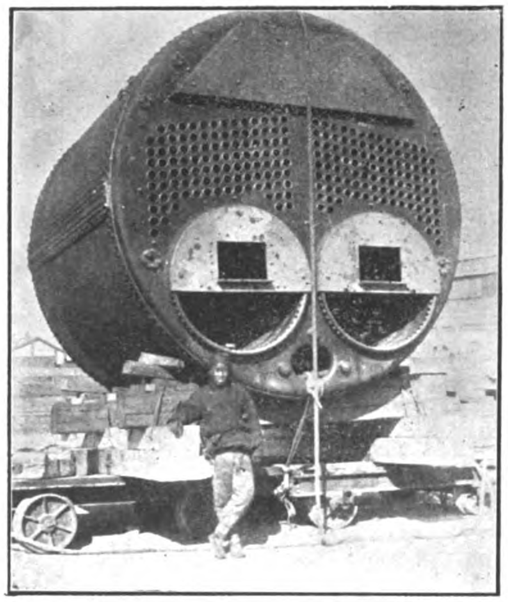
The shipbuilding shed and the place outside in front of it is devoted for punching machines, sheers, rolls, countersink machines, planers and drills of every description, and a floor for laying out steel construction.



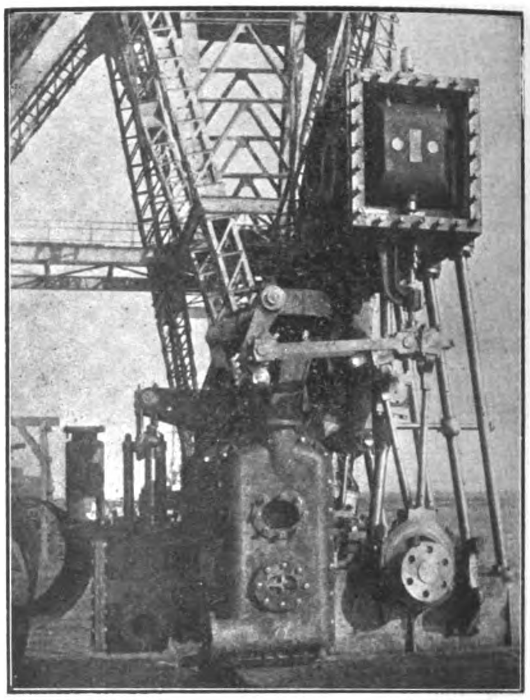
FOUNDRY OF THE TSINGTAUER WERFT



CABIN OF H. I. C. M. S. YACHT "WU FENG" BUILT AND ENGINED BY THE TSINGTAUER WERFT



MARINE BOILER BUILT AT THE TSINGTAUER WERFT



MARINE BOILER AND ENGINES BUILT BY THE TSINYTAUER WERFT

The joinershop is capable of producing the finest cabinet work and is connected with the paintshop and all kinds of upholstery can be done.

There are furthermore a sailmaker, boat-building, coppersmith shop and filecutting shop.

A special building is equipped with a plant for nickel plating, silverplating and gilding metal.

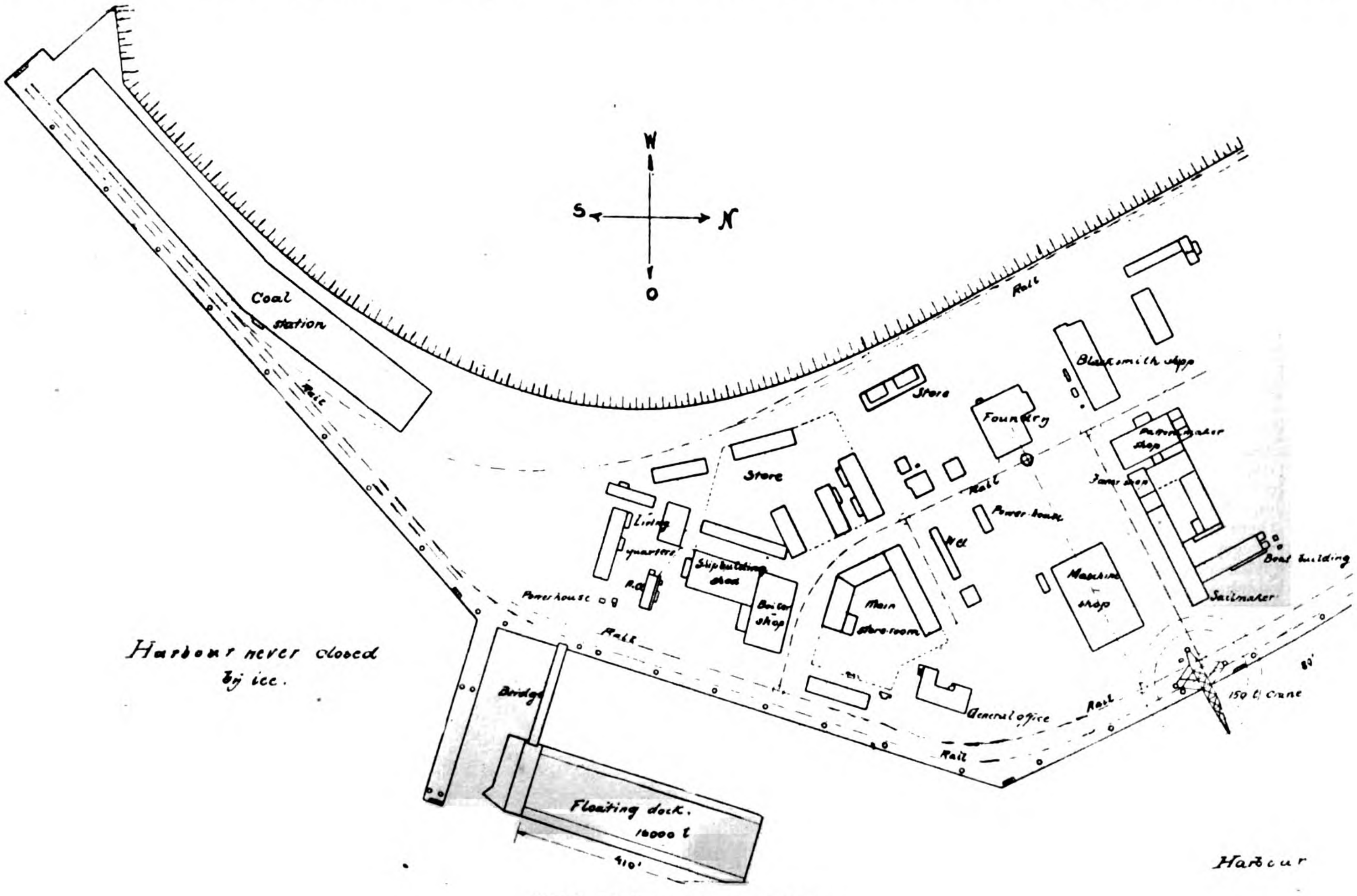
For transporting of materials and articles between the different shops a wide system of rails is laid out throughout the yard.

There are furthermore to be mentioned the boilerhouse from where steam is supplied for heating purposes for all buildings and for ships, while laying in dock or alongside the pier. Living quarters are provided for officers and men together with galleys and bathrooms, while ships are under repair. From the foregoing it will be understood that the works are equipped to do any kind of work as ships, engines, boilers and the various items of equipment and fittings including joinery, cabinet work and upholstery.

Up to the present time 16 ships have been built.

In the year of 1902 the yard started to put in every shop a certain number of Chinese boys as apprentices to the work, which number was increased every year. These boys had to learn for four years each their trade and proved to be very skilful. There are now working a number of about 400 Chinese, which form a staff of foremen or mechanics who have all been educated in the yard.

STEAM YACHT "WOO-FONG."—The steam yacht "Woo-Fong" was designed, built and engined by the Tsingtauer Werft, Tsingtau, China, for order of the Imperial Chinese Navy Department and delivered in December last. The vessel is built of steel with the following dimensions. Length between perpendiculars 126½', beam 19', depth 10' with a displacement of about 220 tons. Externally she presents a striking picture. The lines of the hull,



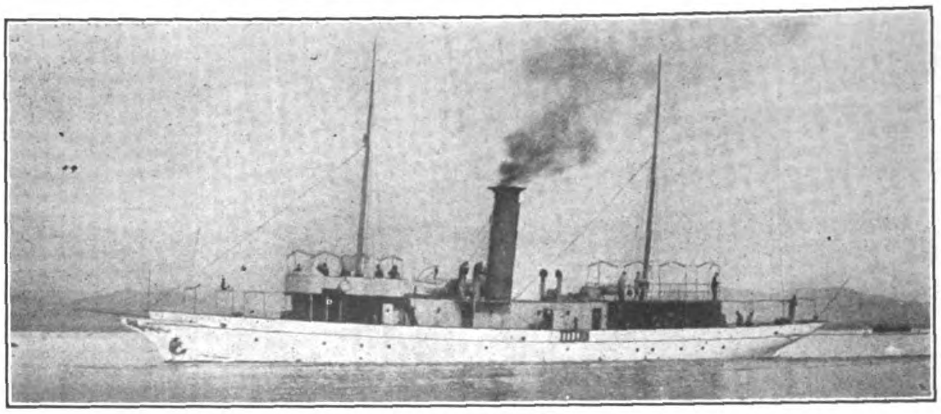
PLAN OF TSINGTAUER WERFT.

the graceful sheer and the tapering masts giving her a very handsome and yachtlike appearance. On the trials, which took place in the presence of Lieutenant Commander C. C. Wong of the Chinese navy, the yacht attained a speed of 15.1 knots on the measured mile in Kiautschou bay, thereby developing 600 indicated horse-powers. This is 1.1 knots in excess of the contract speed, which reflects great credit upon her builders. The vessel has five watertight bulkheads and a deck of selected teakwood and all deck fittings are of gun metal.

The forward deckhouse contains the dining room with sitting accommodation for 10 and is richly furnished with buffet, lockers, steam-heaters, etc., the ceiling being white enamel and gold.

In connection to the dining room there is a well equipped pantry and aft of this over the boilerroom is the galley situated. In the after-deckhouse are the accommodations for a private room for a Chinese prince, consisting of a combined sleeping and living room, a bathroom W. C., and toilet room. A private for a Chinese admiral is also situated in the after deck house. All these rooms are fitted luxuriously, the furniture, carpets, curtains, and all fittings as lamps, electric fans p.p. being supplied from Germany. Aft under deck there is a saloon and four state-rooms for the prince's suite, while forward under deck are the quarters for the crew with galley, lamp lockers and stores.

The yacht is fitted most completely with Lord Kelvin's standard compass, steam capstan



H. I. C. M.'S STEAM YACHT "WUFONG," BUILT AT THE TSINGTAU WORKS

and steam stearing gear.

A complete electric lighting plant is installed for furnishing light and current for electric fans. A searchlight is also fitted on top of the forward deckhouse.

The top of both deckhouses is fitted as promenade decks with seats and awnings.

The machinery consists of two sets triple expansion engines of the usual vertical marine type. The cylinders, liners, covers, and sole plate are all of cast iron and the columns of polished steel. All the shafting is of forged steel. The propellers are three blade and of navy bronze. The condenser is separate from main engines and with ample cooling surface. Three pumps are fitted to complete the pumping system of the yacht.

Steam at a pressure of 210 pounds is supplied by two water tube boilers. In the upper engine room there is situated a fan engine for producing the necessary draft for the boilers. The boiler room being operated on the closed stokehold system, when giving full speed.

The vessel, as can be seen from the accompanying pictures, is one of the prettiest craft, that has ever been seen in the Far East.

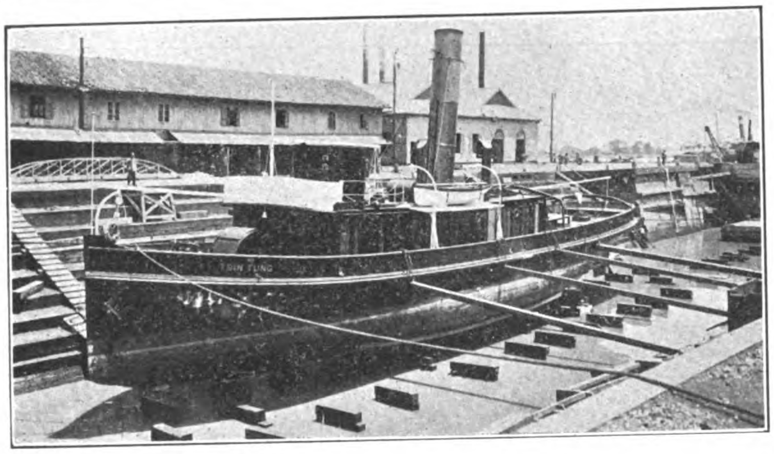
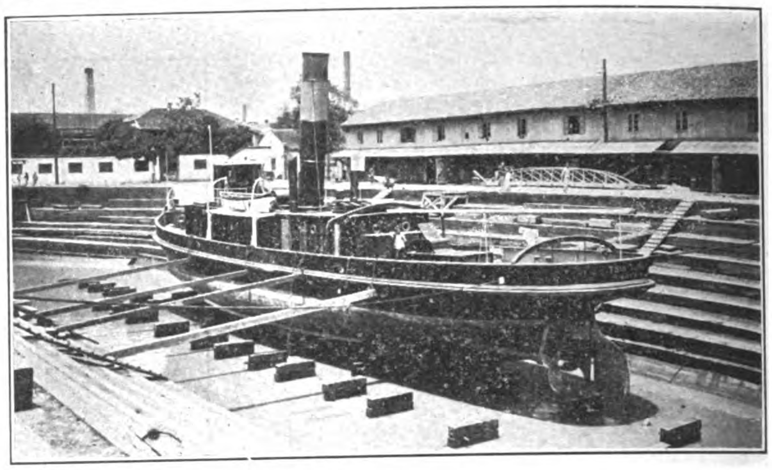
*THE KIANG-NAN DOCK AND ENGINEERING WORKS

The Kiang-nan Dock and Engineering Works, one of the most enterprising and ably conducted concerns of its kind in the Far East, is situated on the left bank of the Whangpoo River, about four miles above the foreign settlements of Shanghai. The premises now occupied by the company originally formed part of the Imperial Chinese Government arsenal and dockyard at Kiang-nan, and is still contained within its walls, though the management and conduct of the business of the two establishments are now quite separate.

The arsenal and dockyard came into existence about forty-five years ago to meet the requirements of the Chinese Government for the manufacture of cannon and the repair of the few small ships of war they at that time possessed, and has gradually grown to its present splendid proportions. In the spring of the year 1905 the dockyard portion of the arsenal, comprising an area of about four acres, lying between the steel works and gun factories on the one hand and the Whang-poo River on the other, was taken over by the present

* Reproduced from the Far Eastern Review of Feb. 1907.

WEST WHARF OF THE KIANGNAN DOCK AND ENGINEERING WORKS, SHANGHAI.

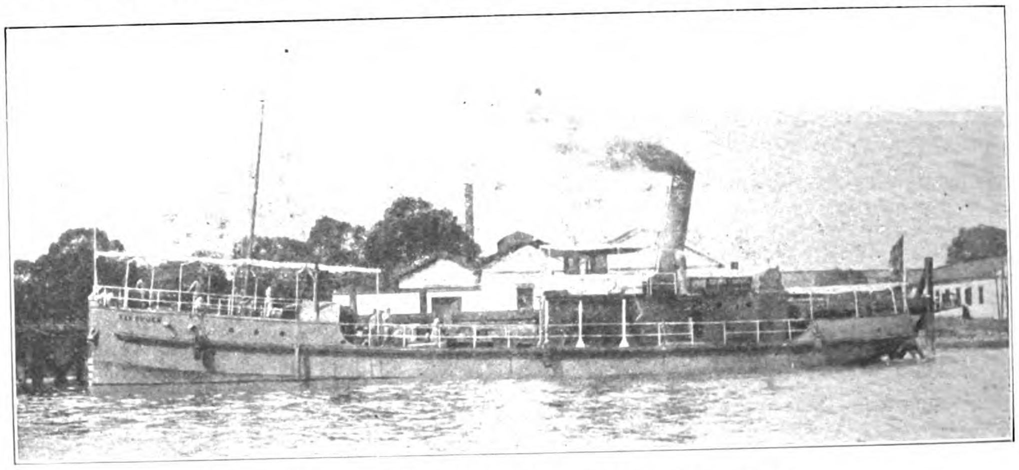



TWO VIEWS OF THE TSIN YUNG IN THE KIANGNAN DOCKS

company and launched as a going commercial concern, and they at once entered into keen competition with existing establishments of the same kind in Shanghai.

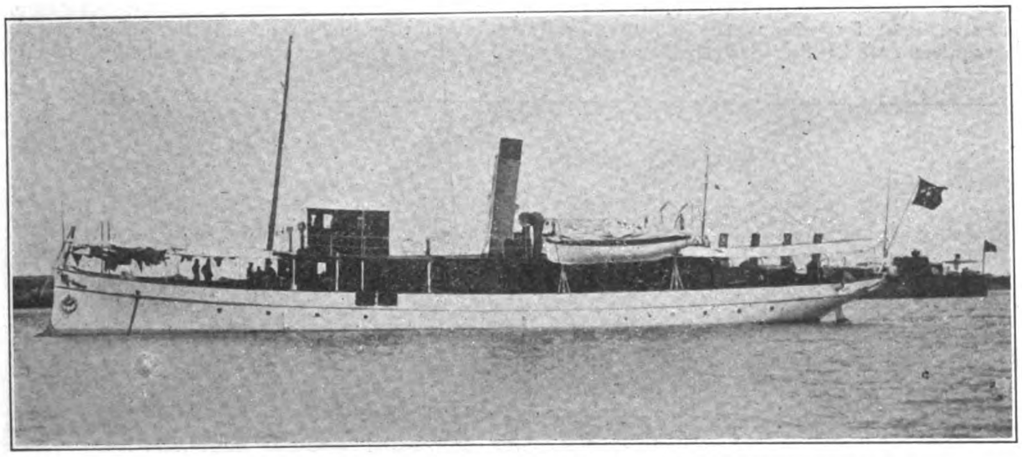
The directors of the Kiang-nan Dock and Engineering Works originally were Admiral C. P. Sah and Captain Y. K. Woo, both of the Imperial Chinese Navy, and Mr. L. Basse. The two latter gentlemen have since retired, and in their place Mr. Kwong-kwo-wah, the present incumbent, was installed as director.

Mr. R. B. Mauchan, a well-known and enterprising member of the engineering staff of Messrs. S. C. Farnham, Boyd, and Co., Limited, of Shanghai, was appointed manager, and still retains that position, assisted by an able staff, principally drawn from the same source. All these gentlemen were well known in the engineering world of the Far East, and to their enterprise and ability the rapid growth of the Kiang-nan Dock and Engineering Works may be mainly attributed.

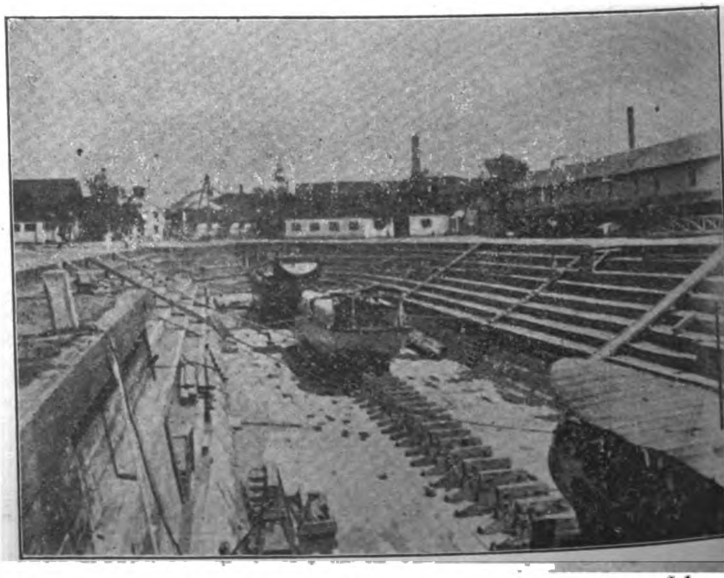


THE "KAN CHUEN," A STEEL SCREW WATER BOAT

Dry Dock. The dry dock, which was very small and totally inadequate for the purposes the company had in view when they took over the works, was the first thing that claimed attention, and steps were immediately taken to enlarge its capacity and to bring it in line with existing establishments of the same kind in Shanghai. Its length was increased to 375 ft. and its width at bottom to 80 ft. the whole of the bottom new piled and decked, and new keel-blocks installed throughout. The somewhat antiquated pumping machinery was wholly removed, and a new modern pumping plant installed, consisting of two 20-in. and one 10-in. centrifugal compound pumping engines. The pumping plant is contained in a large steel tank sunk about 12 ft. into the ground and resting on a huge concrete foundation. Steam is supplied by two large Lancashire boilers, arranged with separate flues and funnels, while an



H. I. C. M. S. "AN FOON," A STEEL SINGLE SCREW DISPATCH BOAT

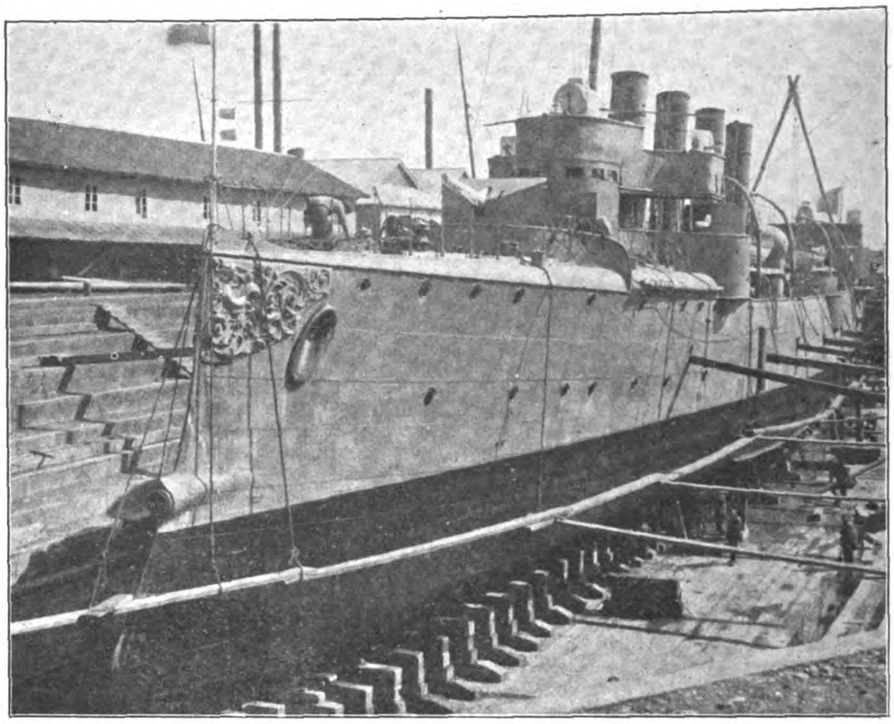


KIANGNAN DOCK—LENGTH OVER ALL, 385'; LENGTH ON BLOCKS, 375'; WATER ON SILL, 19'; DOCK ENTRANCE, TOP, 70', BOTTOM, 60'

auxiliary boiler of the marine type is fitted for use in case of emergency, all with a working pressure of 100 lbs. per square inch. A feedwater heater, with feed pumps of the Worthington type in duplicate, is supplied for feeding the boilers. The pump-house, though built primarily for housing the boilers and pumping machinery, also contains the dynamo engine room, with lavatory and bathrooms for the convenience of the crews of ships using the dock, dock tool store, etc. On either side of the dock entrance are wharves, alongside of which ships entering or leaving the dock or refitting can lie. Both these wharves have recently been extended about 40 ft. further into the river to get deeper water alongside, and a Priestman dredger is provided to remove any accumulation of silt that may occur there or at the dock entrance. On the upper wharf is fitted a heavy pair of sheer legs, capable of lifting 60 tons, with boiler and winding engine complete. In the river and abreast of the company's premises are three large mooring buoys for the accommodation of ships undergoing repair. On the opposite shore of the river is a deep-water anchorage, where the Chinese men-of-war in port usually lie.

Boiler Shop.—Passing up the west side of the dock and bearing to the left, one comes to the shipbuilding yard and slips, where tow-boats, launches, and other small craft are hauled up for repair. Near by is the boiler shop, with its punching, shearing, and plate-bending, plate-edge planing, and drilling machines, plate furnace, and frame-bending floor, and the usual accessories of a modern boiler shop and shipyard. The machinery of this shop is driven by a large Tangye noncondensing engine, while alongside of it is another engine of similar dimensions, which is kept ready for immediate use in the event of anything happening to the former. Steam for these engines is supplied by two large Lancashire boilers at a pressure of 75 lbs. per square inch.

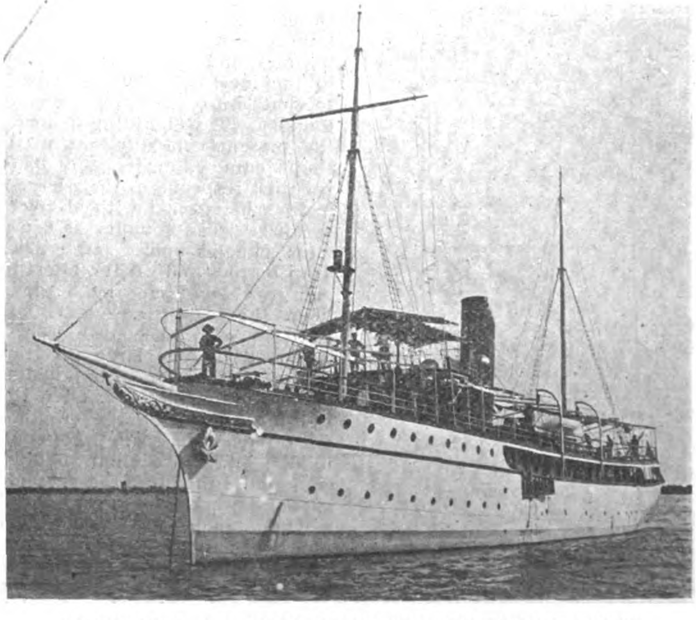
Admiralty House Drawing and General Offices.—Retracing one's steps and passing round the head of the dry dock, on the right is seen the mould loft, carpenters' shops, and a number of huge godowns used for the storage and seasoning of timber. On the left and standing back some distance from the roadway, with a fine stretch of lawn in front of it, stands Admiralty House, a large and handsome building recently erected, forming the residence of Admiral C. P. Sah, Commander-in-Chief of the Imperial Chinese Navy, and containing also the various offices in connection with his department. Nearly opposite this building are situated the company's offices, the ground floor of which is occupied by the directors, manager, and accountants, while the whole of the upper storey is devoted to the use of the drawing office staff.



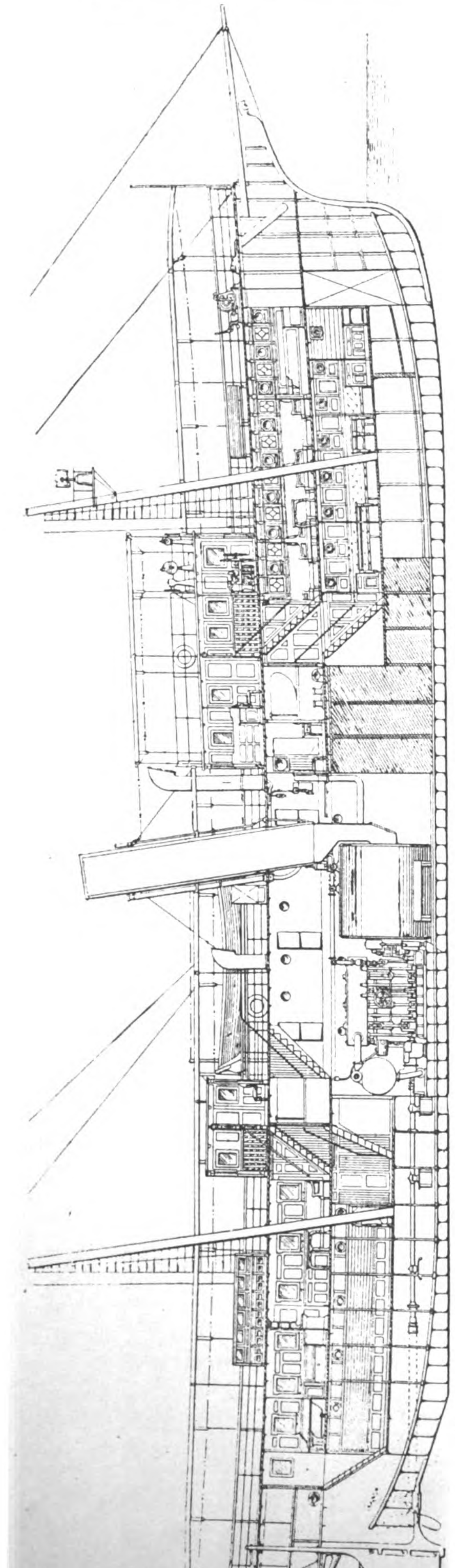
KIANGNAN DOCK WITH A CHINESE CRUISER ON THE WAYS

YANGTSZE RIVER PIRATE CHASER, BUILT BY THE KIANGNAN DOCK & ENGINEERING WORKS FOR THE VICEROY OF NANKING

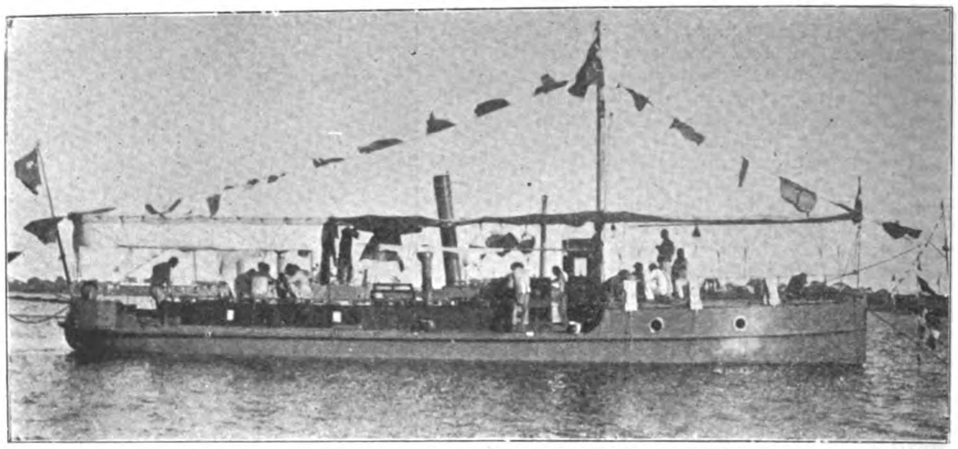
Machine Shop.—Just over the way from here is the machine shop, a large and commodious new building, which is served by a 40-ton travelling crane, supported on cast-iron columns, with steel girders, and running the whole length of the shop. The heavy lathes, planing, and boring machines are placed on either side of the central aisle, where they can be easily and rapidly served by the travelling crane, while the two side bays are fitted with the smaller lathes and machines. On first entering this fine shop one's attention is immediately taken by a huge triple-geared face lathe, manufactured by Messrs. Craven Brothers, of Manchester, the chuck of which is capable of taking in a piece of work 10 ft. 6 ins. diameter by 3 ft. long. Next to this and in line with it is another heavy triple-geared sliding, surfacing, and screw-cutting lathe, also by Messrs. Craven Brothers, 25-in. centres, and capable of taking in a piece of work 32 ft. in length, which, with its



YACHT OF H. I. H. PRINCE HSUI, BUILT BY THE KIANGNAN DOCK & ENGINEERING WORKS



500-TON TWIN-SCREW STEAM YACHT "LIEN-CHING," BUILT BY THE KIANG-NAN DOCK AND ENGINEERING WORKS, SHANGHAI



POLICE BOAT FOR INLAND WATERS, BUILT BY THE KIANGNAN DOCK & ENGINEERING WORKS FOR THE NANKING VICEROY

two double slide rests, carries four tools, all of which can be put in operation at the same time, rendering this a very valuable machine indeed. Next comes a heavy horizontal drilling and boring machine by Smith, Beacock, and Tannett, with two massive boring heads, each of which can be worked independently of the other, and capable of doing a large variety of work. Immediately adjoining this is a heavy vertical planing machine with horizontal traverse, which can take in and machine a piece of work 10 ft. 6 ins. by 16 ft. long. A large horizontal planing machine comes next, and several smaller machines. The other side of the shop under the crane is similarly fitted with heavy machines, among which is a large American slotting machine, two useful horizontal boring machines, and two large radial drilling machines. The two side bays, as mentioned above, are closely packed with a large variety of lathes, planes, slotting, and drilling machines, manufactured by Archdale, Whitworth, Craven Bros, McOnie and Co, and other well-known makers. Power for this part of the works is supplied by a large horizontal non-condensing engine, fitted with Meyer's expansion valves, while in an engine-room immediately adjoining is a large double-cylinder engine of about the same power, ready to be put into operation at once should the necessity arise, it being a principle of the management to take all reasonable precautions to prevent stoppage of the works in the event of a breakdown. Steam for these engines is supplied by two large Lancashire boilers at a pressure of 75 lbs. per square inch, one always being laid off for cleaning while the other is at work.

Foundry and Other Shops.—Passing now through a small auxiliary machine shop containing a number of lathes, wheel cutting, milling, and other machines, which, owing to the increase of busines it became necessary to put into operation, one comes to the foundry. This building before its transfer to the present company was used as a shot and shell foundry, evidence of its former activity in this respect in the shape of huge projectiles being met with all over the extensive premises. The foundry is equipped with two 2-ton cupolas and a large new cupola with drop bottom and all the latest improvements, and capable of melting 8 tons of metal per hour, the blast for these cupolas being supplied by a large Roots blower. The foundry is served by one large jib crane capable of lifting 15 tons, one 3 ton, and several smaller cranes. Immediately under the jib of the 15-ton crane is a large circular steel casting pit capable of casting propellers up to 18 ft. in diameter. A similar, but smaller, pit is sunk under the jib of the 3-ton crane. Situated as these works are on a vast alluvial flat on what is practically a water-logged soil these pits are a necessary adjunct to any foundry turning out castings of large size, and the same thing applies to all kindred establishments in the Shanghai district. The brass foundry contains three ordinary and one Carr's patent crucible furnaces, and a great variety of brass castings ranging from a few ounces to several hundredweights are being constantly turned out.

Smiths' Shop.—Adjoining the foundry is the pattern-makers' shop, and in close proximity is the smithy. This latter shop contains a large steam-hammer, served by two 4-ton jib cranes, and capable of welding propeller shafts up to 14 ins. diameter, which has frequently been done in these works. Two other smaller steam-hammers are provided for ordinary work, and all are in constant use, the smithy in works of this kind being generally a very busy shop indeed. The coppersmiths' shop adjacent to the smithy is also usually well supplied with work, but calls for no special comment. Rails are laid from the wharves and dock into the various shops for the expeditious handling of heavy pieces of machinery. The whole of the shops, dockyard, and offices, including the Admiralty House, are effectively lighted by electricity, while an efficient water service, supplied by water from the adjacent Shanghai Inland Water Works, with numerous hydrants all over the works, testifies to the care and thoughtfulness of the management.

Facilities for All Kinds of Repair Work.—The engineering department is specially equipped for the expeditious handling of all kinds of marine repair work from the renewal of plates to the lengthening of any kind of a vessel while the installation of machinery and repair thereof outside of marine work is becoming an important feature of the company's activity.

Construction.—Chinese waters are dotted with the output of steel and teak-wood vessels ranging from a cargo lighter to Imperial cruisers that represent the capacity of the company's plant. Among the important vessels turned out in recent years, especial attention is directed to the steel twin screw yacht Lien-ching built for H. I. H. Prince Tsai Tsun. This vessel has a displacement of 500 tons and is one of the most handsome in appearance turned out in Far Eastern yards. Its dimensions are: Length, 173 feet over all; beam, 25 feet; depth, 20 feet; draught under steam, 9 feet. The vessel is divided into eight compartments including six water-tight bulkheads and bunker bulkheads and has three decks. The Imperial compartments are aft the main deck while the deck forward is devoted to a handsome reception hall. Two Scotch boilers, equipped with Howden's forced draught system, supply steam at a pressure of 180 pounds provide motive power expressed by two sets of triple expansion engines, cylinders 10, 16.5, and 26.5 inches in diameter respectively with an 18 inch stroke, h. p. indicated, 900. Air and circulating pumps constructed by the Kiangnan company and Weir's feed pumps are installed. The most modern steam steering control is part of the modern equipment and the electric light plant installed has a capacity of 6,000 c. p. At the speed trials the vessel easily maintained 14 knots.

The Kiangnan Works employ about 500 Chinese who are found exceptionally efficient under European supervision as is generally provided in the different departments.

THE FAR EASTERN REVIEW

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DEVELOPMENT OF SHIPBUILDING IN JAPAN

In presenting a general review of shipbuilding in the Fart East an effort has been made to give a comprehensive idea of the large part that shipbuilding and engineering works are taking in the development of Oriental trade and the encouragement of local industries. And perhaps the most striking feature of shipbuilding development with which we have to do is that so closely connected with Japanese history during the last 20 years.

A native canoe-shaped craft utilized in fishing and trading along the coast of Japan and with Korea during the third century gave place in the fourth century to vessels constructed after Korean models. Following Korean construction communication with China by sea was established and a combination of Chinese and Korean junk construction seems to have been adopted generally, but up to the end of the tenth century vessels of over 100 tons were exceptional. It might be said that not until 1542, when the Portuguese began trading with Japan, was any attempt made to construct vessels of sufficient size to venture beyond local waters, but about this time it is known that Japanese vessels navigated Eastern Seas as far South as Australia.

The latter part of the seventeenth century the registered vessels operating under the Shogun government's licenses numbered 200, many of them from 100 to 130 feet in length. European methods were first introduced by William Adams, the shipwrecked English pilot who made his home in Japan and engaged in the shipbuilding trade. He built two modern vessels of approximately 100 tons each about 1635 and there was every indication of renewed activity in this line of endeavor, but in 1638 the Shogun government restricted foreign trade to China, Korea and Holland, prohibited the construction of ships western type and intercourse with foreigners, and until 1853, or over 200 years, only small junks for the coasting trade were built in Japan.

With the advent of Commodore Perry the limit on the size of ships constructed was raised, but little progress was made in modern construction.

In 1854 Captain Putiatin of the Russian man-of-war "Diana," having suffered shipwreck at Shimoda, decided to construct a ship of 200 tons in which to return to Russia and a temporary shipyard was established at Kimizawa near that place. The Japanese shipwrights employed continued the yard and built several vessels of the same type. They became known as the Kimizawa type.

The first steam warship owned by Japan was presented by the Dutch government in 1855 which was followed by the purchase of a screw-propelled warship purchased by the Shogun from Holland in 1857. Following this was a present from the late Queen Victoria to the Shogun of a steam yacht.

It was at this juncture that the Government of the Shogun became interested in shipbuilding. A site for yards was chosen at Nagasaki in 1857 and Dutch shipwrights and engineers placed in charge. Then followed works at Yokohama, Yokosuka and Ishikawajima by the government and in 1864 the Chiyodagata, the first warship propelled by a steel screw, was constructed at the last named yard

In 1861 private ownership of western type vessels was permitted and that date may be said to mark an almost imperceptible beginning of Japan's phenomenal maritime development and especially in the department of shipbuilding and engineering construction.

In 1876 Mr. I. Hirano leased the Ishikawajima Engine Works, owned by the Navy Department, and this was the first important western shipbuilding enterprise under private direction established in Japan. Following it were the works at Osaka established by Mr. E. H. Hunter, 1880; the purchase of the government works at Nagasaki by the Mitsu Bishi firm in 1884 and the establishment of the Kawasaki works at Kobe in 1886. In 1894 the Kosuga-maru, 1,500 tons displacement, constructed by the Mitsu Bishi, was the largest vessel that had been built in a Japanese dock as the great majority of vessels owned by local shipping companies were purchased abroad.

The Sino Japanese war gave quite an impetus to the industry, but it was not until the passage of the encouragement act of 1896 that Japan's remarkable progress in this line of activity began. Then followed the construction of the Hitachi-maru by the Mitsu Bishi Dockyard of 6,000 tons with seven other steamers of 3,000 tons each completed by 1899. The Mitsu Bishi continued building larger vessels for the merchant marine until the recent construction of the Tenyo and Chiyo Maru of 13,400 tons equipped with turbine engines crowned the splendid record of achievement by this company.

As an evidence of the success of the Encouragement Act may be noted the increase in the number of shipyards from 66, in 1896, with an output of 36 steamers aggregating 5,860 tons and sailing craft 950 tons, to 240 shipyards turning out 67 steamers with an aggregate tonnage of 50 795 tons in 1909 and sailing craft of 15,188 tons.

In naval construction Japan has made the most wonderful strides. Up to 1883, the largest vessels turned out were wooden gunboats of about 1,500 tons. Then followed composite and steel construction and, in 1891, the coast defence ship Hashidate of 4.000 tons was completed. This was the largest warship built until 1906 when the battleship Satsuma, 19 200 tons, was constructed by the Yokosuka Dock Yard. The first steel cruiser of 1.750 tons was launched at Kobe in 1888.

The Government established naval dockyards and arsenals at Kure and Sasebo in 1889. A dispatch boat of 1800 tons was launched in 1897 from the Kure yards. All the armor and guns are furnished from the Kure arsenal. The battleship Aki of 19,800 tons was constructed here and with the improvements made super-dreadnoughts may be turned out with expedition. The latest naval construction is the Battleship Kawachi at the Kokosuka yards, and the Settsu at Kure, each having a displacement of 20,850 tons and a speed of 20.5 knots.

And so no term other than revolution may be used to express the transformation that has taken place in the last fifteen years in Japan's shipbuilding industry. Every year records some improvement, some advancement that keeps her abreast of the times.

When Japan set out to make a place for herself among the leading maritime nations of the world, she recognized the seriousness of her task and the many sacrifices involved in the realization of her ambition. There was a singleness of purpose predominating that could not have been realized were it not for the patriotic support given by the taxpayers of Japan. The statesmen who have been directing national affairs during the last twenty years have been fully justified by results and in no department of industry has this been demonstrated more strikingly than in the wise policy of encouragement to Japanese shipbuilding and foreign carrying trade. At one time criticism of this policy took the form of accusation in that Japan's statesmen had been guilty of promoting class legislation designed to build up a special industry at the expense of the Japanese taxpayer. But those critics have been silenced by the era of general development in all branches of trade and industry following the predominence of Japan's ships upon the Pacific and in the presence of her flag in the world's leading marts. There has evolved a national pride in her extensive merchant marine that represents in addition to its commercial potentiality a force for auxiliary naval defence unequalled by any nation with possibly the exception of Great Britain. And it all involved great faith in the nation's future, statesmanship of a high order and the sacrifice that honors a nation.

THE MOTOR BOAT INVASION

During the last few years, the internal combustion engine has been perfected and its effect upon water transportation facilities is now phenomenal. The year has been marked by Lloyds' adoption of rules governing the survey of internal combustion engines using petrol or paraffine fuel. This has been due to the advance made in adapting this class of engine to large vessels, and the growing interest in marine motor power in this form.

But what is more striking is the strides taken in utilizing the internal combustion engines for motor power for small craft, and extending their use to the cargo and passenger carrying trade in the shallow streams and river deltas. When first introduced the motor boat became the ideal small pleasure craft and no doubt the sporting interest in increased speed had much to do with the development of this modern engine which has invaded the ends of the earth.

In this special number will be found evidence that the progressive shipbuilding yards of the Far East, no matter how extensive their operations, are not neglecting motor craft construction. Indeed, if one is to judge by the hundreds of ways in which the motor engine is being utilized to facilitate local trade in the many deltas and small rivers in the different far eastern countries and dependencies, it would seem that this means of transportation is doing more to "hurry the east" than any other influence. The laborious poling of the casco and lighter is giving place to more certain muffled motor power of the internal combustion engine. It may be adapted to the banca, the lorchas, the sampan or the native prao. For the carrying of mails it serves towards rural delivery expansion and its adaptability to light cargo and passenger traffic places formerly isolated sections within easy reach of desirable markets. The motor boat is doing much to supplement the work of the great ocean liners by expeditious local distribution. It finds a market for the isolated producer and encourages greater industry and necessarily greater prosperity. The Philippine customs finds the motor boat the ideal cutter to run down smugglers; the revenue department invades the interior and enforces the law with a case of gasoline; while the tourist and hunter board a motor boat at Manila and spend weeks among the most delightful scenic attractions of the islands. The Canton delta has its fleet of motor boats and in Shanghai, Hongkong, Singapore, and Bangkok motor boat construction is becoming a most important feature of the shipbuilding industry.

The development of the petroleum marine engine in recent years has been given a great deal of attention and its popularity promises to greatly increase as its durability and adaptability to local conditions becomes more generally accepted. European and American manufacturers have brought the petrol or gasoline engine to a high state of efficiency and they have been actively engaged for years experimenting on various models of kerosene motors. That their efforts in this direction are meeting with success is demonstrated by the increased number of reputable kerosene motors on the market. European and American manufacturers of internal combustion engines cannot fail to secure unusual returns for well directed effort introducing their motors in Far Eastern countries where the appreciation of that class of motor power is becoming more and more marked.

DECREASING THE DANGER OF DIVING

The writer had an opportunity to view the antiquated diving methods employed on harbour improvements some years ago in an Australasian port. The diver came up before his usual time, and brought with him an octopus that must have measured a good ten or twelve feet from tip to tip of tentacles. It was clinging to his back, twined round all his limbs, but fortunately had not anchored itself to any of the rocks or piles. The beast objected to his atmospheric bath and slid back into the sea through a two inch gap between the planks of the wharf.

Dangers of this kind are inevitable to the diver's art, but much has been done of late years to protect him from perils of faulty apparatus and inefficient means of communication. A number of these improvements are due to Messrs. C. E. Heinke & Co., of London. The pumps, dress, helmet and boots have all received attention.

Slight improvements have been made from time to time until the aggregate of changes has become very considerable. The old style diving dress was by no means a comfortable garment. The seams at the feet and neck leaked; the pressure of the wrist outlets numbed the hands; the cut of the sleeves prevented the hands being brought together at the front without great discomfort and chafing. Messrs. Heinke have at length found how to make a foot with but one seam, how to form a watertight cuff without undue pressure, and how to reinforce seams without making the dress unwieldy and stiff. Their latest pattern of boot consists of a solid brass casting for protection to the foot. An ingenious arrangement of straps prevents the foot from being accidentally withdrawn. Every detail of the equipment has received the same minute care.

For light, the diver is offered his choice of oil or electric lamps. The former is supplied with air through a branch hose from the air pump. The latter are fed by a special robust flexible cable. For communicating with the attendants above, there is a patent speaking apparatus that depends for its action on an extra air tube, fitted with sound discs in the diver's helmet. A more elaborate device consists of a telephone adapted for submarine work. Transmitter and receiver are suitably placed inside the helmet, and a call button operated by the diver's chin. The conductors can be embedded in the rubber wall of the air tube or in the life line. The equipment for the use of two divers working together makes provision for communication between them as well as to those on boat or land.

The uses to which Messrs. Heinke & Co.'s apparatus has been put form a romance in themselves. When the S. S. "Japan" was burned the first Heinke suit ordered was lost in a wreck. Another was then sent out, the first recovered by its use, and both were then successfully employed to salve £77,000 worth of gold and silver coin in fused masses. Seven of the most celebrated divers have, by the use of this apparatus, salved between them over £10,000,000 of bullion and over 100 vessels. Another curious case was the recovery of a chased silver hunting knife valued at £7000. This was recovered from the S.S. "Cadiz," wrecked off Ushant, after two months submersion.

In pearling naked diving is being fast replaced by diving with apparatus, and it speaks well for the manufacturers that a round thousand of Heinke outfits are in daily use by semi-savage operators.

Homelier uses for this apparatus are found in dock and harbour constructions, dock working and maintenance, emergency ship repairs and a hundred and one other branches of the marine industry. For all purposes, Messrs. Heinke & Co. turn out over seven hundred equipments yearly. Their wide experience and personal knowledge of diving work serve to maintain their position as leading Submarine Engineers.

A MARINE VIEW OF ELECTRICAL PROGRESS.

It is plain to the most casual observer that matters maritime are being rapidly brought under the domain of electricity. The peculiar convenience and flexibility of this form of power have quickly appealed to the business instincts of shipbuilders and naval engineers, and its use has grown from small beginnings until the largest yards and docks are now electrically driven throughout, and electric propulsion of ocean liners and battleships is in the immediate future. The rapidity of this advance has been greatly helped by the enterprise of the great electrical manufacturing interests.

The use of electricity on shipboard was for long confined to lighting, where its popularity was clearly due to its handiness and safety. At the present time electric devices of every kind are to be found on the great ocean liners—fans, lifts, and a dozen other appliances minister to the comfort of passengers, while in winches, pumps, tools, forced draught fans, and coal conveyers, electric power is helping the shareholders to higher dividends. It is in the navy, however, that the same principle has been carried to its greatest development.

A full list of the uses made of electric power on battleships would make the present article like an auctioneer's catalogue. It will be enough to mention gun laying, ammunition hoists, torpedo charging, and the automatic closing of watertight compartment doors as examples of what is being done.

The proposals for marine propulsion on a practical ocean-going scale are so numerous and so untried that this is hardly the place to deal with them. Turbo-electric schemes have now been worked out in great detail, and much ingenuity expended on them. Actual designs have been quoted on to various interested bodies, including some of the great naval powers. One of the most promising patents in this field is held by Mr. J. N. Bailey—an engineer of one of the Westinghouse Companies.

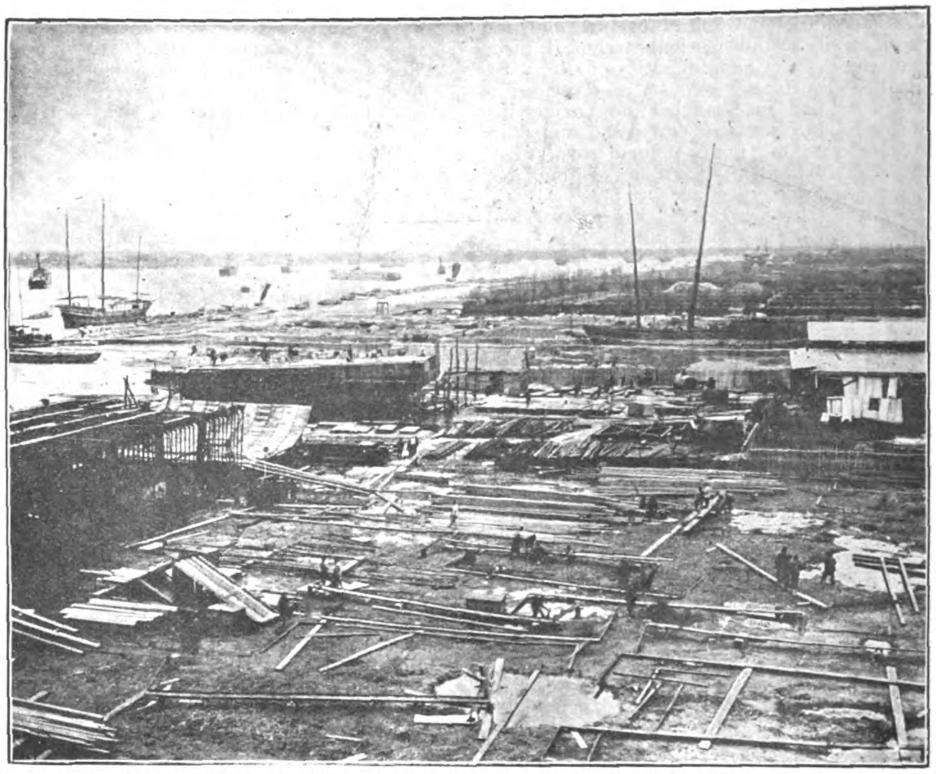
For shipbuilding purposes electric power has become indispensable, owing to the large area covered by a modern shipyard, and to the peculiar nature of the problems involved in putting up the frame and plates. No other system of power distribution can economically solve this problem, or can provide for the rapid concentration of power at the necessary point in cases of emergency. The dockyards of the British Admiralty afford an lexample of the individualised electric drive applied to shipbuilding and naval work. Here motors of all sizes are employed for machine tool drive. The ease with which electric power may be accurately measured has enabled the dockyard authorities to test the power consumption of their tools, and in this way a mass of most valuable information has been collected. In the Boston yard of the U. S. Navy, there may be seen a particularly interesting dry dock pumping plant. Direct coupled centrifugal pumps are used, designed to have an increasing efficiency with increasing head. As the dock empties the head becomes greater, and, with a constant flow of water, more load comes on the pump. The increased efficiency makes for a constant load on the motor. Individual driving, at any rate for the larger tools, is surely winning a victory over the group drive. The brightening of the shop due to the absence of shafting and belts, the economy of eliminating idle gear in motion, the ease of arranging for overtime in certain tools—these are advantages too valuable to be overlooked by the wide awake shop manager.

Until comparatively recently, many engineers considered that electricity could not satisfactorily replace hydraulic power for cargo handling appliances. This idea has now been completely exploded, and received its final death blow a few weeks ago, when Messrs. Dixon and Baxter read their paper before the Institution of Electrical Engineers on the equipment of Rothesay Docks. Cranes, coal tipplers, elevators, and capstans are now being electrically driven in all parts of the world, and doubtless the Far East will not be behind hand in adopting this most convenient of all systems.

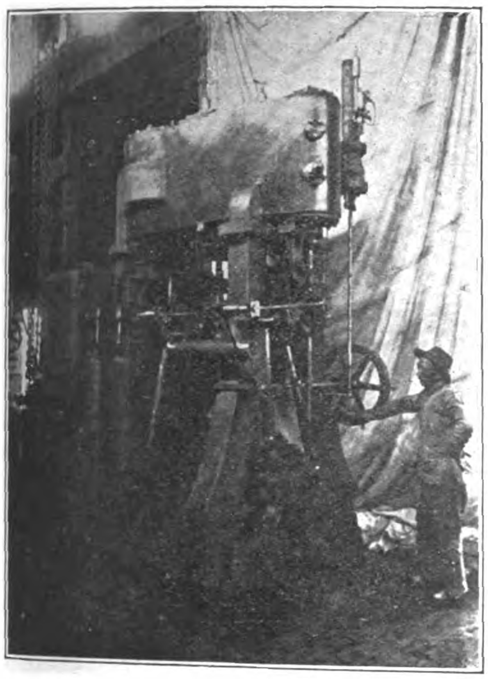
PROPOSALS FOR COAL.—Headquarters Philippines Division, Office of Chief Quartermaster, Manila, P. I., January 7, 1911. Sealed proposals in triplicate, subject to the usual conditions, for furnishing approximately 65,000 tons of coal to the Quartermaster's Department, U. S. Army, during the Fiscal Year 1912, will be received here until 11:00 A. M. May 8, 1911, and then opened. Information and blank forms furnished upon application. F. G. HODGSON, Assistant Quartermaster General, U. S. Army, Chief Quartermaster.

THE NICOLAS TSU ENGINEERING WORKS, SHANGHAI

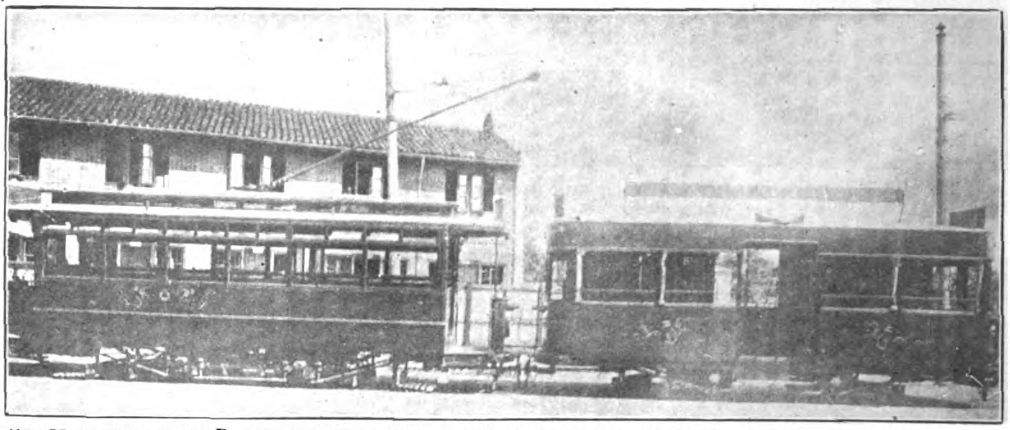
In contrast with the remarkable engineering advancement of Japan, is the apathy of China in these industries which make for national progress. Engineering is still in its infancy in China, and there are no characters in her language to convey the meaning of the simplest technical terms. Aside from the great Han-yang Iron & Steel Works, and a few small machine shops in the treaty ports, engineering



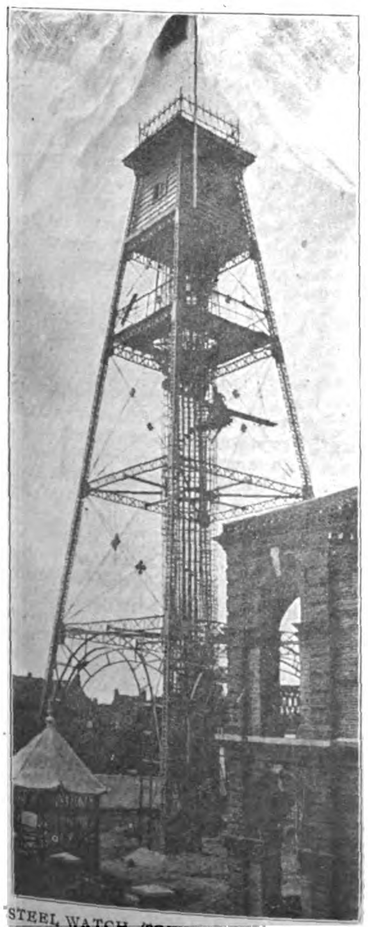
GENERAL VIEW OF SHIPBUILDING YARD OF THE NICOLAS TSU ENGINEERING WORKS, SHANGHAI



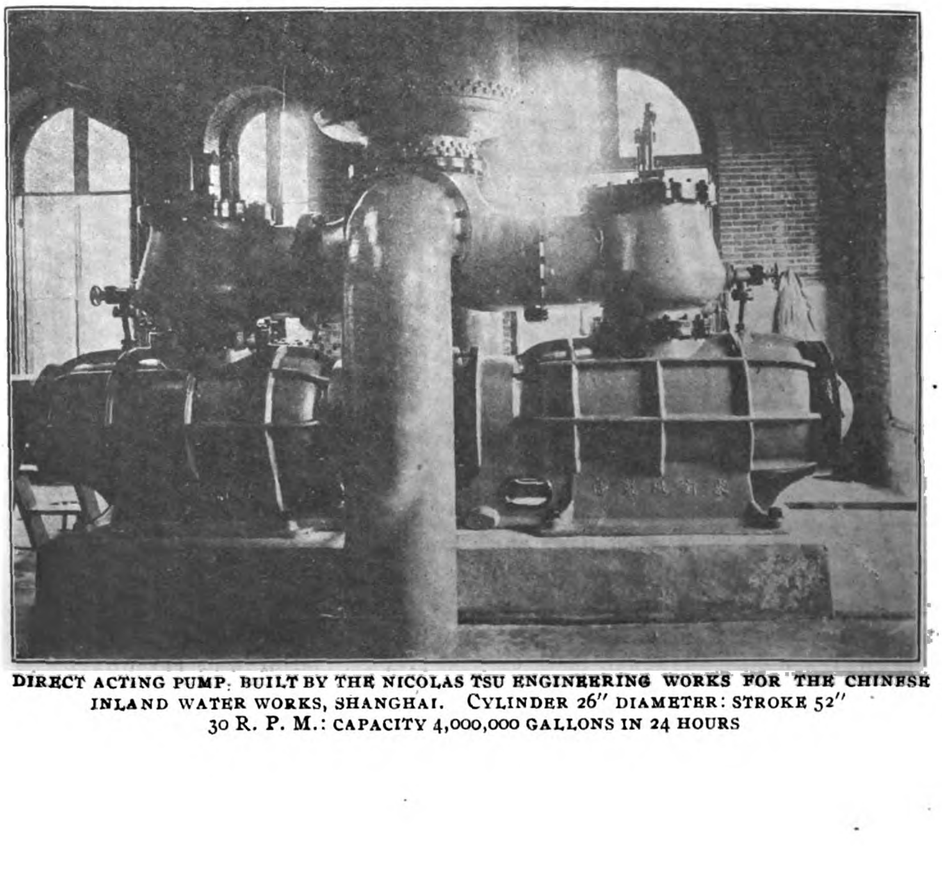
ENGINE FOR STEAMER BUILT IN NICOLAS TSU'S SHOPS



TRAILER CAR, TYPE B; BUILT BY THE NICOLAS TSU ENGINEERING WORKS FOR THE SHANGHAI AND FRENCH TRAMWAYS



STEEL WATCH TOWER WITH ALARM BELL, FOR THE CHINESE CITY, SHANGHAI



DIRECT ACTING PUMP: BUILT BY THE NICOLAS TSU ENGINEERING WORKS FOR THE CHINESE INLAND WATER WORKS, SHANGHAI. CYLINDER 26″ DIAMETER: STROKE 52″ 30 R. P. M.: CAPACITY 4,000,000 GALLONS IN 24 HOURS

is in the hands of foreign concerns. Railways are being constructed, mills and electrical plants installed, and mines opened, but for lack of trained and efficient technical men, the machine shops and foundries of China are controlled by foreigners. It is therefore a surprise to find in Shanghai an engineering and shipbuilding works, operated and controlled by Chinese capital, under Chinese supervision, comparing favorably with some of the large foreign establishments of the Orient.

A visit to the Nicolas Tsu Engineering and Shipbuilding Works, located on the Whangpoo River near the Kiangnan Arsenal, is a revelation to the foreign engineer. Here is found a complete up to date plant, with French equipment turning out all kinds of engineering work, run under the direction of Mr. Louis Tsu, a graduated engineer from one of the French technical colleges.

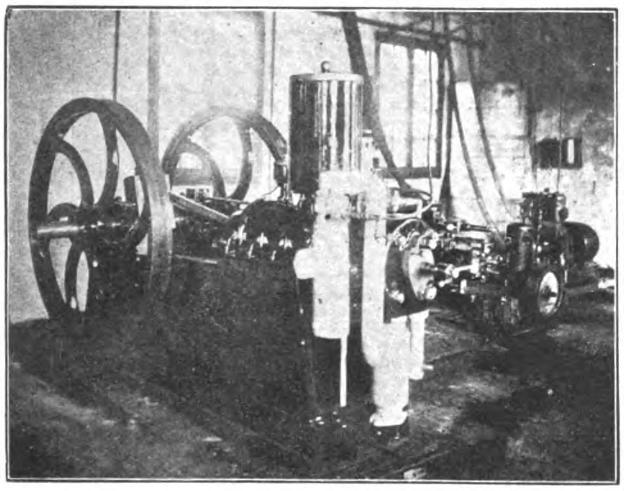
The works comprise the machinery and fitting shop, iron and brass foundries, blacksmith shop, boiler makers' shop, carpenter and model shop, railway car erecting and finishing shop, shipbuilding yard, oil engine and electrical shops, technical and drawing office.

The staff and workmen number over 500 men, and the works cover an area of 11 acres. The works specialize in many machines and it is interesting to note the progress made along lines hitherto considered as exclusively foreign in China.

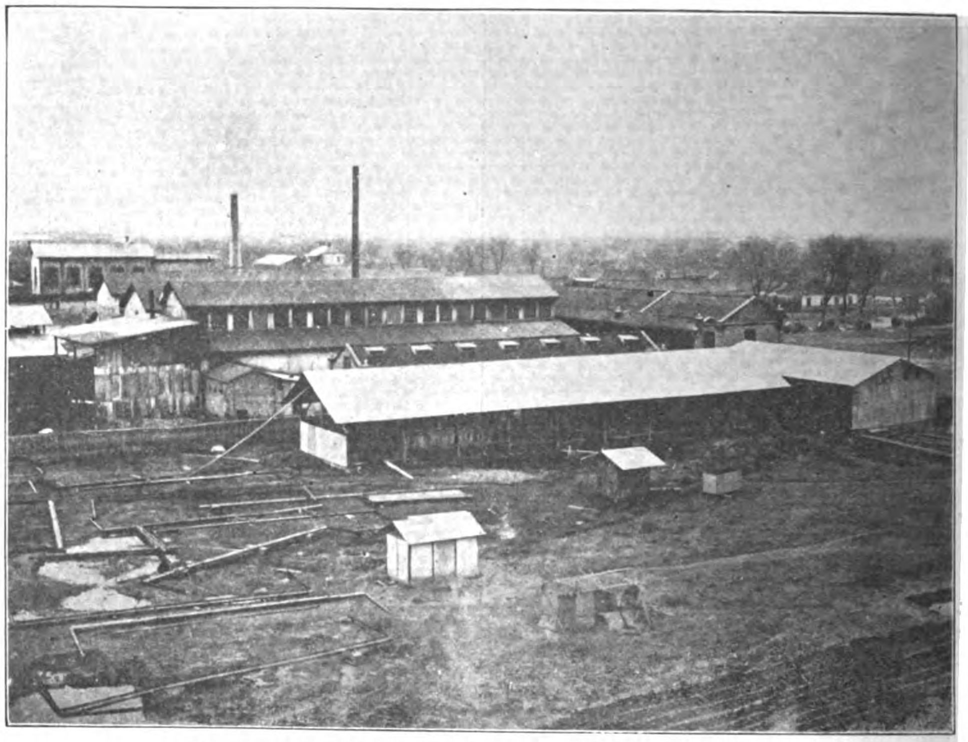
With the construction by native capital of the Kiangsu and Chekiang railways it was quite natural that their patronage would be tendered to a Chinese firm, especially when the latter's works are located only a short distance from the Shanghai terminus of the line, and with the orders of these companies as a start, the Nicolas Tsu Works have firmly entered the field for participation in the supply of Chinese railway material.

Passenger and freight cars, bridges, water tanks, crossings, switches, rail fastenings, pile drivers, jacks, winches, cranes, drills, etc., have been made to the order of various railways. A few of the special orders will give a better idea of the extent of their activity.

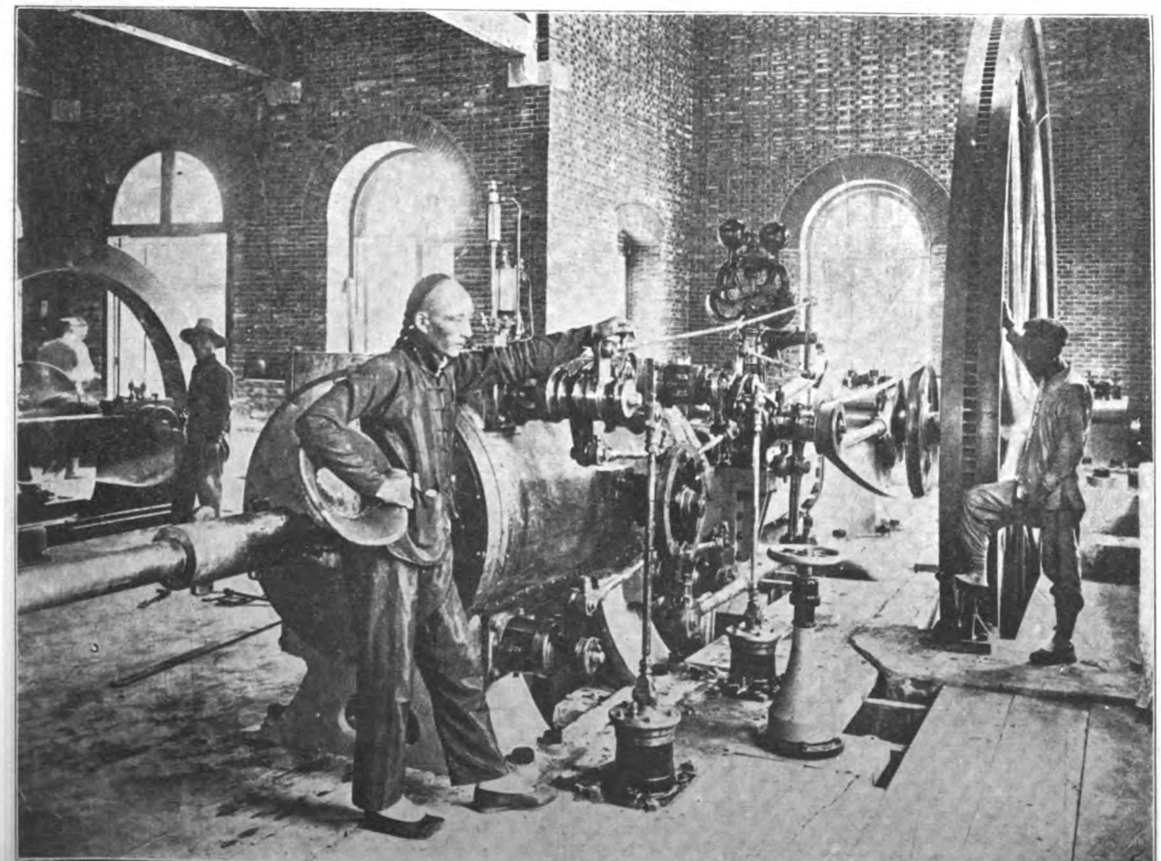
Railway Material.—Steel Roadway Bridge for Ningpo, 200 ft. long in 3 spans. For the Chekiang and Kiangsu Railways many steel girders for bridges 20 to 100 ft. long were constructed; 2 railway passenger coaches for the Kiangsu Railway; 6 30-ton freight wagons for the Kiangsu Ry.; 12 passenger coaches, 1st, 2nd and 3rd class, following the type of those on the Shanghai-Nanking line, were built for the Chekiang railway, and the water tanks, pile drivers, jacks, winches, crossings, switches and rail fastenings for the Szechuen-Chuen-han, Chekiang and Lo-tung railways. Several trailer cars for the Shanghai and French Tramways were also built.



25 H. P. KEROSENE ENGINE MADE BY THE NICOLAS TSU WORKS



GENERAL VIEW OF NICOLAS TSU ENGINEERINC WORKS



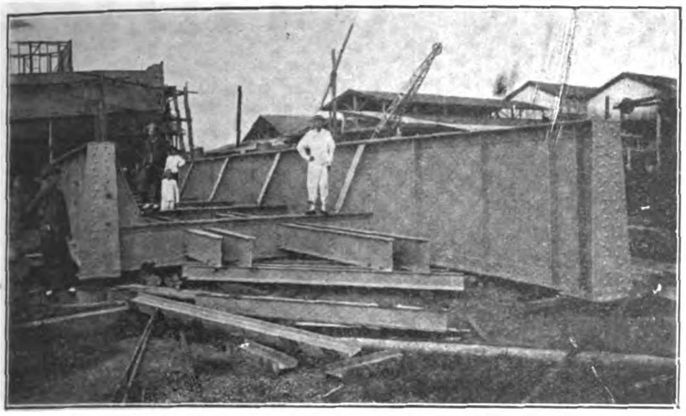
CORLISS ENGINE BUILT BY THE NICOLAS TSU ENGINEERING WORKS FOR THE CHINESE INLAND WATER WORKS, SHANGHAI. DIAM 62 × 52 STROKE; DIAMETER OF FLY WHEEL 22 FT., 30 R. P. M. COMPLETE WITH CONDENSER AND AIR PUMP

Shipbuilding.—The works have successfully built and engined: One steam cargo and passenger boat, 160 ft. long and 350 H. P.; two steam cargo and passenger boats 140 ft. long and 300 H. P., for Chinese Navigation Companies; several steam tow boats 70 to 90 ft. in length for the Szechuen-Chuenhan Railway and the Hanyang Iron & Steel Works.

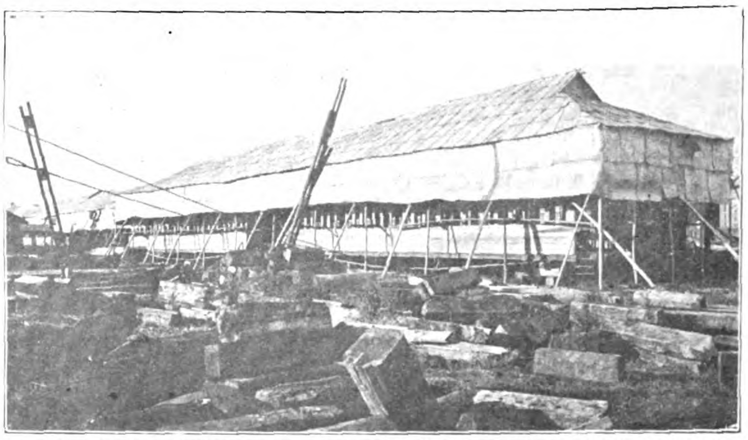
Three shallow draft steamers, 60 ft. long 2 ft. draft; 70 ft. long 2 ft. 6 inch draft; and 90 ft. long, 4 ft. draft, were built to the order of the China Merchants Inland Navigation Co. Steel lighters from 100 to 300 tons for the East Asiatic Dredging Co. and the Szechuen Railway and the pontoons and pontoon-hulks from 180 to 250 ft. long for the Yangstze service of the Cie. Asiatic de Navigation and others have been constructed at Tsu's works.

Kerosene and gasoline motors, for marine and stationary work from 5 to 25 h. p. are made for the native trade, and many small rice and ginning mills are being operated with Tsu's engines.

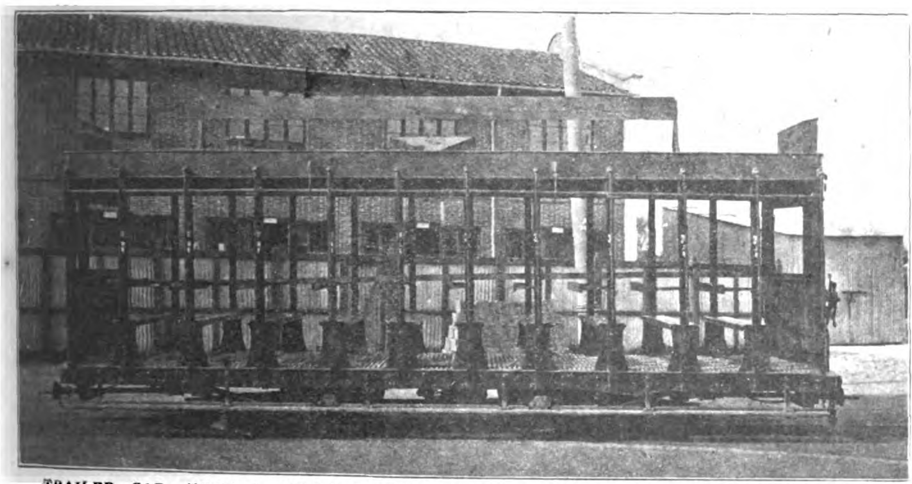
Complete Oil Mill machinery has been furnished the Shanghai Cong Chong Cotton Seed Oil Mill with a capacity of 1,500 piculs of seed in 24 hours. Complete oil and bean cake plants to the "Yu Shing Bean Oil Mill in Anhui, consisting of 60 presses, and 100 presses to the "Hai Foon" Bean Oil Mill at Haichow, besides several smaller plants. Rice cleaning and



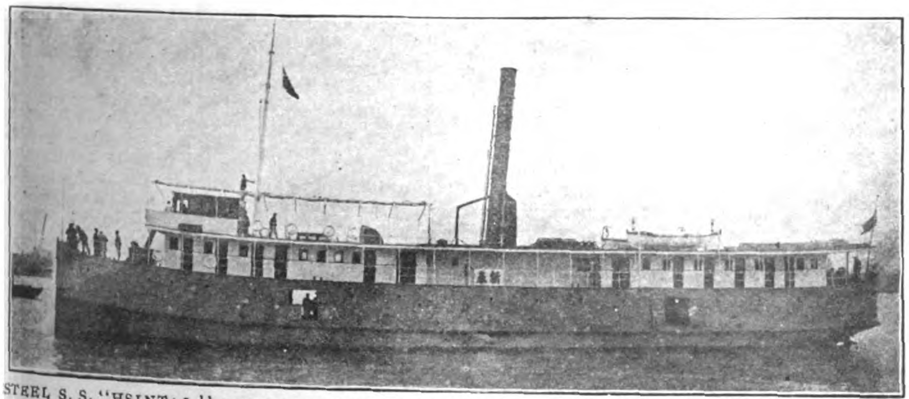
RAILROAD BRIDGE OF 60 FOOT SPAN CONSTRUCTED BY NICOLAS TSU FOR THE KIANG-SU RAILWAY CO.



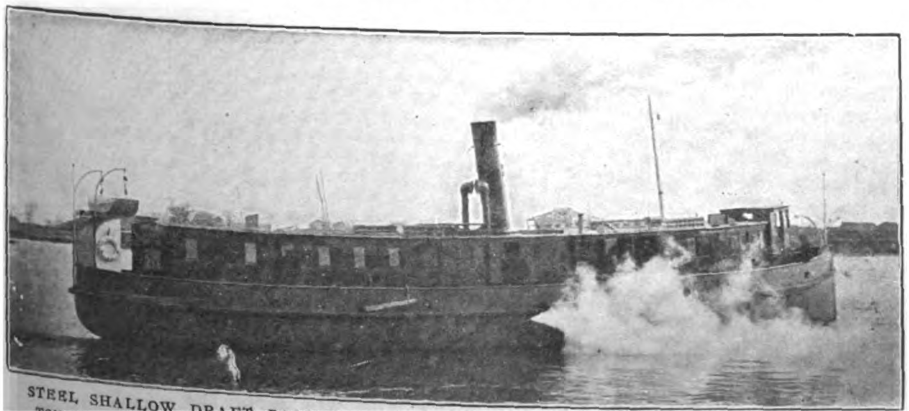
VIEW OF 12 PASENGER CARS IN COURSE OF CONSTRUCTION FOR THE CHEKIANG RAILWAY CO. (1ST, 2ND AND 3RD CLASS) AS CARS ON SHANGHAI-NANKING RY.



TRAILER CAR, TYPE C, BUILT BY THE NICOLAS TSU ENGINEERING WORKS FOR THE SHANGHAI TRAMWAYS



STEEL S. S. "HSINTAI," DISPLACEMENT 291 TONS, SPEED 11 KNOTS. DIMENSIONS 160' × 21' × 10'. DRAFT 8' COMPOUND CONDENSING ENGINE 320 H. P. TO CARRY 300 PASSENGERS: BUILT BY THE NICOLAS TSU ENGINEERING WORKS



STEEL SHALLOW DRAFT PASSENGER BOAT "HENG HSIN" BUILT BY THE NICOLAS TSU ENGINEERING WORKS FOR THE CHINA MERCHANTS INLAND NAVIGATION CO.

hulling machines are made at the works, and with the small kerosene oil engines, make a compact plant, suitable for the small farmer. Machines with capacities from 60 to 600 piculs per 12 hours are made and marketed.

Engines and boilers from 40 to 350 H. P., and one complete set of Corliss 28"×52" engines and 18"×52" pumps with condenser and air pump were supplied to the Chinese Inland Water Works at Shanghai, having a capacity of 4,000,000 gallons in 24 hours. Minting machines for the new copper coins were supplied to the Kiangsu and Fengtien Provincial Mints.

The steel chimney for the Hupeh Cement Works, 200 ft. high and 11 ft. diameter, bell and whistling buoys for the Imperial Maritime Customs, letter boxes for the Postal Department, the Customs' jetty at Shanghai, the staircase for the Shanghai Club, and many other varieties of work have been executed.

The success of this firm has encouraged them to further expansion of the works, and in due course new high speed machine and special tools will be added.

A dry dock and steel casting plant is contemplated, which will not only enable them to compete with the other local concerns, but permit the production of finished and complete machines of all kinds entirely within the works.

WILKS & JACK, LTD.

This firm was founded at Hongkong in 1902 by Mr. E. C. Wilks, M. I. Mech. E., as a marine engineer's and surveyors' bureau. Mr. Wilks was joined in 1903 by Mr. W. C. Jack, M. I. N. A., formerly Ingénieur en Chef of the Tonkin River Mail Service, and afterwards assistant manager at the Kowloon establishment of the Hongkong and Whampoa Dock Company.

The firm has designed and superintended the construction of a large number of river steamers and launches. In December, 1906, the business was converted into a limited liability company, under the style of Wilks & Jack, Ltd., with the former proprietors as general managers.

The firm submits designs and estimates for steamships and launches for sea or river service, and make a speciality of craft of lighter draft. Vessels are inspected and trial trips run on behalf of prospective purchasers.

THE OSAKA IRON WORKS

This successful enterprise that has won a prominent place among the leading industrial enterprises of Osaka was inaugurated in 1880 by E. H. Hunter, Esq., a prominent importer and exporter of Kobe who during many years of residence realized the necessity of shipbuilding yard and engineering, works for the repair of vessels, thus increasing the attractiveness of the port for the carrying trade. With five Japanese partners, he secured a site at a desirable point on the Ajikawa River, Osaka, and the construction of building was expedited. Machinery was installed and the works constructed at great outlay.

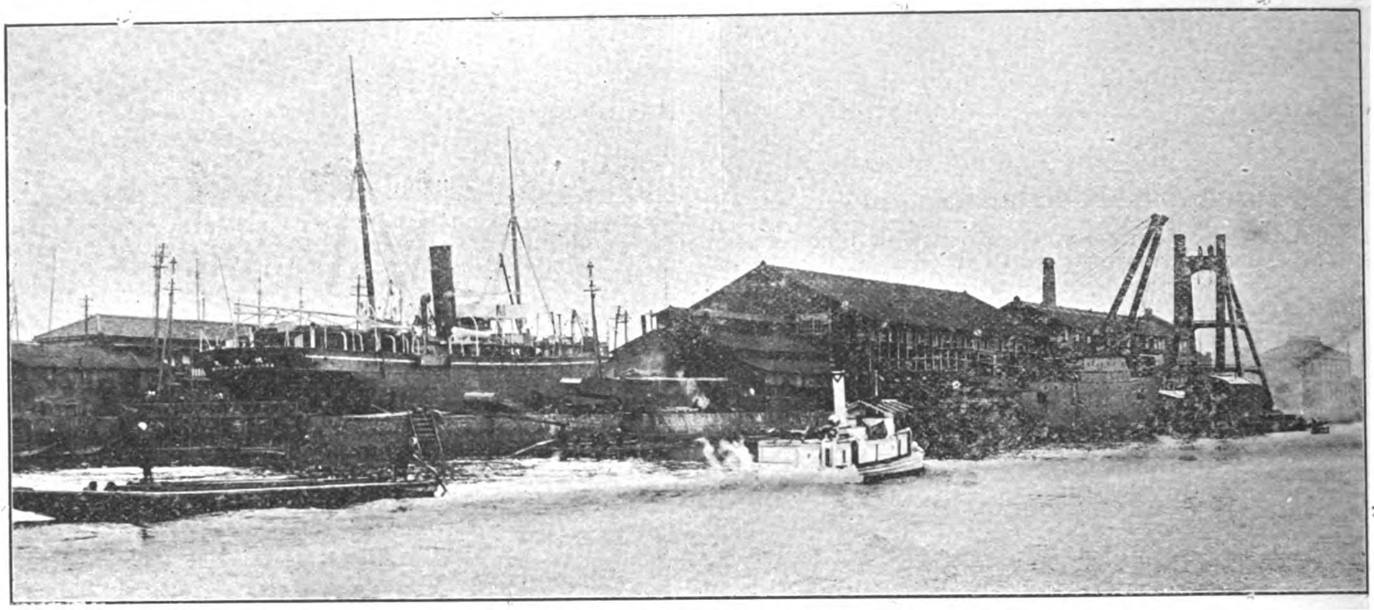
While Mr. Hunter continued sanguine of success, his Japanese partners lacked his courage and before the works were completed, they retired one by one until Mr. Hunter was left to bear the whole burden and responsibility for the success of the enterprise, financially and otherwise. He did not falter and his whole fortune was invested as an evidence of his faith in the venture. His tenacity of purpose, his resourcefulness, and his ability, won for him success in large measure.

Work began to pour in from the day the works were opened and in 1884 it became necessary to reconstruct the dock in order to repair the steamer Mikuni-Maru. The reconstructed dock was built of granite. The first boiler constructed in Japan is to the credit of these works.

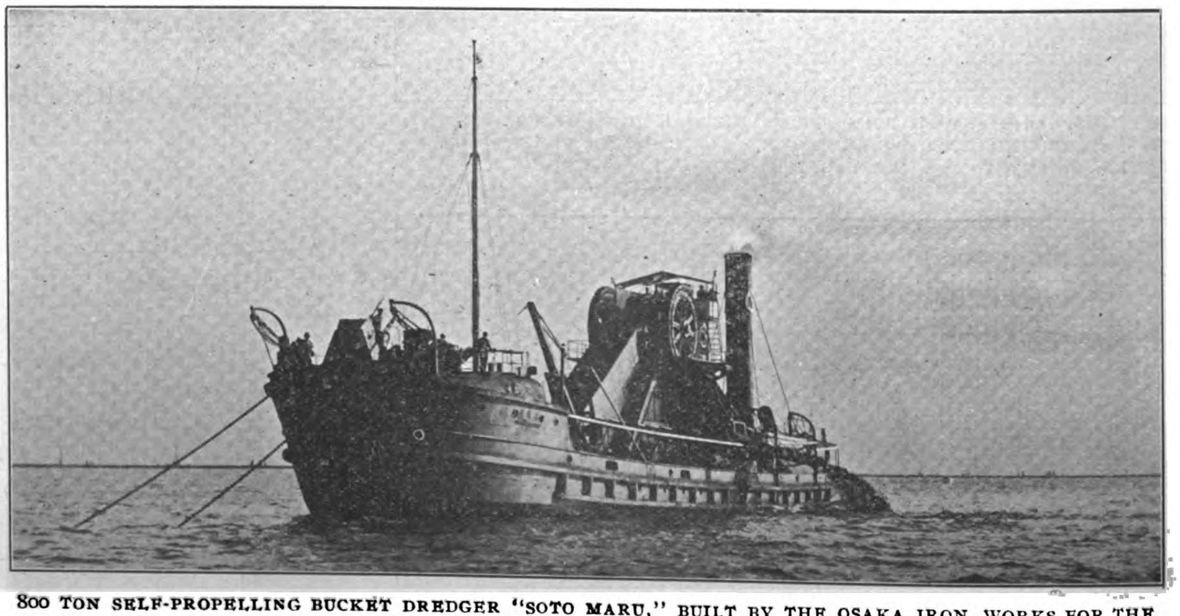
It soon became necessary to extend the works to meet the requirements of the increased volume of business. The result was the Kiyamachi plant on the south beach of the Ajikawa completed in 1889 for the construction of wooden vessels.

Then followed several years of depression but there was no lack of courage in tiding over the hard times. Mr. Akizuki, the Japanese manager during this period, was largely responsible for the success of the struggle which finally ended with the outbreak of the China-Japan war when government orders came pouring in. Then in 1900, the business was further advanced by the Imperial Shipbuilding Encouragement Act. To benefit from this legislation it became necessary to rebuild the entire works. Fortunately at this time Mr. Roytaro Hunter, the eldest son of Mr. E. H. Hunter who had been taking an eight years course abroad, had returned and assumed the management. He proceeded at once to refit the works. The original yard was turned into the present engine and boiler shops and a new site comprising twenty acres located at a point called Sakurajima, a mile from the old site near the mouth of the river inside the new harbor then under construction by the City Corporation. This new plant was equipped to construct steel vessels of all sizes and included other necessary shops for repair and engineering construction.

At this time the principal cities of Japan began installing modern water systems and Manager Hunter with his usual foresight decided to inaugurate a pipe foundry to meet this new demand. The early history of the foundry was far from satisfactory, due largely to lack of experienced direction. But finally Mr. Hunter and Mr. Kouga, his assistant, solved the problem of making first class product with the result that the foundry has for years supplied pipe, not only to the principal cities of Japan but to Formosa and Manchuria as well. This was the first successful pipe foundry established in the Empire and stands as a



THE OSAKA IRON WORKS: HEAD OFFICE AND WORKS AT AJIKAWA, OSAKA, JAPAN



800 TON SELF-PROPELLING BUCKET DREDGER "SOTO MARU," BUILT BY THE OSAKA IRON WORKS FOR THE SOUTH MANCHURIAN RAILWAY COMPANY IN 1910.—DREDGING CAPACITY 800 TONS PER HOUR, DREDGING DEPTH 45 FEET, SPEED 8 KNOTS

monument to the enterprise and courage of the management of the Osaka Iron Works.

In 1905 the Temposan yard originally used for the repair of vessels on the harbor works was acquired from the City Corporation. This addition included two docks and is situated just opposite the Sakurajima Yards. They were completely remodelled and refitted and are utilized exclusively for repair work on vessels.

The Osaka Iron Works now occupy an area of 33 acres with immense water frontage and includes docks and shops for the manufacture and repair of all sizes of engines, boilers, steel and wooden ships, and cast iron pipes of all kinds. The Works also own a branch yard at Keelung, Formosa, with a dock capable of receiving vessels of 1,000 tons and is equipped for general engineering work, large contracts being undertaken for the Formosan government and private interests.

In addition to the present works at Osaka, plans for a new dock 500 feet in length have been completed and it is expected that the new extension will be in operation in 1911 when the river in Osaka will be dredged to an average depth of 25 feet.

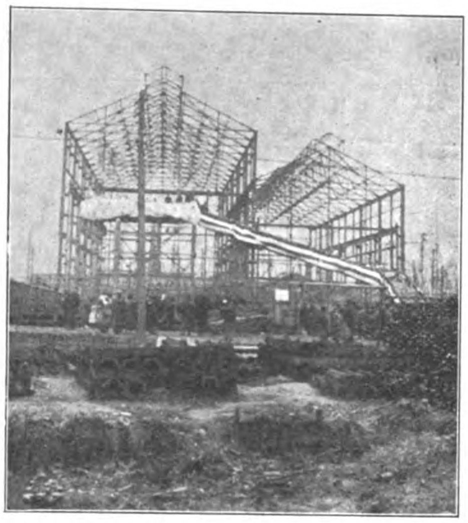
The works now employ 3,500 skilled mechanics in the different departments.

The development of these works is typical of the remarkable history of the shipbuilding industry of Japan. During the war with China these works accomplished much in facilitating Government orders for repairs and for furnishing war materials, and during the war with Russia, the Works were so extended that they were utilized in refitting several warships with expedition besides building two new torpedo destroyers for the Imperial Navy.

In recognition of the splendid service rendered the Japanese Government, His Imperial Majesty conferred the Fifth Grade of the Order of Merit on Mr. Tyotaro Hunter and the Sixth Order was conferred on Mr. Kouga, Mr. Miyeshi and Mr. Shirato of his staff as well as recognition for others connected with the management during the war

The officers of the works follow:

President and Proprietor, Ryotaro Hunter,



OSAKA IRON WORKS, NEW FOUNDRY UNDER CONSTRUCTION 150×90 FEET. FITTED WITH TWO 30 TON AND TWO TEN TON ELECTRIC OVERHEAD TRAVELING CRANES AND COMPLETE EQUIPMENT

Esq.; General Manager, Ukichi Kouga, Esq.; Manager, Mitsuisabuso Miyoshi, Esq.; Naval Architect, Bunichiro Fukuchi, Esq.; Chief Engineer, Sakutaro Takakura, Esq.

The head offices of the company are at Ajikawa-dori, Osaka.

HAKODATE DOCK COMPANY, LTD.

This dock located at Hakodate, on the Island of Hokkaido, is the most northern of the Japanese Companies. The works were first started with a patent marine slipway having rails 520 feet long, and capable of lifting vessels up to 1,200 tons gross. The increased shipping interests of this section demanded greater facilities, and a new granite drydock was constructed of the following dimensions:

Extreme length, 531 feet; length inside caisson, 503′ 9″; length on blocks, 461 ft.; width at entrance, 81′ 8″ top, 71′ 9″ bottom.

The difference between high water at ordinary spring tides and at ordinary neaps is 2 ft. 8 in. The present channel of 20 ft. at low water leading to the dock is to be dredged to 25 ft. In addition there is a Berry's improved slipway capable of lifting a ship of 1,200 tons gross. These works are well equipped with up to date tools having a 2-ton steam hammer capable of forging 12-inch shafts. The foundry can handle castings up to tons. This is not a shipbuilding company, being confined to marine repairs, but many smaller harbor vessels and sailing craft, lighters, etc., have been turned out.

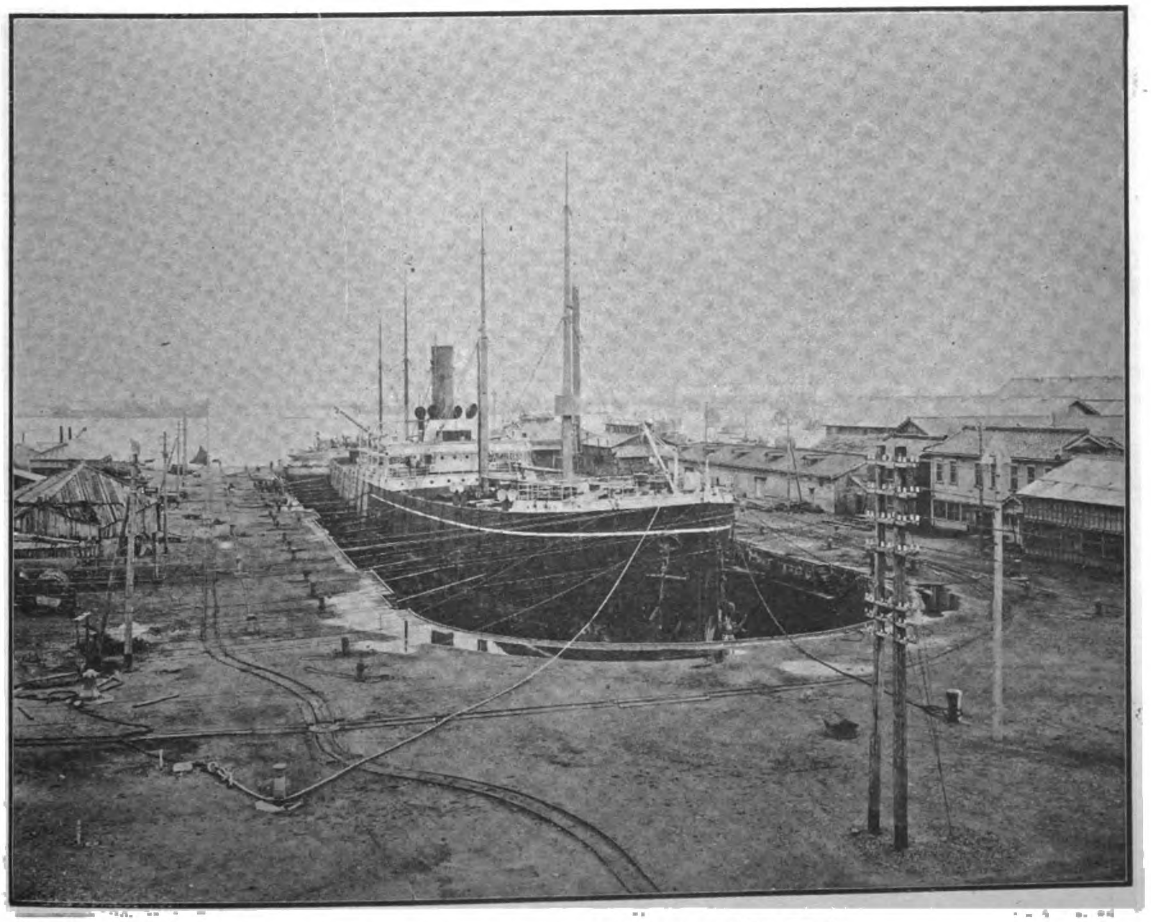
The company has a capital of Yen 1,800,000 of which Yen 1,200,000 is preferred and Yen 600,000 common stock.

THE TOKYO ISHIKAWAJIMA SHIPBUILDING YARD, LTD.

Main Office: Tsukuda, Tokyo. Officers and Directors: Managing Director, S. Umeura; Directors, T. Shimidzu, K. Sato, S. Tanaka. Auditors, E. Tanaka; M. Sato; S. Tomioka; Manager and Chief Engineer, T. Uchida; capital, Yen 1,020,000.

Description of Docks.—Length on bottom, No. 1, 299′; length on bottom, No. 2, 270′; width at entrance, No. 1, 41′ 9″; width at entrance, No. 2, 32′ 9″; depth on sill, No. 1, 14′ 9″; docks can take vessels of about 1,000 tons gross.

Besides shipbuilding this concern has a large and increasing trade, outside of the regular marine line of work. It has never constructed any large vessels but has launched some 300 small craft mostly of wood. At present the works comprise 12 shops fitted with the most modern appliances, especially adapted for structural steel work. In this branch the Company has taken the lead, having erected most of the truss bridges in Tokio, and some of the larger railway bridges in other parts of the Empire. The largest steel building in Japan called the National Wrestling Hall, was designed, constructed and erected by this company. Electric generators, pumps, engines and other machinery is manufactured.

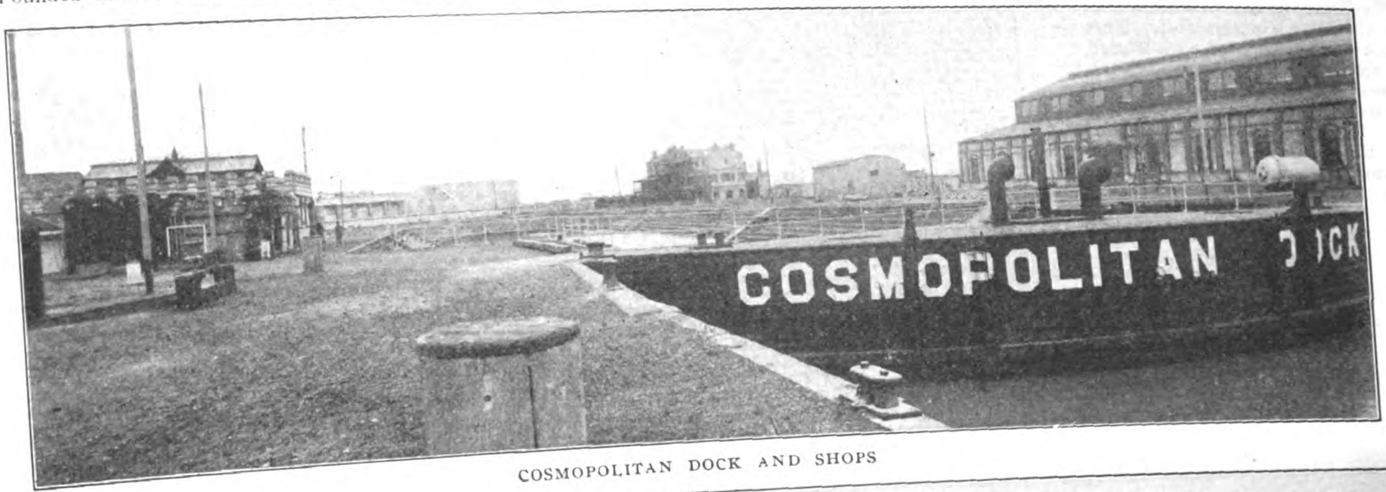


GENERAL VIEW OF THE HAKODATE DOCKYARD

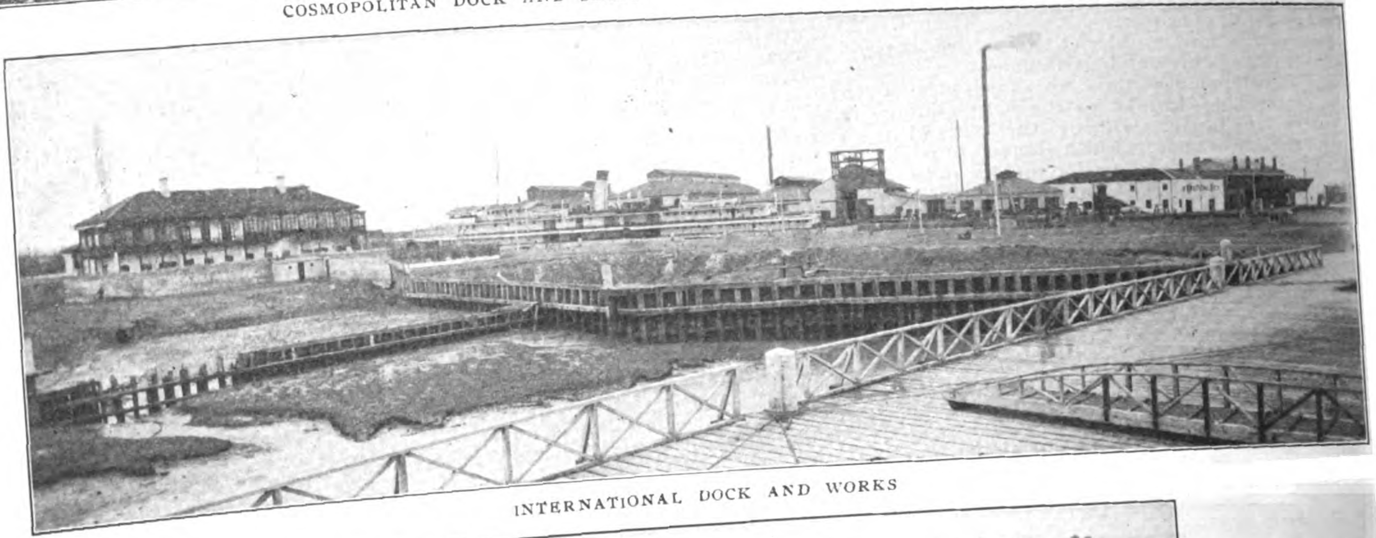
THE SHANGHAI DOCK & ENGINEERING CO., LTD.

The Shanghai Dock & Engineering Co., Ltd., is a combination of the two principal shipbuilding and engineering companies in Shanghai. Founded almost simultaneously, in the early days of foreigners in China, they amalgamated in 1900, and now form the largest shipbuilding concern on the China Coast, with a capital of over Five Million Taels (roughly £700,000). The Head Office is at the Old Dock, Broadway, Hongkew, opposite the Central or Pootung Works

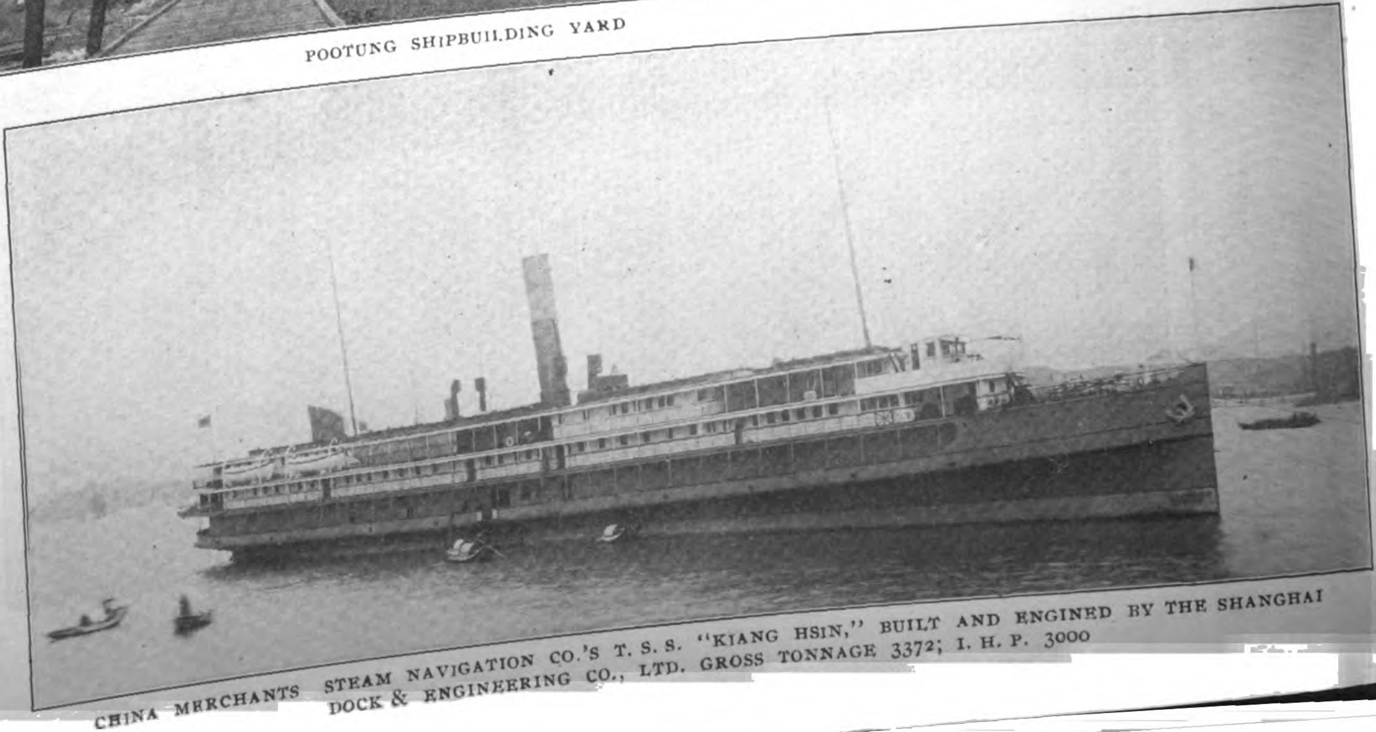
The area of the property is 96 English acres,

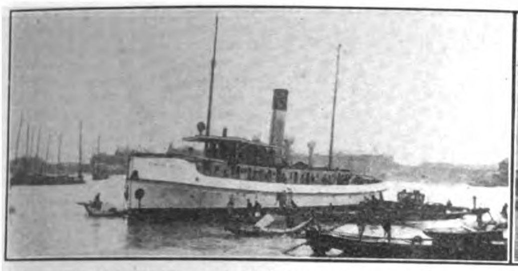


COSMOPOLITAN DOCK AND SHOPS

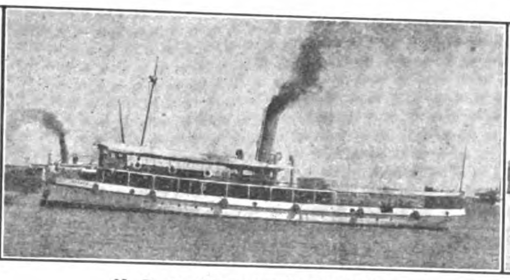

INTERNATIONAL DOCK AND WORKS

POOTUNG SHIPBUILDING YARD

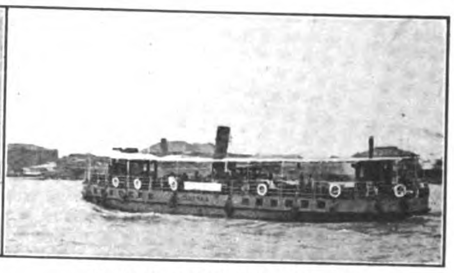

CHINA MERCHANTS STEAM NAVIGATION CO.'S T. S. S. "KIANG HSIN," BUILT AND ENGINED BY THE SHANGHAI DOCK & ENGINEERING CO., LTD. GROSS TONNAGE 3372; I. H. P. 3000



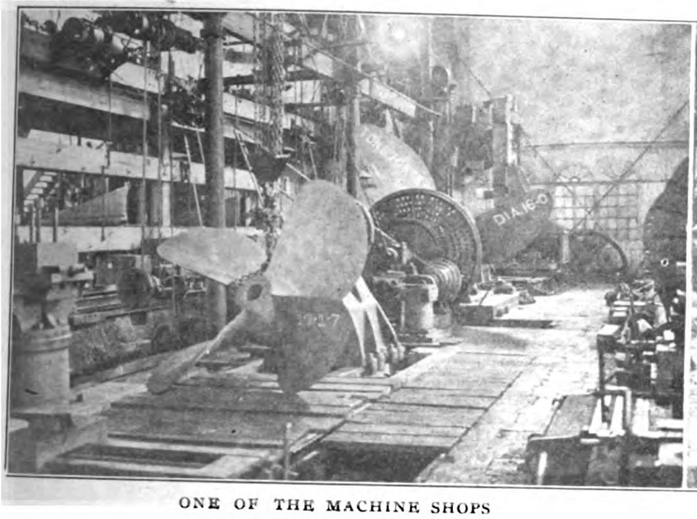
TUG "GENERAL WEEKS" FOR U. S. ARMY
TONNAGE 416; I. H. P. 1232



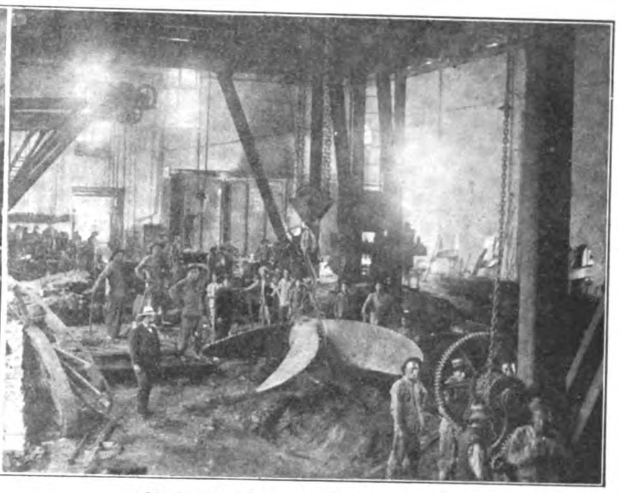
N. D. L. TENDER "BREMEN"
146′×25′×12′ M. L. D.



FERRY BOAT "CLUTHAX"
90′×18′×9′ M. L. D.

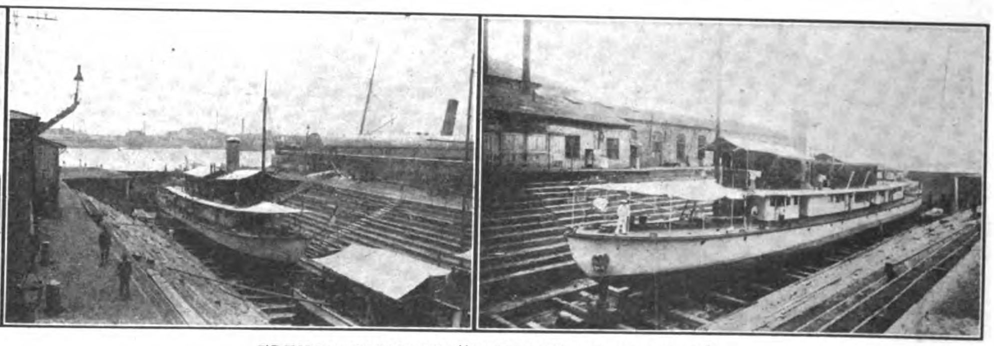


ONE OF THE MACHINE SHOPS



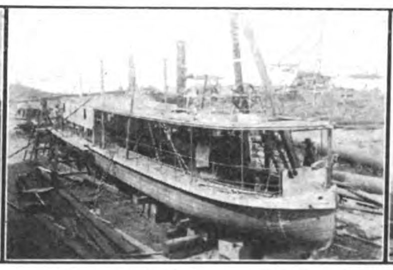
ONE OF THE MOULDING SHOPS

GERMAN GUNBOAT "OTTER"
IN INTERNATIONAL DOCK

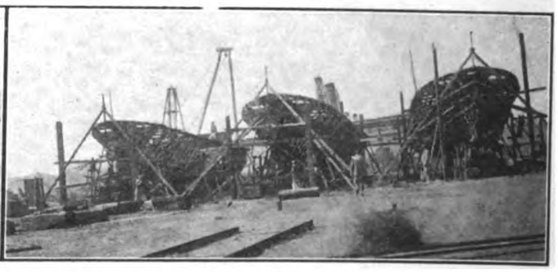


FRENCH GUNBOAT "DOUDART DE LAGREE"
IN OLD DOCK

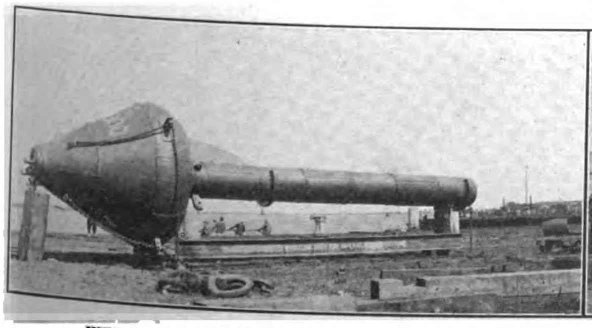
LAUNCHES UNDER CONSTRUCTION FOR MANILA



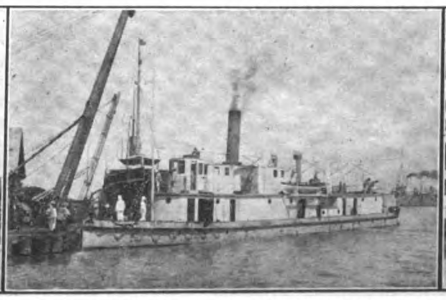
LIGHT DRAFT STEAMER "PATROL,"
BUILT AT POOTUNG



LAUNCHES FOR MANILA

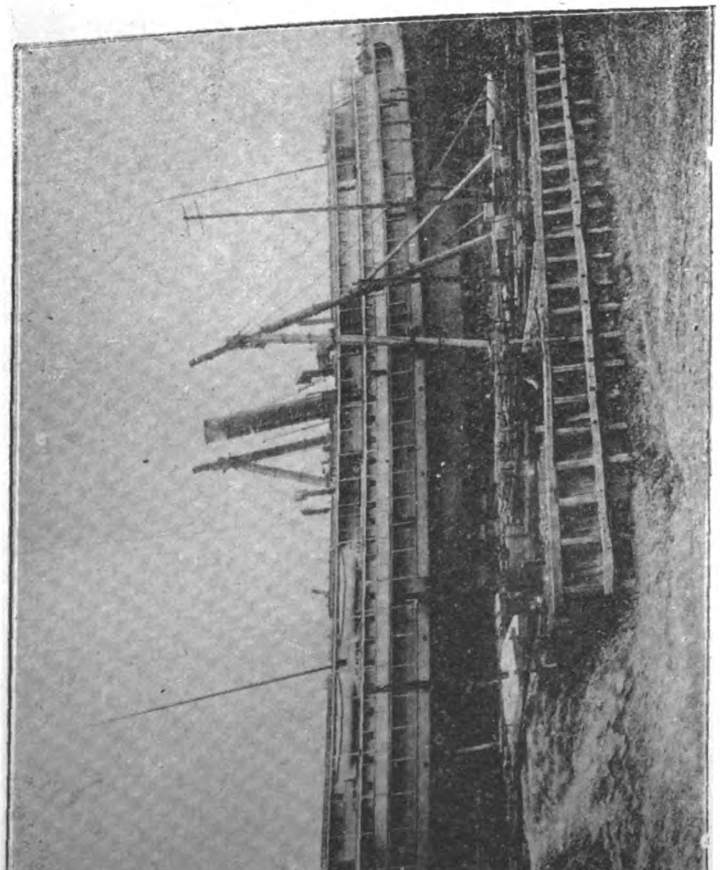


WHISTLING BUOY FOR THE IMPERIAL
MARITIME CUSTOMS

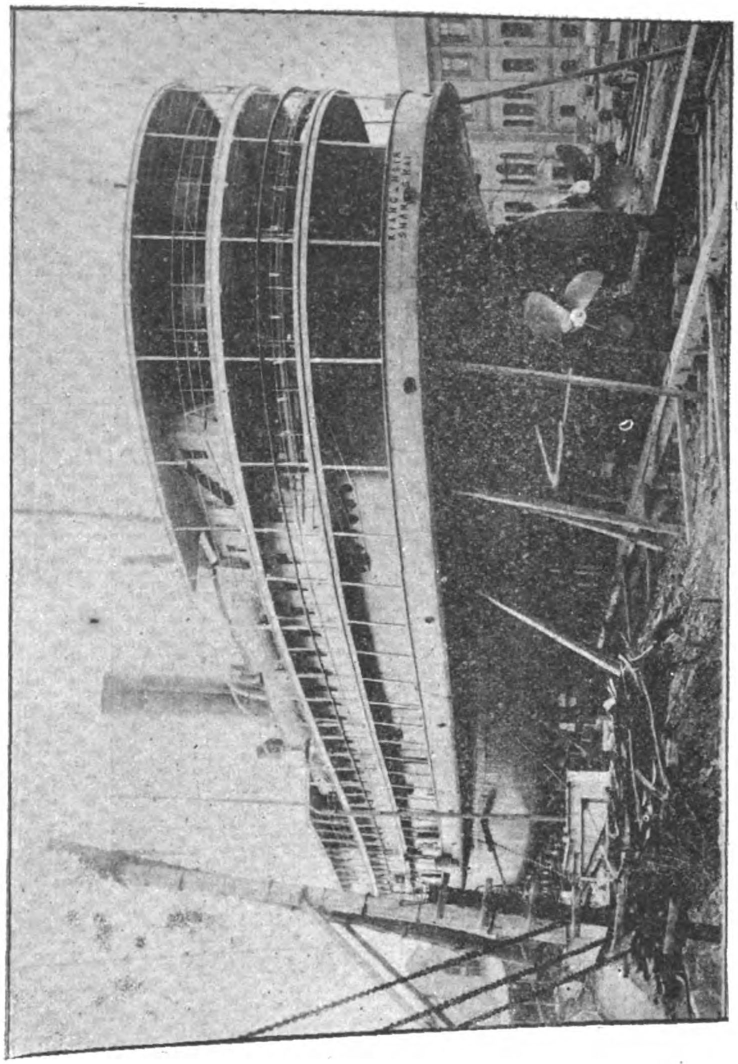


FRENCH RIVER GUNBOAT "OLRY"
115′×22′×6′ 6″ M. L. D.
BUILT BY THE S. D. & E. CO., LTD.

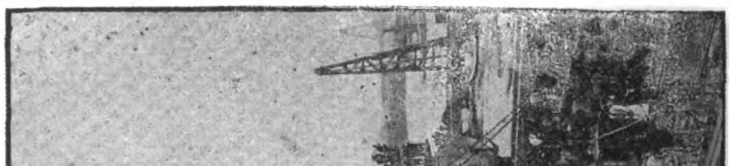
STERN OF S. S. "TOO NAN" REPAIRED
BY S. D. & E. CO., LTD.



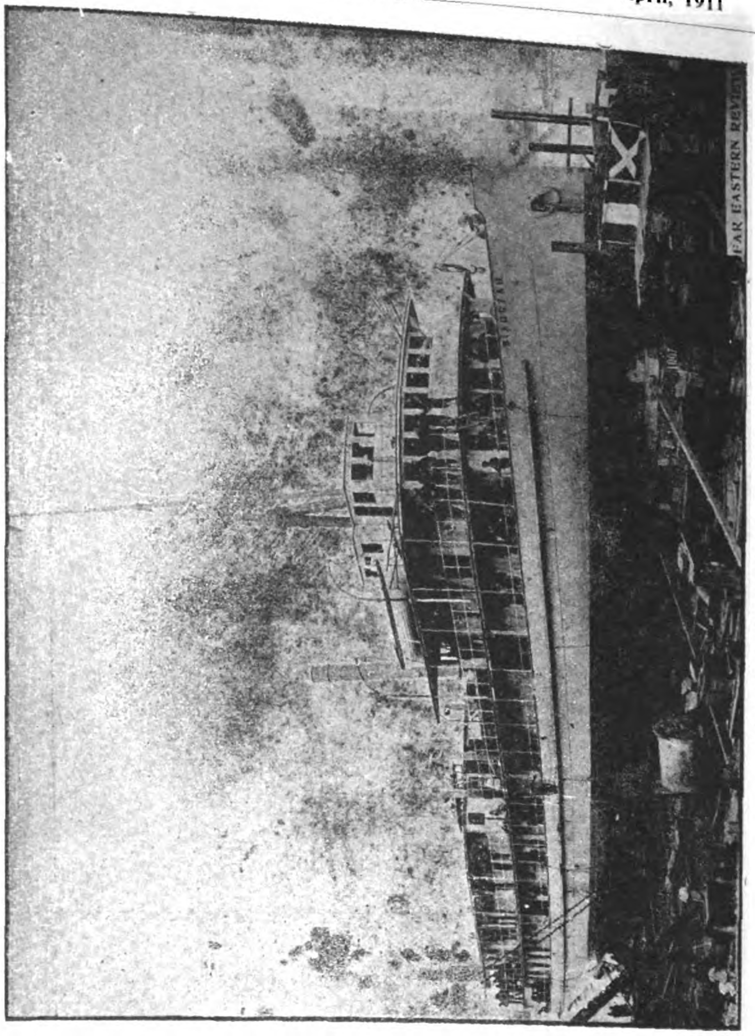
BEAM VIEW OF THE "KIANG HSIN" ON THE STOCKS



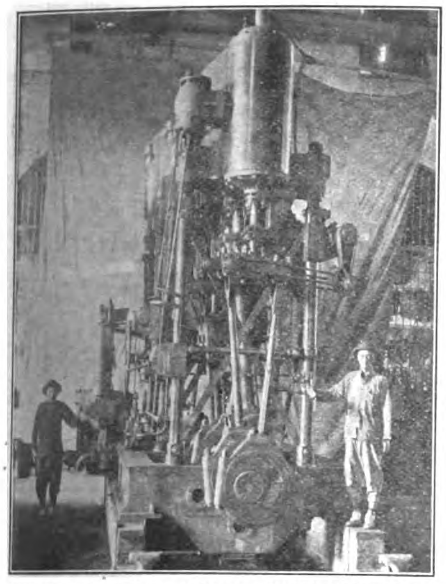
STERN VIEW OF "KIANG HSIN" SHOWING TWIN PROPELLERS



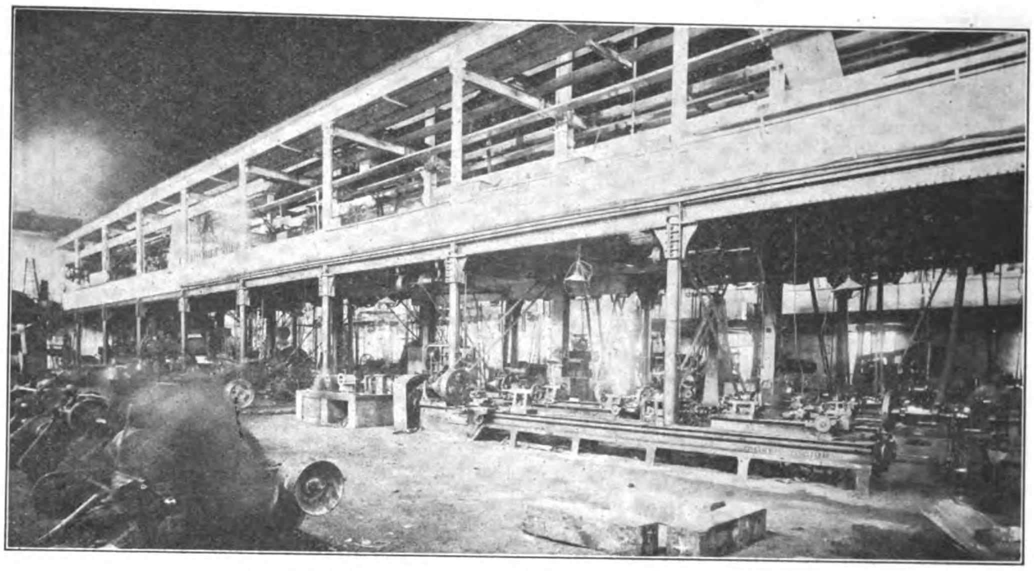
LAUNCHING OF THE STEAMER "SIANGTAN"



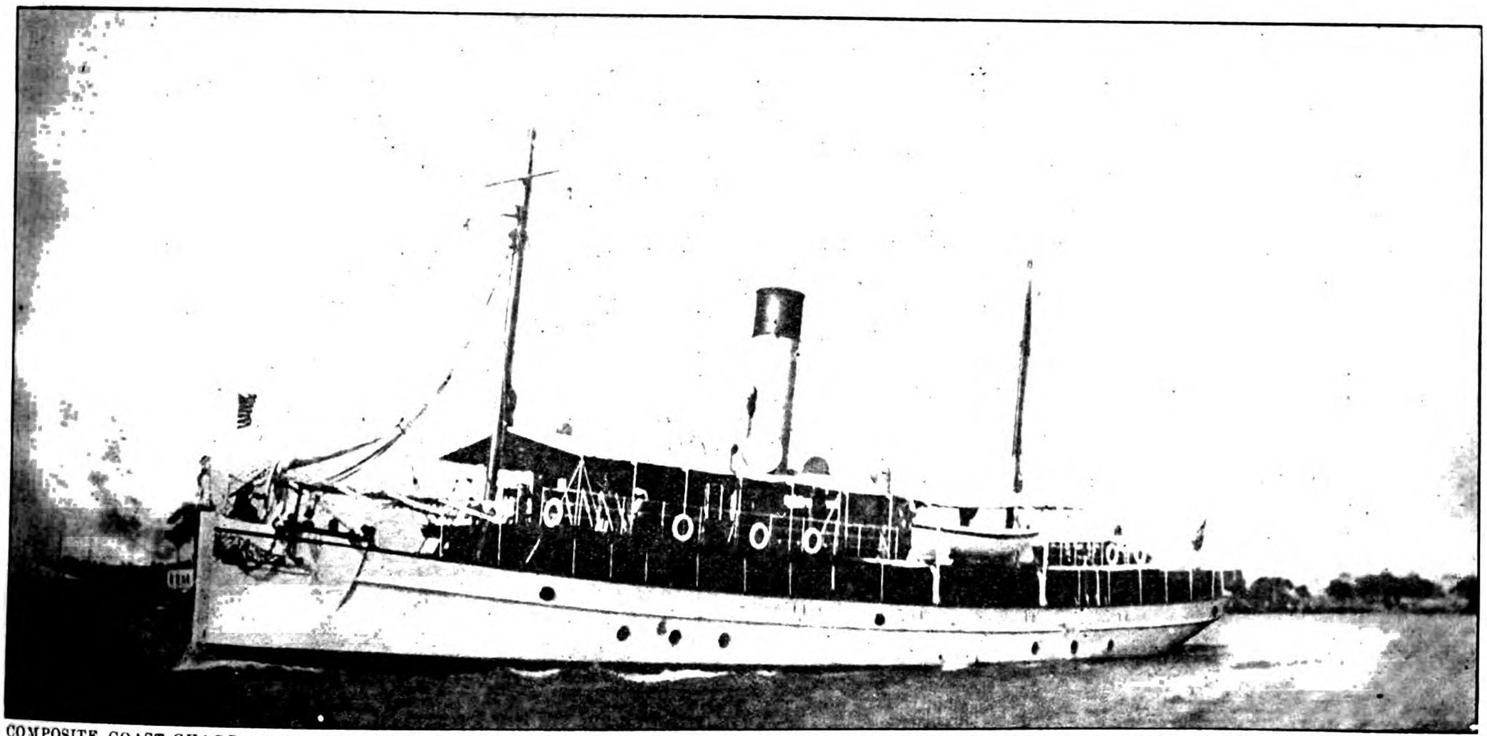
STEAMER "SIANGTAN" IN THE STOCKS



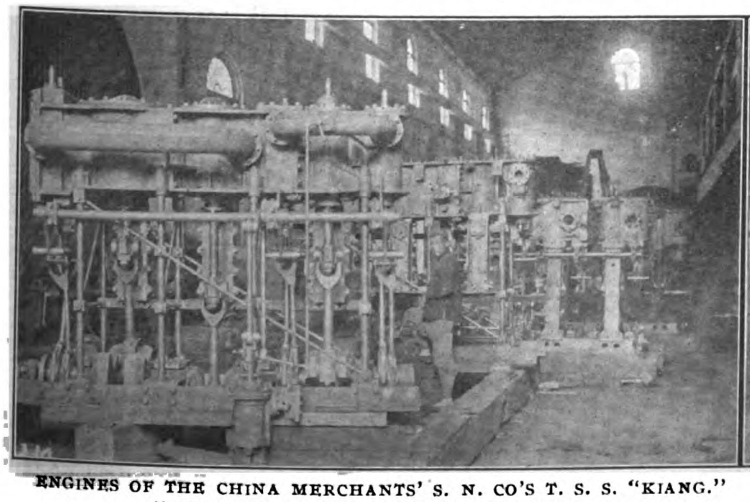
ENGINES FOR THE CHINA MERCHANTS' S. N. CO.'S T. S. S. "KIANG HSIN." TRIPLE EXPANSION, SURFACE CONDENSING ENGINES $\frac{19''-31\frac{1}{2}''-52''}{33''}$ W. P. 160 LBS TOTAL I. H. P. 3000



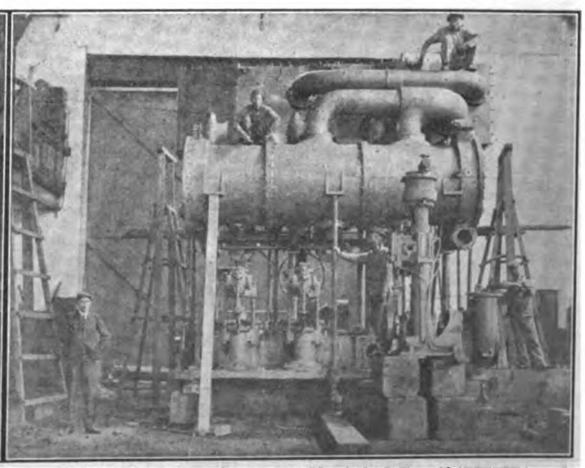
PART OF MACHINE SHOPS AT THE POOTUNG WORKS



COMPOSITE COAST GUARD AND REVENUE CRUISERS FOR THE GOVERNMENT OF THE PHILIPPINE ISLANDS BUILT AND ENGINED BY THE SHANGHAI DOCK AND ENGINEERING CO. LTD.; LENGTH OVERALL--148; LENGTH B. P.--140; BREADTH--25; DEPTH--11'9''; SIZE OF ENGINES: H. P. CYLINDER--18''; L. P. CYLINDER--36''; STROKE--24''; I. H. P. 600. S. S. BALALAC, BASILAN, BUSUANGA, CORREGIDOR, LEYTE, LUZON, MASBATE, MINDANAO, MINDORO, NEGROS, PALAWAN, PANAY, POLILLO, SAMAR, TABLAS.



ENGINES OF THE CHINA MERCHANTS' S. N. CO'S T. S. S. "KIANG." TRIPLE EXPANSION, SURFACE CONDENSING $\frac{9''-14''-23''}{15''}$ W. P. 175 LBS TOTAL I. H. P. 850



ENGINES OF THE S. S. "HSIN KONG." TRIPLE EXPANSION, SURFACE CONDENSING, $\frac{19\frac{1}{2}''-31\frac{3}{4}''-52''}{36''}$ W. P. 160 LBS TOTAL I. H. P. 1300

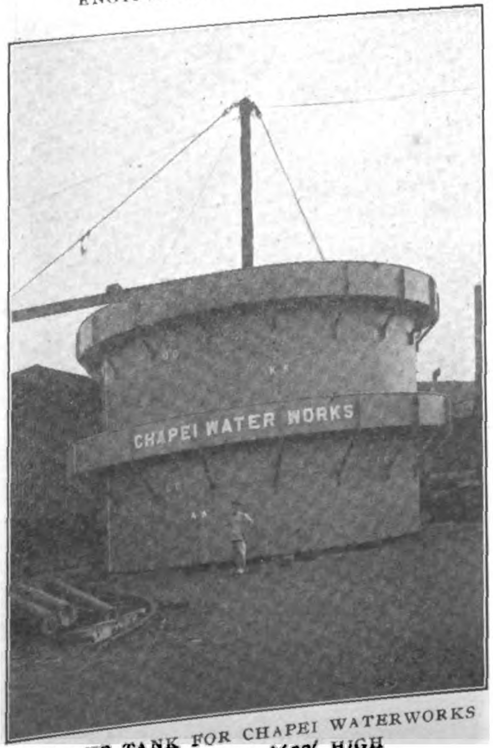
with a river frontage of about 1½ miles in length. Wharves and pontoons are so arranged that vessels can moor alongside during repairs or in the stream at head and stern moorings.

The Company owns the five dry docks here mentioned:

Names.	Length on Blocks	Breadth of Entrance	Depth on Sill at High Water
Cosmopolitan Dock	532 ft.	77 ft.	24 ft.
International Dock	528 ft.	77 ft.	23 ft.
New Dock	450 ft.	74 ft.	21 ft.
Old Dock	399 ft.	53 ft.	16 ft.
Tunkadoo Dock	355 ft.	67 ft.	16 ft.

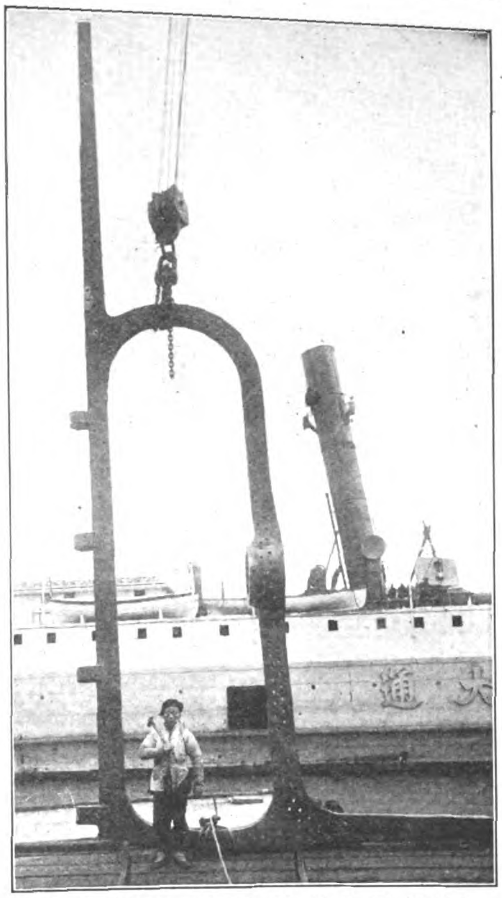
Two of these docks, which are placed at convenient angles to the river, are among the largest in the East, and capable of docking vessels up to 530 ft. in length; the conjoined water frontage is 4,465 feet, with deep water

ENGINES OF S. S. "WAN CHUN"

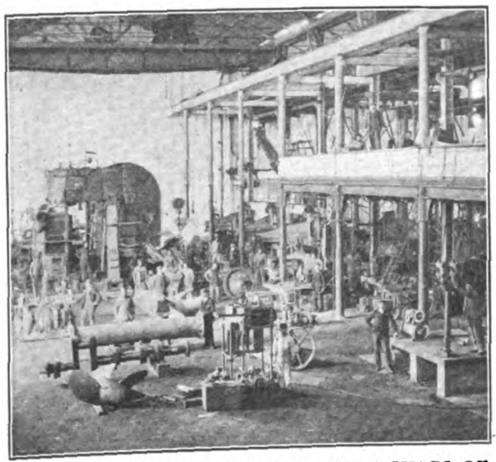


SETTLING TANK FOR CHAPEI WATERWORKS 30' DIAMETER × 22' HIGH

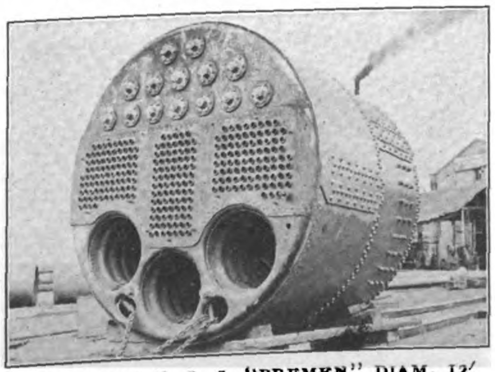
the whole length. Large buildings afford ample room for housing crews, and storing material. Shear Legs capable of lifting up to 65 tons



STERN FRAME FOR C M. S. N. CO.'S S. S. "TOO NAN"



CORNER OF ONE OF THE MACHINE SHOPS OF THE SHANGHAI DOCK & ENG. CO., LTD.

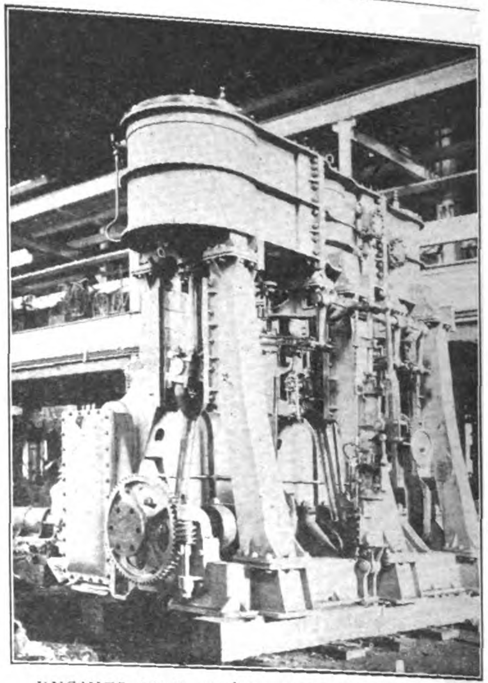


BOILER FOR T. S. S. "BREMEN" DIAM. 12' 3" × LENGTH 11' W. P. 190 LBS.

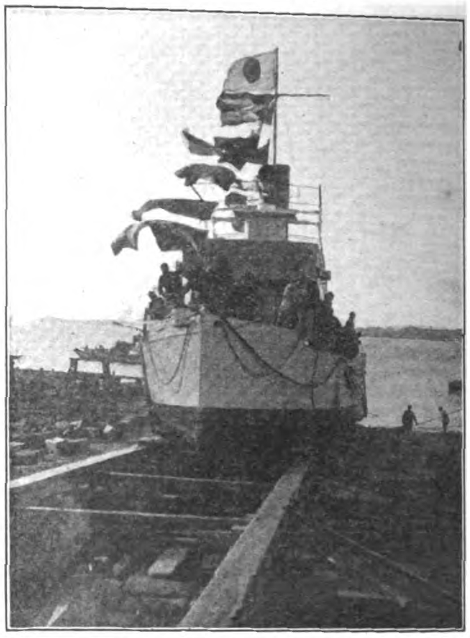
are placed at the various Docks and are available on short notice.

The shipbuilding yards face the river, and berths for building steamers of all sizes are laid out, together with slips for hauling up smaller craft.

There are extensive workshops, with all the latest improved tools, hydraulic and pneumatic machinery, and travelling cranes of 60 tons' capacity.



ENGINES OF S S. "WAN CHUN," TRIPLE EXPANSION SURFACE CONDENSING $\frac{16''-26''-43''}{30''}$ W P. 180 LBS. TOTAL I. H. P., 900



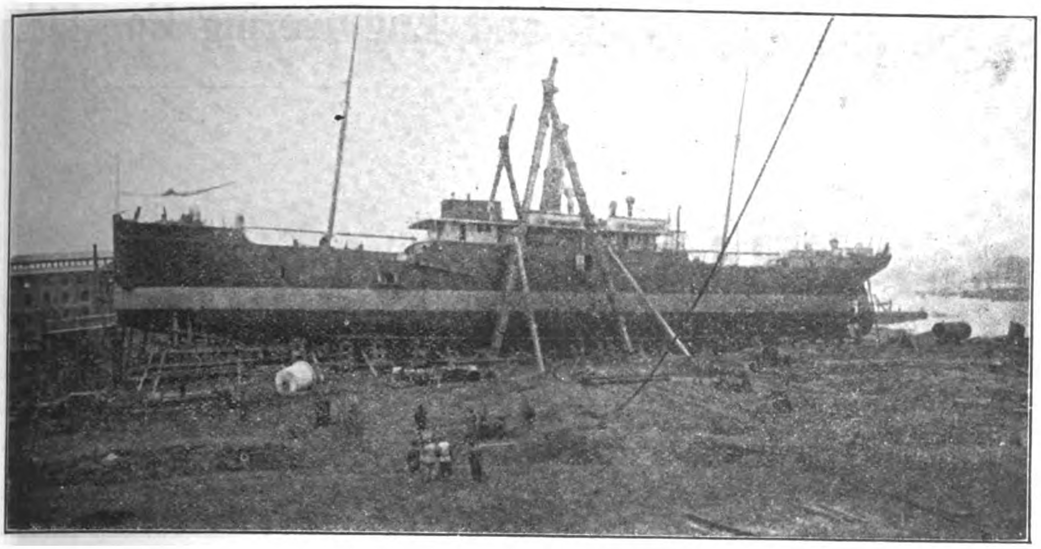
H. I. J. M. "SUMIDA" BEFORE LAUNCHING

Powerful salvage appliances are always ready for any emergency.

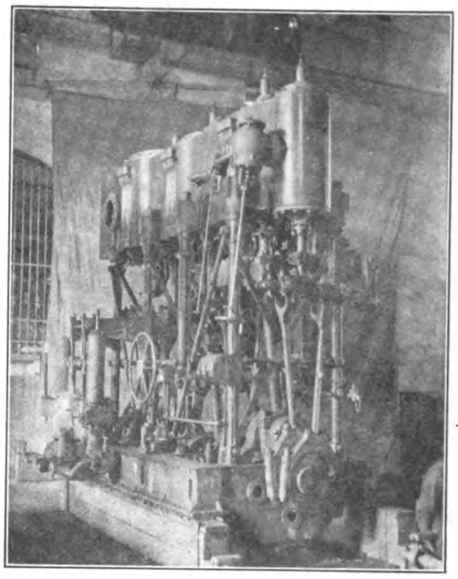
The docks and shops are lighted by electricity to facilitate night work and steamers under repair can have electric light supplied. Light railways for the quick handling of machinery run through the workshops and yards.

A large and experienced European staff of draughtsmen, shipbuilders, engineers, boilermakers, etc., provide adequately for the efficient carrying out of all work entrusted to the Company, and when required, afford every assistance to prospective clients, in designing or selecting the particular article most adapted to their requirements.

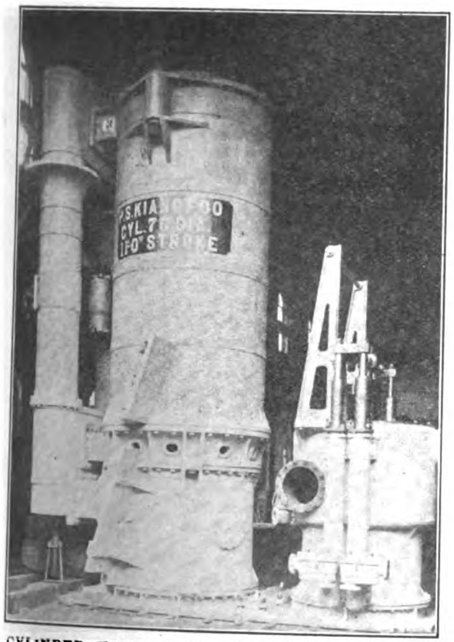
The central works on the Pootung side of the Whangpoo River cover an area of 16 acres, having about 700 feet of water frontage, and the usual workshops of an up to date concern. A marine railway for hauling small craft up to 300 tons deadweight and a railway for conveying heavy weights from wharf to shops or elsewhere about the yard, together with shear legs of 35 tons capacity are also available



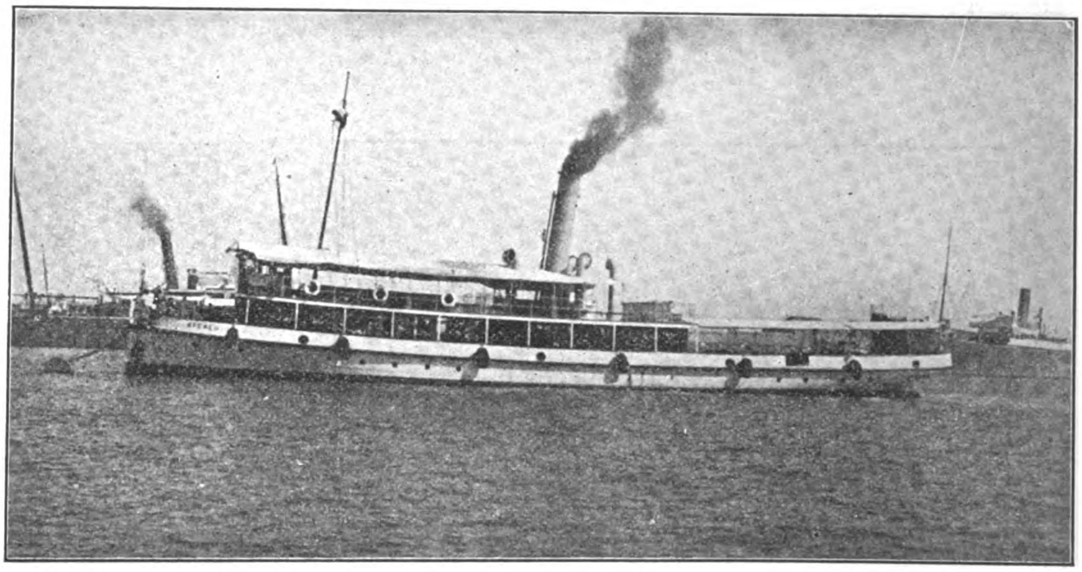
CHINA MERCHANTS' S. N. CO.'S STEEL SCREW STEAMER "HSINKONG"



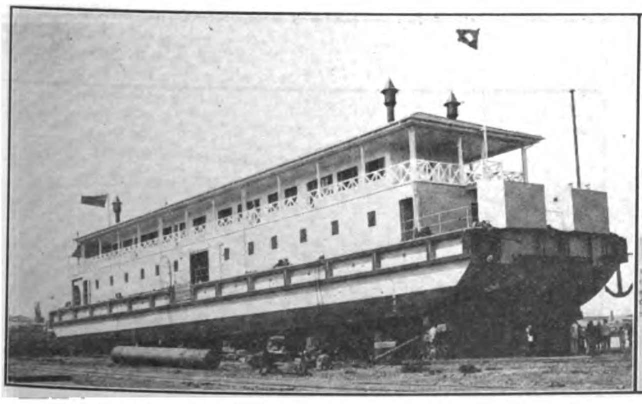
ENGINES OF S. S. "KIANG HSIN" I. H. P. 3000



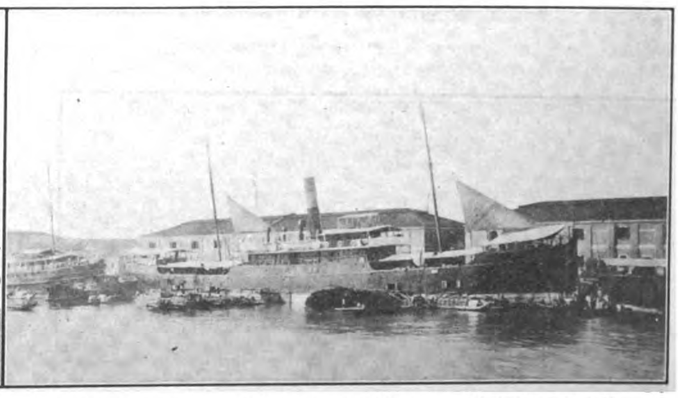
CYLINDER FOR S. S. "KIANG FOO." HEAVIEST CASTING MADE IN SHANGHAI, WEIGHING 13 TONS 15 CWTS.



NORDDEUTSCHER LLOYD TENDER "BREMEN" BUILT BY THE SHANGHAI DOCK AND ENGINEERING COMPANY



STEEL STORAGE VESSEL "NANKING" 165'×35'×11' M. L. D.



CHINA MERCHANTS' S. N. CO.'S. S. S. "HSIN KONG" 270'×40'×21'6"—GROSS TONNAGE 2146; I. H. P. 1281

The godowns contain stores for building and fully equipping vessels of every class and size, and expeditiously completing repairs of every description, and are all conveniently adjacent. Offices, docks and workshops are in direct telephonic communication with each other.

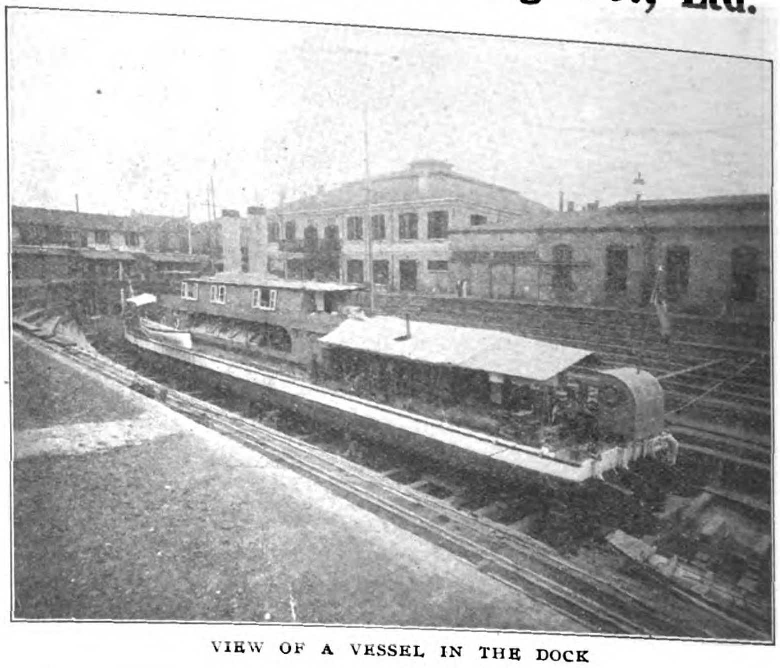
The electrical department undertakes the installing and wiring of light and power plants, building small dynamos, rewiring old ones, and electrical repairs generally.

The Company does not confine its operations to marine engineering, but is also largely employed in structural steel and bridge work, hydraulic machinery and pumping plants, electric lighting and steam and hot water heating installations.

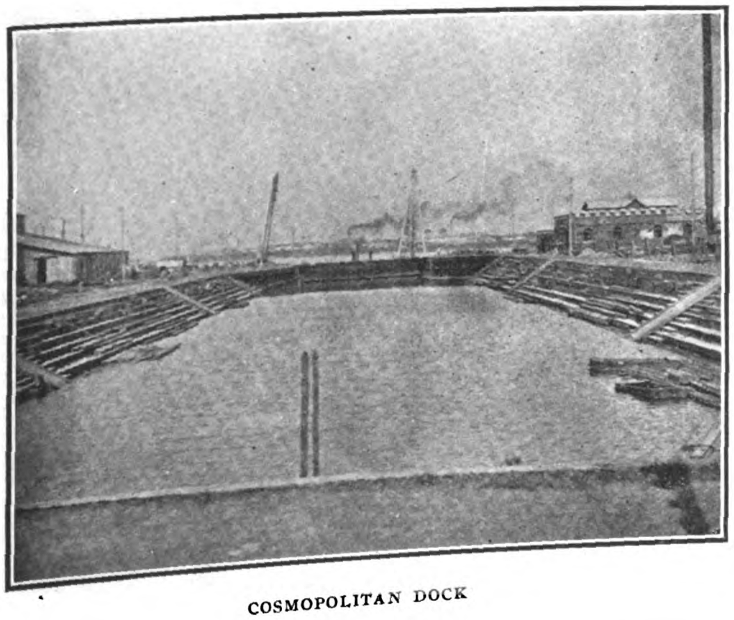
Every department is under skilled European superintendence, a steam ferry running at regular intervals maintains communication between the various docks and works, and a fleet of launches enable foremen to continually visit and supervise the work proceeding afloat

Views of the Works of the Shanghai Dock and Engineering Co., Ltd.

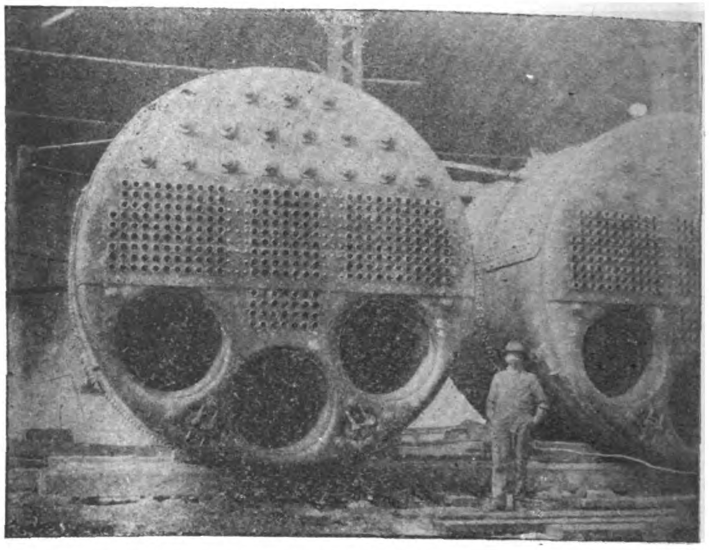
TUNKADOO DOCK: STERN WHEEL STEAMER "CHANG WO" UNDER REPAIRS



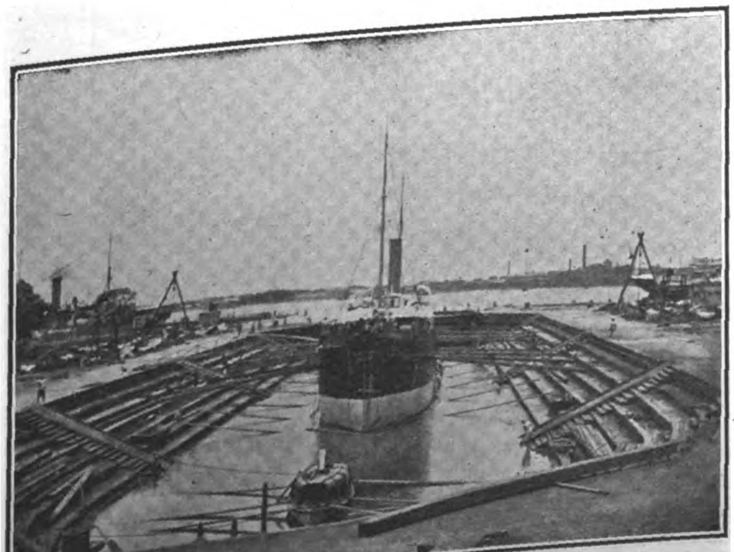
VIEW OF A VESSEL IN THE DOCK



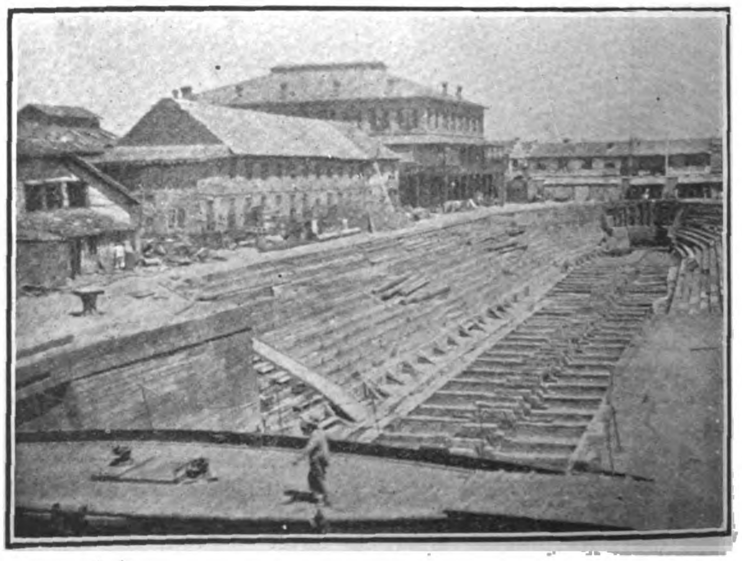
COSMOPOLITAN DOCK



"KIANG HSIN'S RETURN-TUBE BOILERS



NEW DOCK



OLD DOCK

VULCAN IRON WORKS, LTD., SHANGHAI

The engineering and shipbuilding business carried on by the Vulcan Ironworks, Ltd., was founded in 1905. The yard and works are conveniently situated at Yangtszepoo, on the north bank of the Whangpoo, and can be approached by river and road. The property embraces an area of rather more than 37 mow of land—a little over six acres—and has a river frontage of 360 feet. About half this area is covered by offices, workshops, and storage godowns. Few concerns of the kind in the Settlement have a heavier or more up-to-date plant, the latest labor-saving devices having been installed. The whole of the plant is motor-driven, power being generated by duplicate sets of 75-kilowatt dynamos, each giving 340 amperes at a pressure of 220 volts. These sets are run on alternate days. The dynamos are direct-driven by engines running at 550 revolutions per minute.

The scope of the works may best be illustrated by a detail sketch of the various departments. The general and drawing offices are spacious, well-lighted apartments, surrounded by wide verandahs. The building is two storeyed, and measures 100 feet long by 62 feet wide.

In the pattern-makers' shop, which is 80 feet long by 50 feet wide, are band and circular saws, planing machines, and lathes, grouped on a 25 horse-power motor, together with a modern mitreing machine.

The foundry is 204 feet long by 63 feet wide. A travelling crane of 15 tons' capacity has been erected. Castings up to ten tons can be made, the cupolas employed being of the Thwaites rapid pattern—one of 5 and the other of 2 tons' capacity—with blast from a Root's blower.

The machine shop, which is 175 feet long by 60 feet wide, contains a large chuck-lathe of 15 feet diameter; lateral lathes so arranged that, by combining two of them, a piece of work 30 feet in length can be taken; shaping, planing, drilling, slotting, shearing, and screw-cutting machines; a band saw for iron, and other machines, some of which are grouped, while others are geared independently to motors Overhead runs a travelling crane of 5 tons' capacity by Craven Brothers.

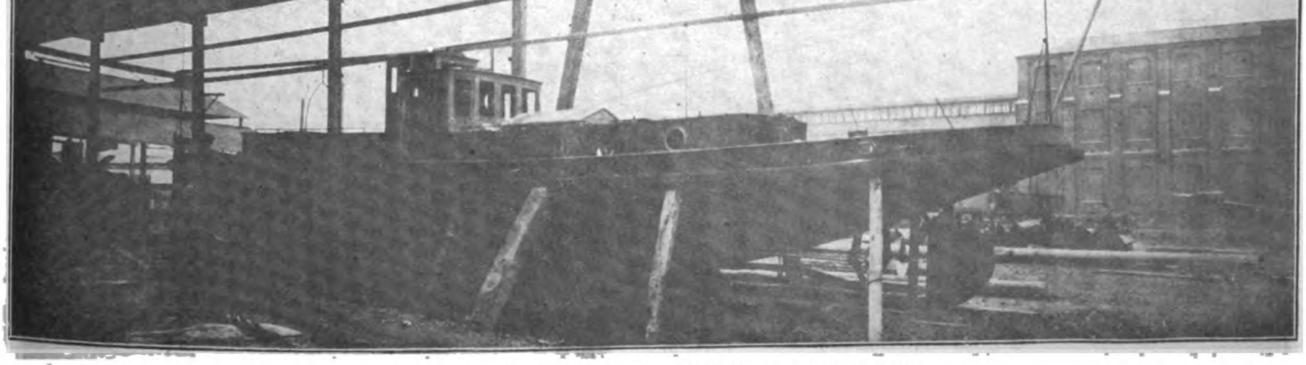
The blacksmiths' shop, 100 feet long by 52 feet wide, contains fourteen fires supplied with blast by independent Root's blowers, and is fitted with two steam hammers by Massey, one being of 30 cwt. and the other of 10 cwt. In the coppersmiths' shop, which is 45 feet long by 52 feet wide, a complete plant has been installed, consisting of two drilling machines, a hydraulic pipe bender, rolls, punching and shearing machines, etc.

The largest machinery in the works is that located in the boiler shop. This building is 175 feet long by 85 feet wide. In it there are four punching and shearing machines, two large drills, two counter-sinking machines, one plate-edge planing machine, a set of heavy rolls for bending plates, and a machine known as a "mangle" for straightening plates. There is also a hydraulic plant, the accumulator being charged by means of a motor-driven three-throw pump. The power is applied to a large, fixed riveter, with 9 feet gap (on Tweddle's system, by the well-known firm of Fielding & Platt, of Gloucester), two portable riveters, for dock, bridge, and guider work; a hydraulic flanging machine, with arrangements for flanging Lancashire boiler flues; and two 4-ton hydraulic cranes, built by the Vulcan Ironworks.

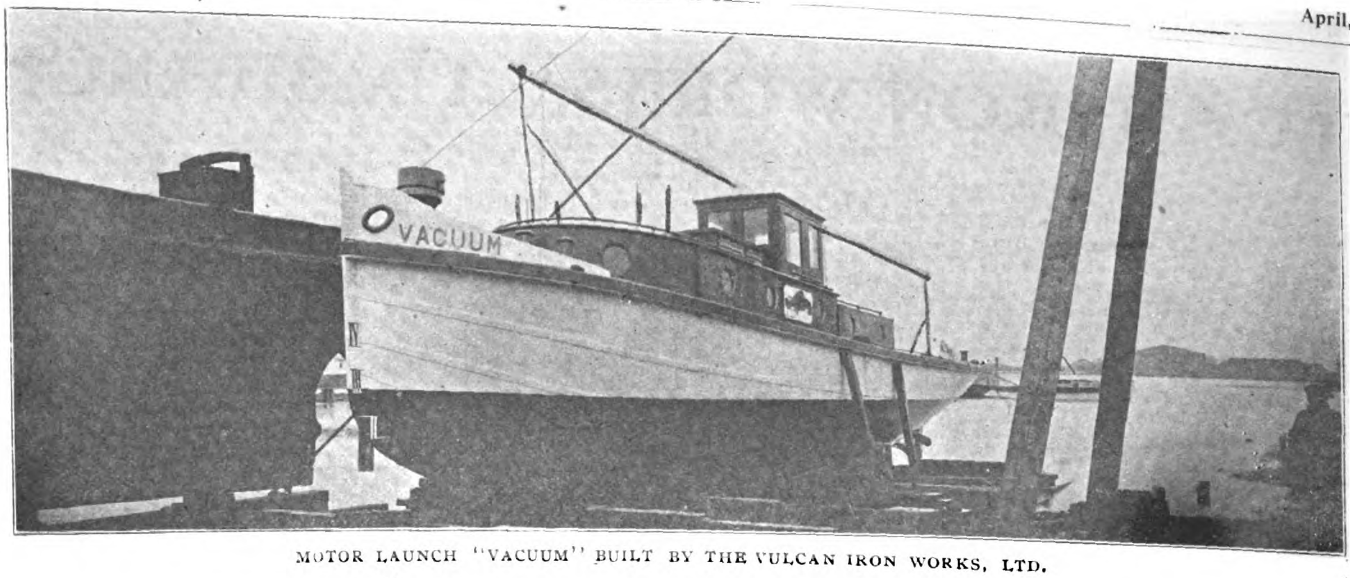
Besides these shops there is a moulding loft, 140 feet long by 50 feet wide, and a carpenters' shop immediately beneath, with motor-driven machinery of all descriptions, whilst to facilitate repairs to small vessels of about 100 feet in length a patent slip has been laid down, equipped with motor-driven hauling gear manufactured by the firm.

The Vulcan Ironworks have constructed a creditable number of vessels of all descriptions, including steel and wooden lighters, pontoons, and pontoon-hulks, tugs, passenger tenders, steam and motor launches, etc., ranging in length from 20 feet to 250 feet. In addition to these, all kinds of fitting-out and repair work have been executed to ocean-going vessels calling at the port, and installations, overhauling, and general repairs have been carried out in the many factories and mills in and around this busy and industrious centre by skilled native labor under competent European supervision. Railway cars and coaches have been erected for various Chinese roads.

MOTOR LAUNCH "SUMATRA" BUILT BY THE VULCAN IRON WORKS LD. OF SHANGHAI FOR THE ASIATIC PETROLEUM CO. LD.—DIMENSIONS, LENGTH 66'-0" OVERALL, BREADTH 11'-0", DEPTH 5'-3", DRAUGHT 4'-3".



LAUNCH BUILDING SHED AT VULCAN IRON WORKS

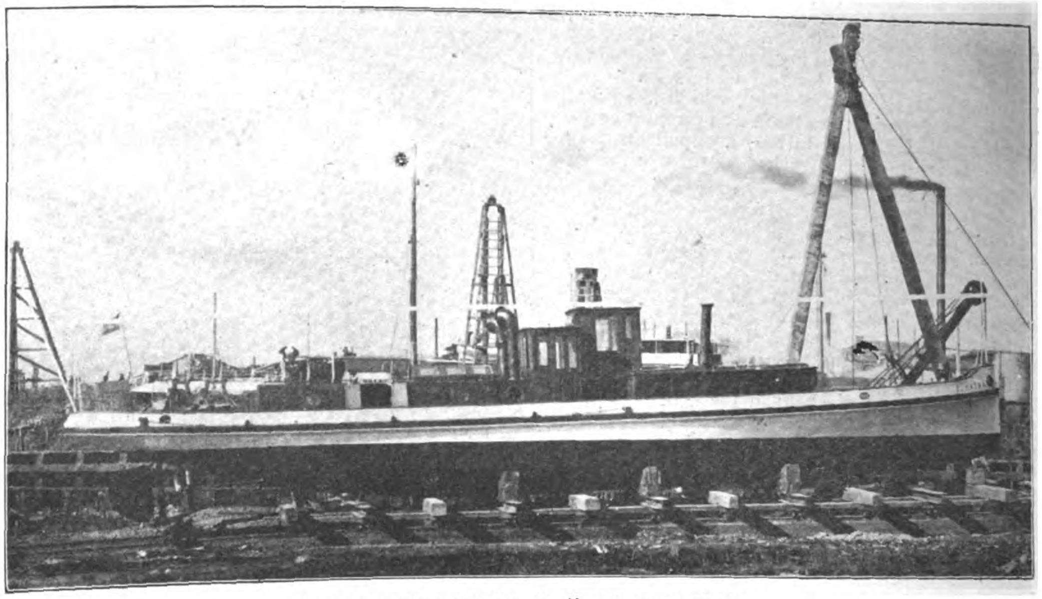


MOTOR LAUNCH "VACUUM" BUILT BY THE VULCAN IRON WORKS, LTD.

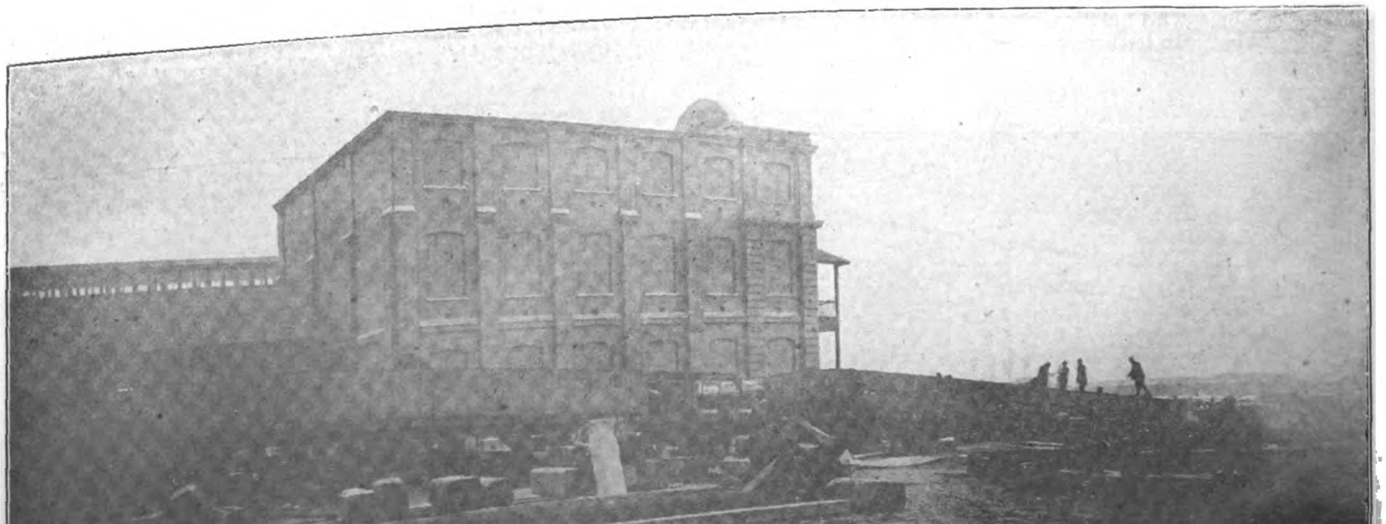
THE YANGTSZE ENGINEERING WORKS, LTD., HANKOW

The Yangtsze Engineering Works, Ltd., a company capitalized and managed by Chinese, was established in 1907 with its Head Office in the German Concession, Hankow. The works, situated at the Seven Mile Creek, command a prominent position on the lower reach of the Yangtsze River. They cover an area of about 30 acres of ground, and a further extension at the back of the present works, where another larger piece of land fronting the creek has been acquired and reserved for the purpose, is contemplated.

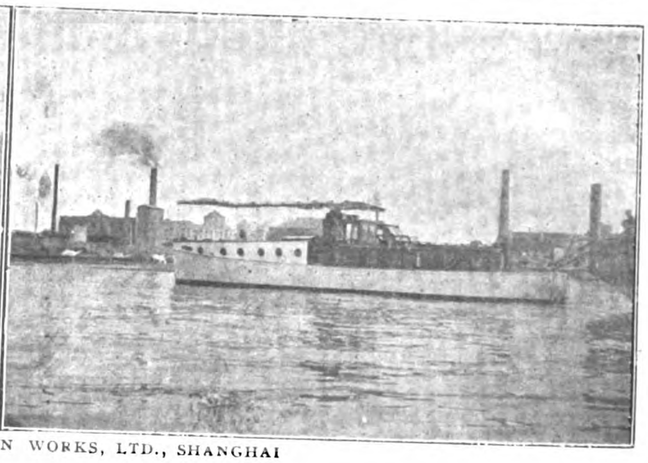
The main feature of the works is the bridge-building shop, which is well equipped with the most modern machinery for this class of work. Among the machine tools installed in this workshop may be noted a Patent Powerful Four roller and Mangles, Long Plate Edge Planers, Radial Drills, Girder Ending Machine, besides a full equipment of Punches, Shears, Cold Saws, Bending Presses, Riveters, Blowers, Furnaces and complete Hydraulic and Pneumatic Plants, while the handling of material is done by a powerful Electric Overhead Travelling Crane and Jib Cranes. The iron building is spacious, and is well arranged in the matter of light and ventilation.



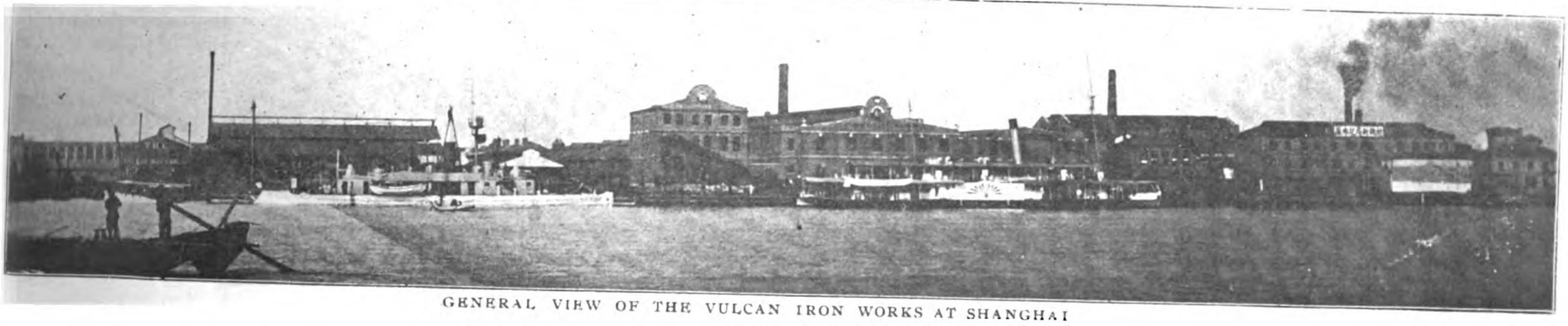
THE LAUNCH "SUMATRA" ON THE WAYS



STEEL PONTOONS EIGHT DAYS AFTER CONTRACT AT THE VULCAN IRON WORKS LTD.



MOTOR LAUNCHES BUILT BY THE VULCAN IRON WORKS, LTD., SHANGHAI



GENERAL VIEW OF THE VULCAN IRON WORKS AT SHANGHAI

The office, the store, the fitting and machine shops, the point and crossings shop, the smithy and the foundry are, for convenience, arranged in a row, practically under one extensive roof, and are equipped with lathes, drilling, screwing machines, rail planers and sharpeners—the last specially adapted for dealing with points and crossings, of the latest patterns and imported from well-known English makers. The buildings of these shops were constructed of iron materials supplied by the Hanyang Iron and Steel Works.

All the machine tools are driven by electricity, the generating plant and motors having been supplied by the Lancashire Dynamo and Motor Co., while the gas suction plant was made by Crossley Bros. of Manchester. The power plant also supplies electric lighting throughout the works.

A loft with joiner's shop attached is erected at a little distance from the machine shops, in which patterns and templates are made.

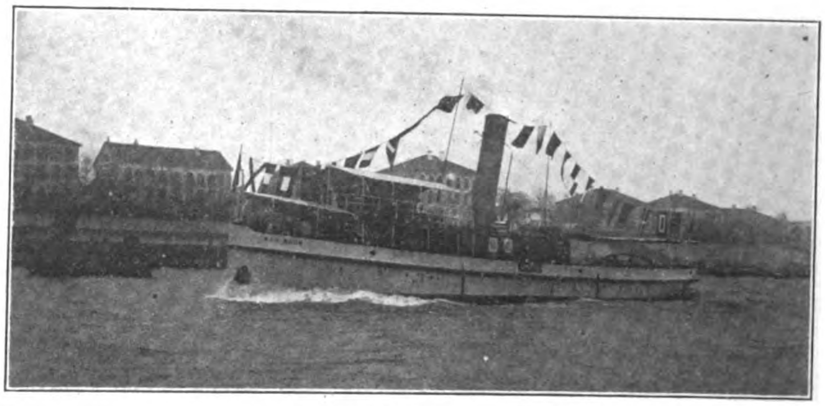
The special lines, besides shipbuilding and general engineering work, in which the Yangtsze Engineering Works possess exceptionally good facilities for handling, are bridge-building and making points and crossings.

The management aims at making the works thoroughly efficient and up-to-date in every respect, and is confident that they will occupy a place in the front rank of engineering concerns in China.

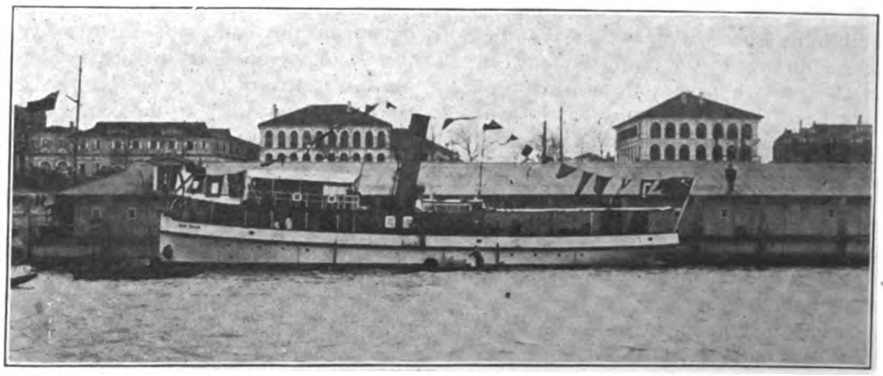
The Directors are Mr. V. K. Lee, General Manager of the Hanyang Iron and Steel Works, Mr. Lo Hung-chang, Manager of the Board of Communications Bank, and Mr. Sung Wei-chen, Manager of the Hankow Waterworks and Electric Light Co. The General Manager is Mr. Wong Kwong, M.I.N.A., M.I.S. Inst., and the staff, which is quite a large one, is composed wholly of Chinese with the exception of Mr. G. W. Cockburn, who is in charge of the Bridge Department. The latter gentleman is an English bridge engineer and designer of good experience and standing, having been or a number of years with Messrs. Head, Wrightson and Co., Ltd., the Cleveland Bridge Co. and other well-known bridge building firms.

Mr. Wong Kwong, the General Manager, is the only Chinese gentleman, who has been awarded the degree of M.I.N.A., M.I.S. Inst.

During 1909 they turned out one large steel tug and a good number of lighters, points, and crossings; they also executed a large amount of steel structural work and extensive repairs to steamers, tugs, and launches. The orders booked have necessitated the installation of an additional plant and the extension of the works in every way.



THE HAN SHUN UNDER WAY



VIEWS OF THE STEAM TUG HAN SHUN BUILT BY THE YANGTZE ENGINEERING WORKS FOR THE HANYANG IRON & STEEL WORKS

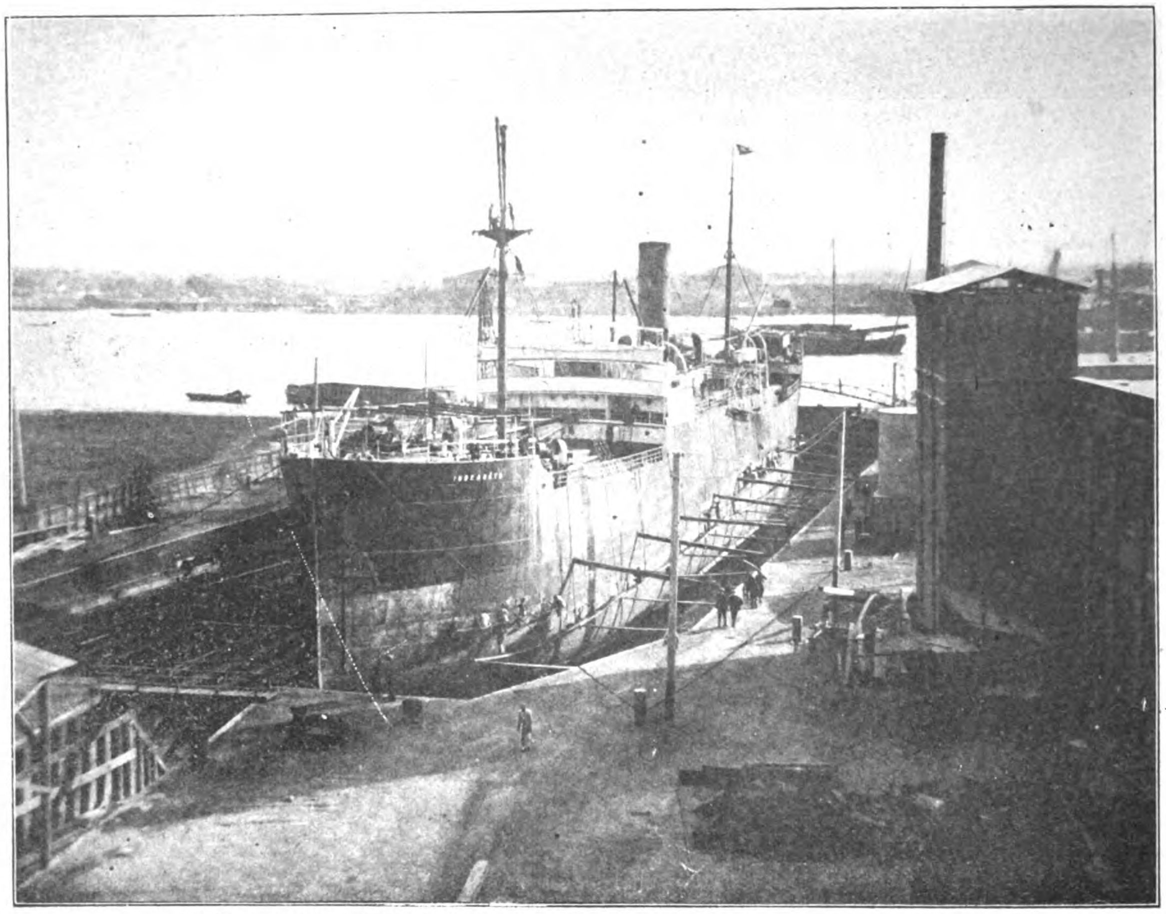
The Steam Tug "Han Shun" is a steel vessel, 120′ 0″ long by 21′ 0″ beam by 12′ 0″ deep, propelled by one set of Compound Surface Condensing Engines with an indicated Horse Power of about 500. Her boiler is of the Cylindrical Multitubular type constructed to Board of Trade Rules for a working pressure of 120 lbs. per square inch. The Han Shun is specially designed and strongly built for towing purposes, her speed when light being 11 knots and with a tow of 1,000 tons, 7 miles per hour. The vessel has been running satisfactorily since the 15th March, 1910, when she was handed over by the builders, The Yangtse Engineering Works, Hankow, to the owners, The Hanyang Iron & Steel Works, Hanyang. The designer is the General Manager of the Yangtse Engineering Works, Mr. Wong Kwong, M. I. N. A., M. I Mech. E., etc.

NEW ENGINEERING & SHIPBUILDING WORKS, LTD., SHANGHAI

This enterprise has forged to the front as one of the leading shipbuilding and dockyard establishments of the Orient. Founded in 1900 as a limited liability company under the Hongkong Ordinances, the shares were taken up privately and are still so held. Messrs. Arnhold, Karberg & Co. are the general managers of the company and so successful have been its operations that the extensive additions to the original plant, including the great expense of constructing a drydock, have been paid for out of the earnings. These works situated on Yangtzepoo Road, with a deep sea frontage on the Whangpoo River, are equipped with hydraulic riveting machinery, pneumatic tools and electric drills for the quick execution of repair work, and an up-to-date plant in each of the various shops.

Since commencing operations the company has built over 150 vessels in steel and teakwood, ranging from five to 500 tons each. Forty of these were steam vessels with an aggregate of 4,000 horse-power. The firm makes a specialty of light draught vessels, tug-boats, and lighters, and has been very successful with light draught tow-boats of the hollow stern type, some of which are now in constant employment at Hankow and Chefoo. It has constructed a large number of pleasure craft, for which the demand in Shanghai is growing. In the engineering shops the firm has constructed machinery aggregating 1,200 indicated horse-power for saw-mills, cotton mills, cigarette factories, etc., and erected tanks at Chingkiang, Tongku, and Hangchow for the Shell Company, as well as six large oil tanks for the Standard Oil Company—three of them at Shanghai, measuring 80 feet each in diameter, and 25 feet in height, and three at Hankow measuring 70 feet each in diameter. The orders for the boilers of American type, for the Shanghai and Hankow installations, were also entrusted to the firm. At the close of the Russo-Japanese War, the Company adapted five large vessels for the transport of troops, Each was fitted with bunks, officers' quarters, hospital accommodation, cooking ovens, and bathing appliances for a large number of men, the average number carried by each steamer being 2,000. Altogether some 500 men are constantly employed in the works.

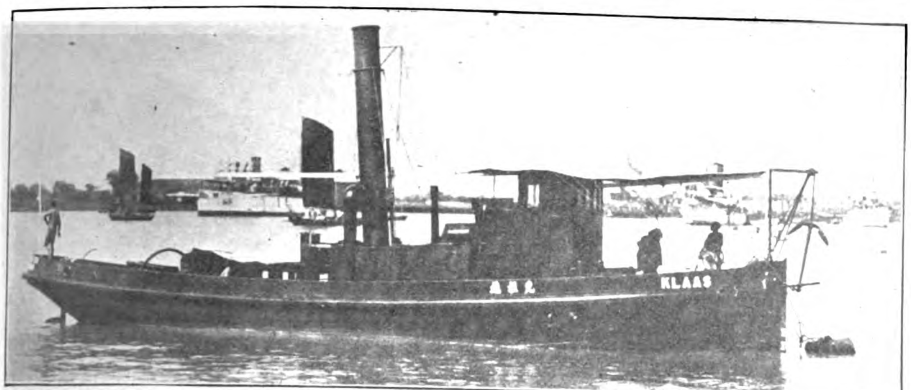
In 1908 work was commenced on a drydock so as to enable the company to compete for and secure its share of the larger marine repair contracts. Profiting by the experience gained in building other docks in Shanghai, the work of construction was pushed ahead without any serious delays or handicaps and completed in twelve months.



GENERAL VIEW OF THE YANGTSZEPOO DOCK, SHANGHAI.—S. S. INDRAMAYO, 5200 TONS, IN DRYDOCK, 410 FEET LONG

The principal dimensions of the Yangtszepoo Dock are as follows: length on blocks 452ft.; width of entrance—bottom 60 ft.; coping 70 ft.; depth to floor, 27 ft,; depth of water at ordinary spring tides on 3 ft. blocks, 19 ft. Work on the dock was begun on May 22, 1908. The interior consists of mud terraces and planks, and the entrance is closed by a steel caisson, the only one of its kind in Shanghai. This caisson is equipped with electrical pumps, which are operated by

VIEW OF DOCK AND WORKS FROM THE RIVER.—S. S. INDRAVELLI JUST OUT OF DOCK; S. S. SIBIR ENTERING AND S. S. EIGER ALONGSIDE



TUGBOAT BUILT AND ENGINED BY THE NEW ENGINEERING AND SHIPPING WORKS, LTD. FOR THE EAST ASIATIC PETROLEUM CO.

connexions with water-tight plugs on either side of the entrance. The caisson floats in 9 ft. of water, and as there are always 12 ft. on the blocks, the dock can be opened at shorter notice than any other in Shanghai.

The pumps for emptying the dock have been constructed on the premises and are placed in an engine-house on the west side, They consist of two 22-inch centrifugal pumps driven by compound surface-condensing engines, and can discharge 18,000 gallons of water a minute. With a vessel of moderate size on the blocks the dock can be emptied in from two to two and a half hours.

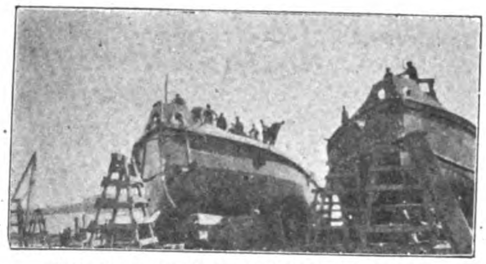
It is the intention of the New Engineering and Shipbuilding Works to add sufficient new machinery, etc., to cope with every kind of work that comes its way. The sanitary accommodation for the use of the crews of vessels under repairs includes a bathroom with hot and cold water laid on, and electric light. Ships in dock can be supplied with electricity or steam, and besides an efficient fire service a tank has been installed which has a capacity of 70 tons of filtered water.

It may be mentioned that the dock was constructed in the short space of twelve months from start to finish, a record in dock building in this part of the world. Since the opening, the dock has been very well patronized. Last autumn the company salved the S. S. "Proteus" which was badly ashore on the shifting sands at the delta of the Yangtsze, the vessel was brought into dock where she was repaired and reclassed, the repairs included the renewal of the stern frame, stern tube, rudder and propeller, also a number of plates, etc.

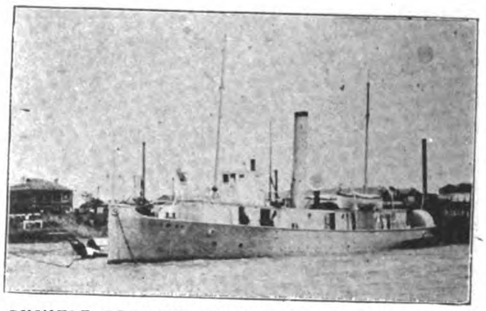
Sheerlegs are being erected which will be capable of handling weights of 60 tons. The works have a river frontage of 830 feet with an ample depth of water alongside for accommodating vessels which visit the port.

The organizer of the works and designer of the dry dock is Mr. John Blechynden,

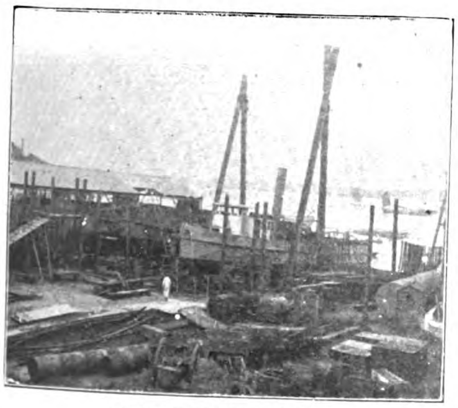
ONE OF TEN UP RIVER LIGHTERS AFTER LAUNCHING



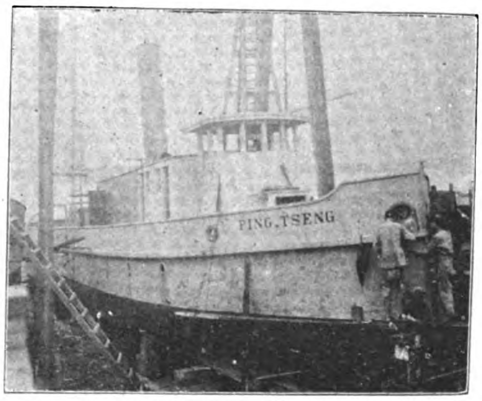
TWO OF TEN LIGHTERS FOR UP RIVER SERVICE



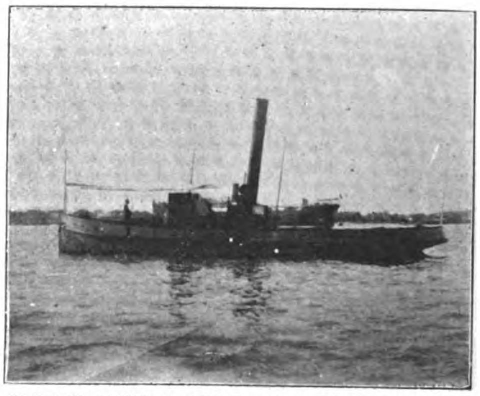
CHINESE CRUISER JUST PREVIOUS TO DEPARTURE FOR NORTHERN WATERS



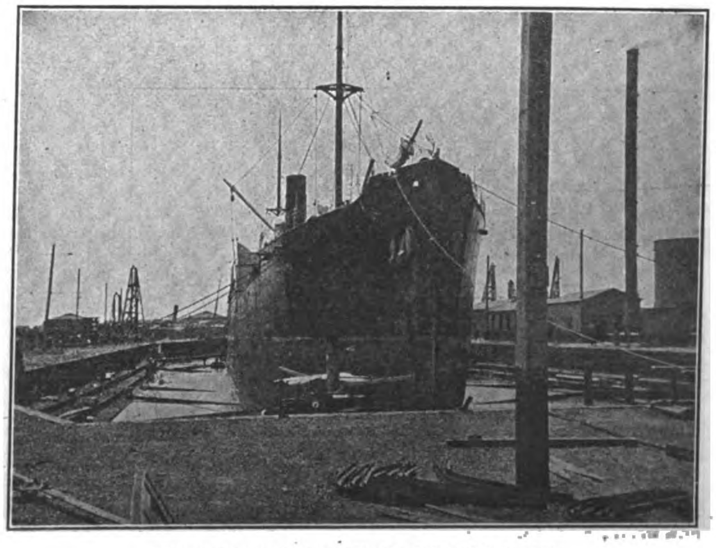
PART OF SHIPYARD



LIGHT DRAUGHT TOWBOAT HOLLOW STERN TYPE FOR UP RIVER SERVICE



TENDER YENTAI BUILT BY THE NEW ENGINEERING WORKS FOR THE CHINA NAVIGATION CO. FOR SERVICE AT CHEFOO



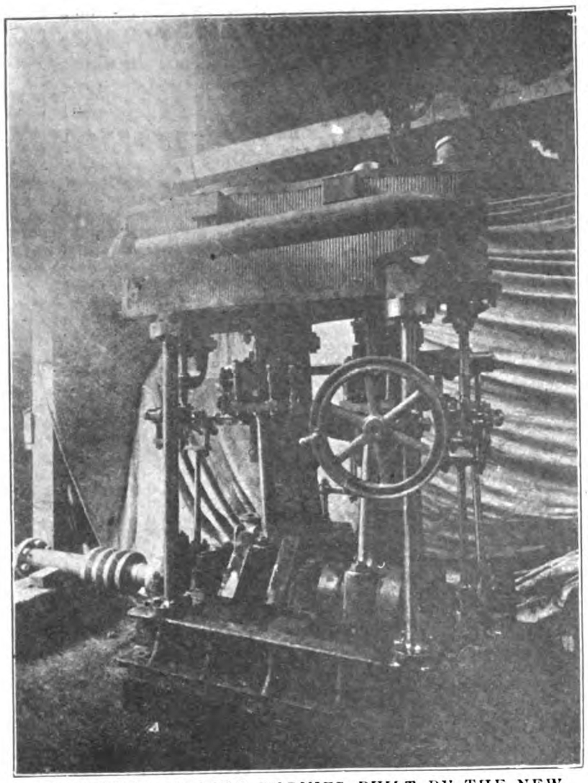
ANOTHER VIEW OF YANGTSZEPOO DOCK

M. I. M. E., who still retains his connection with the firm.

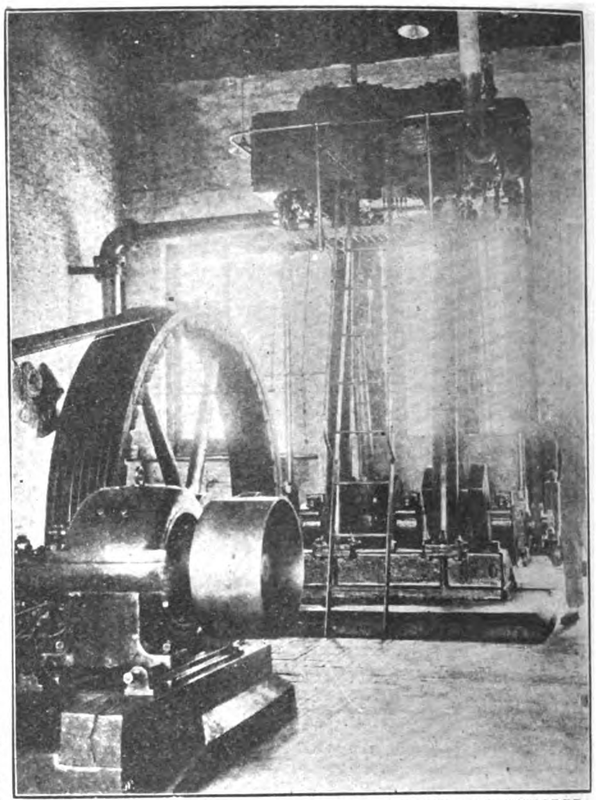
The New Engineering & Shipbuilding Works have also inaugurated a new departure in the form of a native sampan fitted with tanks for the purpose of transporting bulk oil. These tanks have a capacity each of 60 tons of oil and the craft is propelled by two motors of 50 b. h. p.

CHINA GENERAL ENGINEERING CO., SHANGHAI.

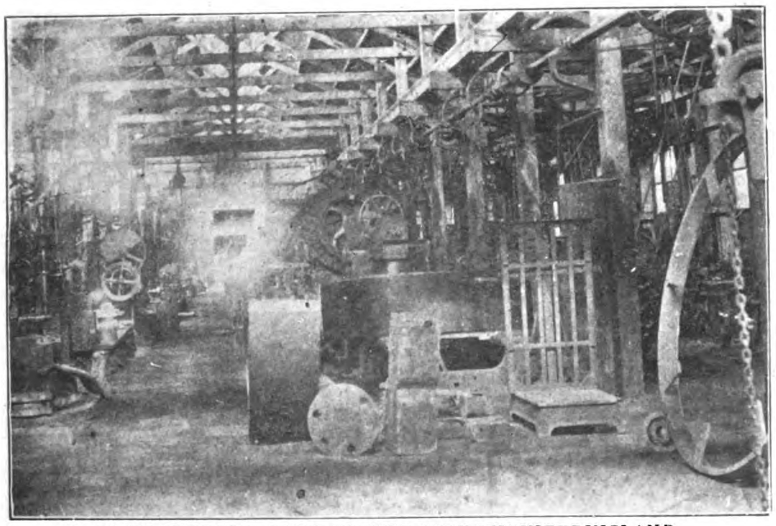
This company specializes in motors and motor boats, holding The Grei and Fairbanks Morse & Co.'s agencies for China. It has its own boat building works on Liziza Road by the side of the Foochow Creek, and it has successfully built over 100 motor launches destined for all parts of the Empire. Up in far Szechuan, in the Fungting Lake and as far north as Harborvsk, their launches are plying the rivers of China. The Imperial Maritime Customs, and the Russian Government, give this firm an almost exclusive monopoly of their motor boat trade. The manager, Mr. O. Jansen, C. E., has a wide experience in motor boat work.



COMPOUND MARINE ENGINES BUILT BY THE NEW ENGINEERING AND SHIPBUILDING WORKS

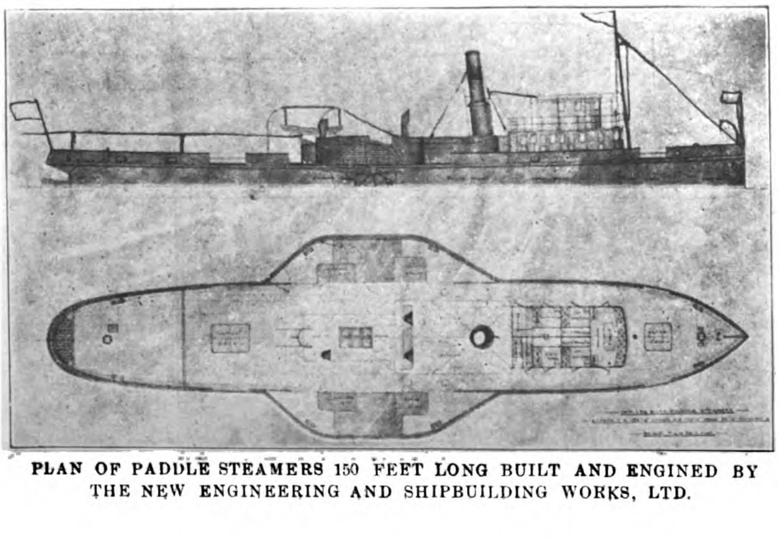


COMPOUND ENGINE FOR SAWMILL BUILT AND ERECTED BY THE NEW ENGINEERING WORKS

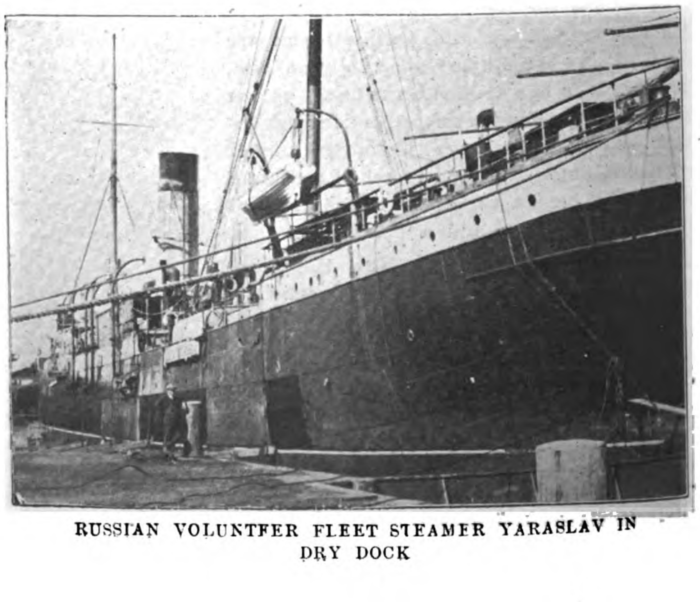


PART OF MACHINE SHOP OF THE NEW ENGINEERING AND SHIPBUILDING WORKS

ENTRANCE TO THE WORKS ON YANGTSZEPOO ROAD, SHANGHAI



PLAN OF PADDLE STEAMERS 150 FEET LONG BUILT AND ENGINED BY THE NEW ENGINEERING AND SHIPBUILDING WORKS, LTD.



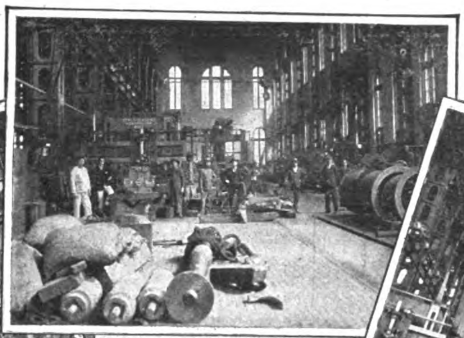
RUSSIAN VOLUNTEER FLEET STEAMER YARASLAV IN DRY DOCK

THE HONGKONG AND WHAMPOA DOCK CO., LTD., OF HONGKONG

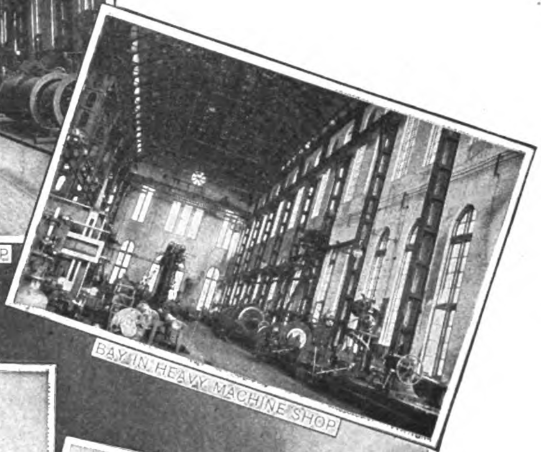
The Hongkong and Whampoa Dock Co., Ltd., was established in 1863 and is one of the leading shipbuilding establishments in the Far East. The company has a most extensive plant and engages in shipbuilding, marine and land engineering, iron and brass founders work, forging, electrical construction, railway supplies, etc. The head office is located at the Kowloon Dock and the Town Office in Queen's Building, Hongkong.

The Company has six granite dry docks and two patent slipways which are situated at their three establishments at Hunghom, Tai-Kok-Tsui and Aberdeen. Their dimensions are as follows:

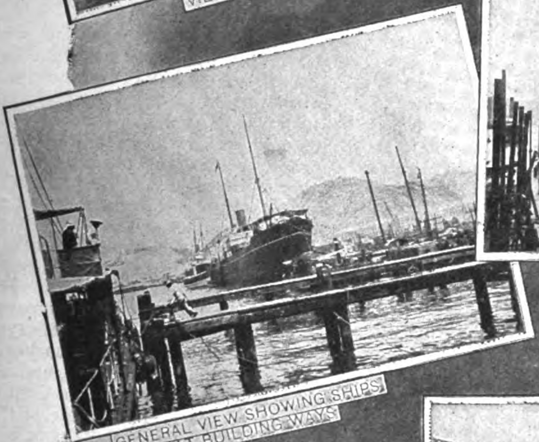
VIEW OF ERECTING SHOP



BAY IN HEAVY MACHINE SHOP



BAY IN HEAVY MACHINE SHOP



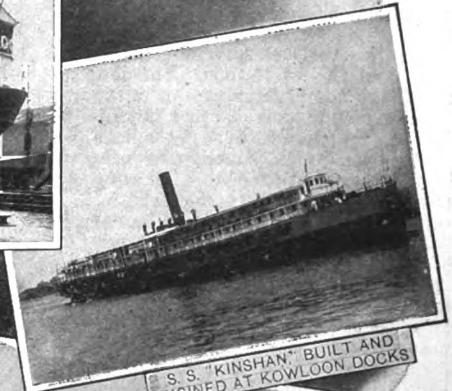
GENERAL VIEW SHOWING SHIPS AT BUILDING WAYS

H. M. S. "ATLAS" ON NO. 2 SLIPWAY, KOWLOON

2,000-TON SHIP ON NO. 1 SLIPWAY, KOWLOON

THE S. S. "CLAM" IN NO. 2 DOCK, KOWLOON. VIEW SHOWING SHEER-LEGS

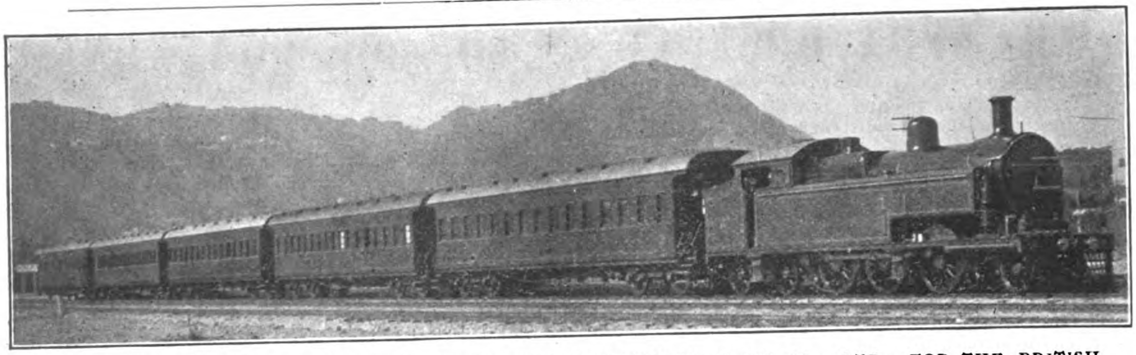
S. S. "LOONGWO," 300-FT. RIVER STEAMER, BUILT AND ENGINED AT KOWLOON DOCKS



S. S. "KINSHAN," BUILT AND ENGINED AT KOWLOON DOCKS

TUGBOAT "EDITH," BUILT AND ENGINED AT KOWLOON DOCKS

GEODETIC AND SURVEY SHIP "FATHOMER," BUILT AND ENGINED AT KOWLOON DOCKS



PASSENGER COACHES BUILT BY THE HONGKONG & WHAMPOA DOCK CO., LTD., FOR THE BRITISH SECTION OF THE KOWLOON-CANTON RAILWAY

Name of Dock or Slip.	Length on Keel Blocks.	Entrance Breadth.	Depth over Sill at ordinary Spring Tides.	Rise of Tide. Spgs.	Rise of Tide. Neaps.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*
"Kowloon."					
No. 1 Dock	700	86 ft. top 70 bottom	30	7′ 6″	3
No. 2 Dock	371	74	18′ 6″	7′ 6″	..
No. 3 Dock	264	49′ 3″	14	7′ 6″	..
No. 1 Pat. Slip	240	60	14	7′ 6″	..
No. 2 Pat. Slip	220	60	12	7′ 6″	..
"Tai-Kok-Tsui."					
Cosmopolitan Dock	466	85′ 6″	20	7′ 6″	..
"Aberdeen."					
Hope Dock	430	84	23	7′ 6″	..
Lamont Dock	333	64	16	7′ 6″	..

The principal works are at Hunghom on the Kowloon side of the Harbour, distant about two miles from the City of Victoria, and among some of its chief points of interest may be mentioned:—

Machine Fitting and Erecting Shop—Three Bays, each 272′ 0″×52′ 0″, containing together two 10-ton electric overhead travelling cranes, one of 15-tons and two of 20-tons. The shop is equipped with a complete plant of up-to-date high speed machine tools of every description capable of turning out work of the heaviest class with expedition. Among the principal tools may be mentioned the following: *Longest Lathe* can take 75′ 0″ between centres, height of centres from top of shears 27″, motor driven.

Largest Chuck Lathe can take 10′ 0″ diameter in chuck, motor driven.

Lathe for heavy turning with high speed tools can take 21′ 0″ between centres; height of centres 21″ motor driven.

Largest Planing Machine, 8 feet between housings, can clear 8′ 0″ high from table, length of stroke 20′ 0″ motor driven.

Largest Milling Machine, can machine 5′ 0″ above table, width between housings 5′ 0″. Table 12′ 0″×5′ 0″, traverse of table 12′ 0″.

Largest Slotting Machine, 27 inches stroke, motor driven.

Wall Planer, to plane 12′ 0″ vertically and 12′ 0″ horizontally, motor driven.

Largest Boring Machine, suitable for cylinders up to 5′ 0″ diameter by 9′ 0″ long.

Boiler Shop.—One Bay 262′ 0″×62′ 0″ contains one 30-ton overhead electric travelling crane and one hydraulic rivetter.

One Bay 262′ 0″×42′ 0″ contains one 40-ton overhead electric travelling crane and one 10-ton overhead rope driven crane with one largest size hydraulic rivetter, drilling and screwing machines, etc.

Boiler Shop Smithy.—Two Bays, each 121′ 0″×30′ 0″ containing 28 fires and two 8-cwt. steam hammers.

Shipyard and Boiler Shop Machine Shed.—This shed comprises four bays, each 262′ 0″ × 30′ 0″, containing punching and shearing machines, light and heavy rolls, machine for rolling angle frames, plate edge planes, drilling machines, hydraulic flanging press, hydraulic manhole punch, hydraulic keel plate bender, hand overhead cranes, emery wheels, grindstones, etc.; also one bay 209′ 0″×56′ 0″ containing angle bar cutting machine and punch and 17 angle smith's fires and one bay 139′ 0″ × 42′ 0″ containing large rolls suitable for plates 30′ 0″ wide, and overhead hand cranes.

The ship building yard which adjoins has a frontage of 570 feet and will admit of ships 500 feet in length being laid down. The position is well protected, and there is deep water for launching ships with safety.

Blacksmith Shop.—This department comprises three bays, each 195′ 0″×50′ 0″ containing 48 ordinary smith's fires, one furnace for 1-ton hammer, six 8-cwt. steam hammers, one 1-ton steam hammer, four bolt, nut and rivet making machines and furnaces, radial drills, screwing machines, etc

Forge.—160′ 0″×82′ 0″ with three furnaces, one to suit each size steam hammer. The largest hammer is 10 tons, suitable for heaviest marine shafting work, etc., and there are two 2-ton hammers with steam cranes to each. There are two open hearth smith's fires. The company can handle and make forgings up to 20 tons, the largest propeller shaft forged being about 10 tons and the heaviest stern frame, about 8 tons.

Foundry.—This department comprises one bay 54′ 0″×43′ 0″, three cupolas for cast iron, 3 steam cranes, and one 2-ton air furnace for brass.

One bay 48′ 0″×43′ 0″ with brass furnace, white metal furnace, overhead cranes, etc.

One bay 60′ 0″×57′ 0″ with one 10-ton steam crane, gear wheel moulding machine, oil furnace for melting brass, etc., capacity 500 lbs.

The largest cylinder cast is 10 tons, the largest propeller 18′ 0″ diameter, 8 tons, cast iron, the heaviest bronze propeller blades 3½ tons each and the longest liner cast, 25′ 0″ in one length.

The heaviest casting turned out is an anvil block for 10-ton steam hammer representing 100 tons of cast iron.

The greatest monthly output was 130 tons cast iron and 7 tons brass.

Sawmill and Joiner Shop.—The sawmill and joiner shop is completely equipped with a large plant of all descriptions of steam driven saws and wood working tools of most modern and improved design.

The extensive carpenter shops and boat building sheds adjoin the saw mill.

Steam Shears.—Powerful steam shears 80 feet high and capable of lifting 75 ons, stand on a granite wharf with deep watertfrontage.

Railway Lines are laid throughout the yard to the various departments enabling gear and materials to be transported with convenience and expedition.

Electric Light is installed in all the shops, the yard and around the docks, admitting of work on ships being carried on at night. Current can be supplied to ships lying in dock or alongside.

The Galvanizing Plant by electrical deposit is of the most improved type and is capable of taking plates 20′ 0″×9′ 0″.

The Company's *Stores* carry a heavy stock of all descriptions of steel, iron, and timber for shipbuilding or repairing, engine and boiler fittings, etc., all of the best quality, which are supplied at reasonable rates and delivered with despatch.

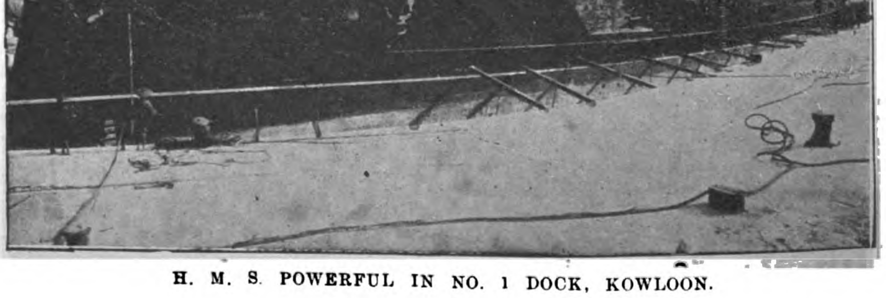
Compressed Air Plant.—The works are equipped with a complete installation of compressed air tools in the way of rivetters, hammers, drills, chippers, etc.

Salvage Steamer.—The twin screw salvage steamer *David Gillies* is fully equipped with a complete plant of powerful salvage gear and tools and on call can be despatched at a moment's notice. In addition, the Company has on hand a number of large and small centrifugal wrecking pumps, diving gear and other salvage appliances, all in readiness for shipment without delay.

Steam Launches.—The company's large fleet of fine steam launches is always in readiness to attend on ships in the harbour, for conveyance of workmen, material, etc.

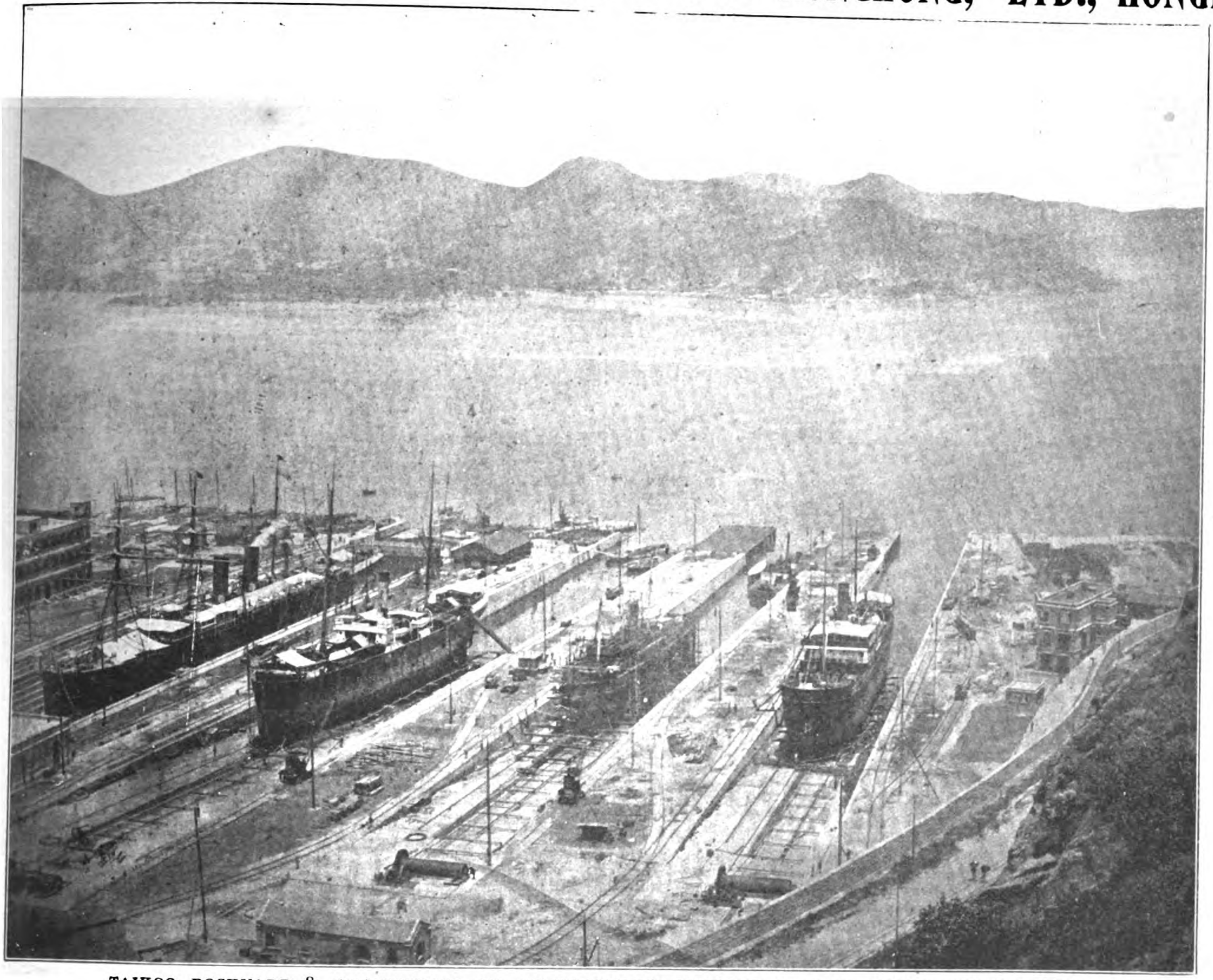
Cosmopolitan Dock.—The Cosmopolitan Dock is also on the Kowloon side of the harbor and is situated at Tai-Kok-Tsui in a well sheltered position and distant about two miles from Victoria. The dock, which is built of granite, can accommodate ships up to 450′0″×53′0″×21′0″ draft. The workshops possess every facility and appliance necessary for efficient and prompt repairs to ships or machinery.

Aberdeen Docks.—The Aberdeen Docks are situated at the head of an inlet on the South



H. M. S. POWERFUL IN NO. 1 DOCK, KOWLOON.

THE TAIKOO DOCKYARD & ENGINEERING CO. OF HONGKONG, LTD., HONGKONG



TAIKOO DOCKYARD & ENGINEERING CO. OF HONGKONG: GENERAL VIEW OF DOCKS AND SLIPWAYS

The Taikoo Dockyard & Engineering Co. of Hongkong, Ltd., whose management is represented by the well known firm of Messrs. Butterfield & Swire is the latest addition to Far East Dockyard and Engineering establishments. Commenced in 1900 and first opened to public business at the end of 1908, it is now fully equipped with the most modern machinery and appliances for the whole range of constructional, docking and repair work.

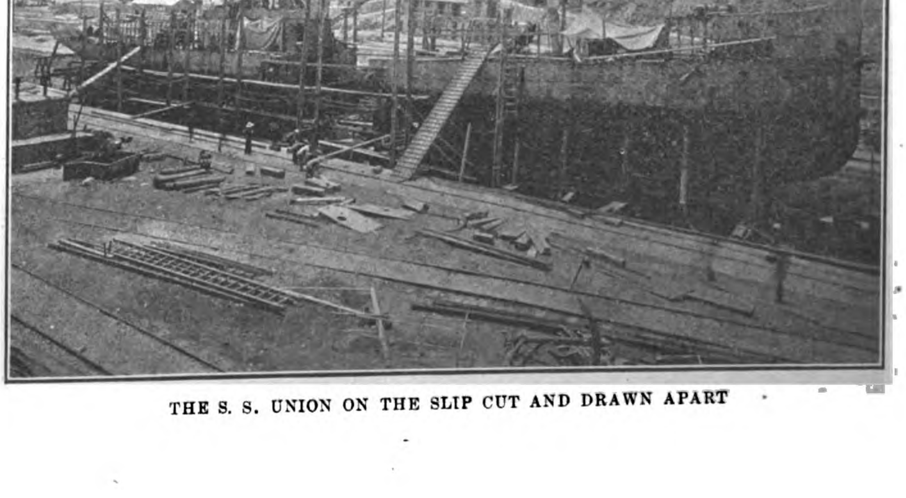
The site, with its dry dock, slipways and workshops covers an area of 50 acres with magnificent water frontage and approach. The accommodation is ample for the largest vessels afloat in these waters, as an examination the undernoted figures will show, and supplemented by a full technical staff and skilled foremen from the yards of Clyde and Tyneside it takes its stand amongst the leading enterprises of its kind in modern times.

The yard now actively competes for Far Eastern business. It has the docking and repair work of the large fleet of China Navigation Co. steamers in its charge in addition to that of other well known companies trading on the adjacent coast of China and in Southern waters. The big Pacific liners of the Pacific Mail and Toyo Kisen Kaisha dock and repair there, and although the past two years have not been noticeable for marked activity in shipbuilding construction, the company has secured a fair share of such work as has been offering.

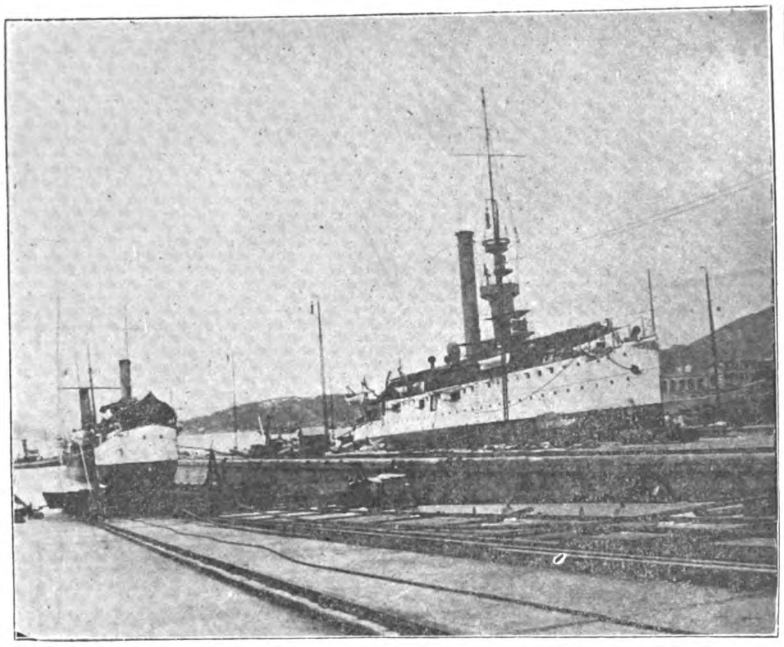
The Dock.—Situated just inside the Lyeemoon Pass, the Northern and deeper entrance to the harbour, the Dock is conveniently placed for the full and free manoeuvring of ships prior to docking or repairing, being well clear of any congestion of shipping in the harbor.

side of the island of Hongkong. The entrance is safe and the anchorage good. The docks are substantially built throughout with granite.

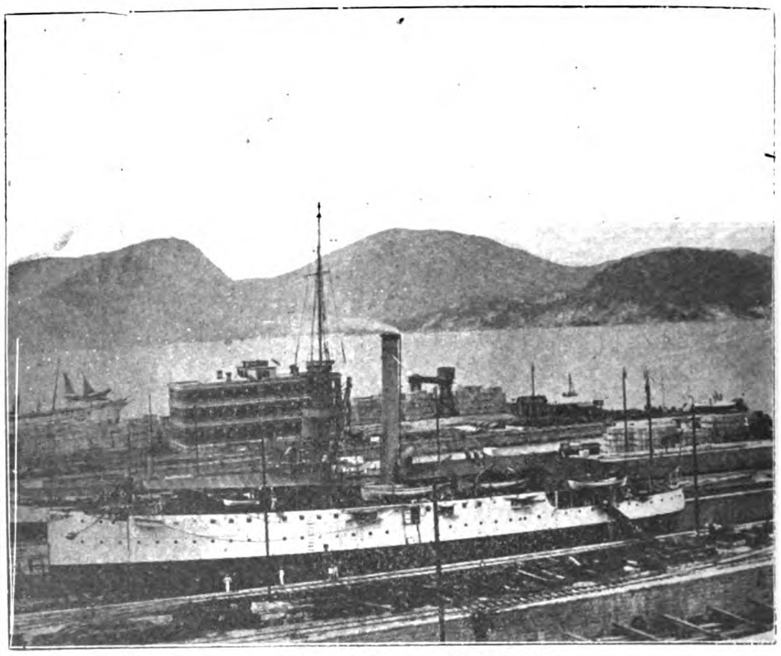
The company is in a strong position to undertake all classes of constructional and general engineering work, also locomotives, railway rolling stock and plant, bridge work, etc. Extended experience and success in the building of coast and river steamers, tug boats, shallow draft vessels, stern wheelers and launches of all descriptions. A speciality made of high speed passenger and cargo motor boats. Defibrating, pulp, sugar and auxiliary machinery for land and marine purposes, pumps, etc., made with expedition. The plant throughout is of the most modern and up to date type. Docking and repairs effected with promptitude and at moderate charges. All classes of cocks, valves and other ships' fittings supplied at reasonable rates. A large and varied stock of steel and iron plates, bars, etc., always kept on hand.



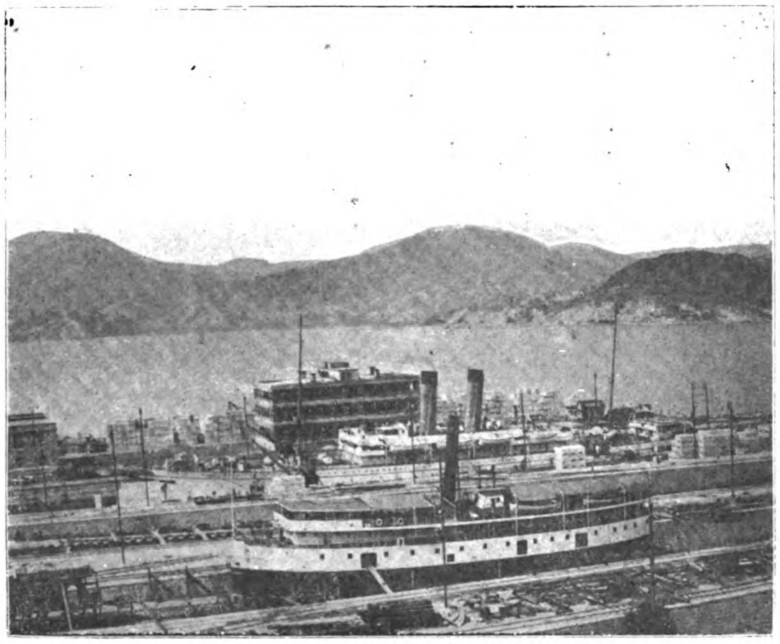
THE S. S. UNION ON THE SLIP CUT AND DRAWN APART



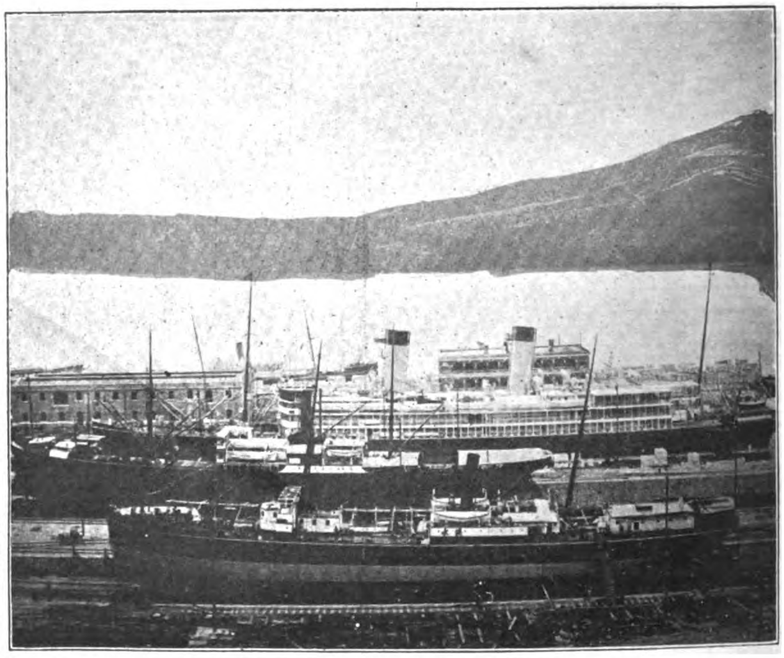
U. S. S. HELENA ON NO. 2 SLIP AND U. S. GUNBOAT "SAMAR"



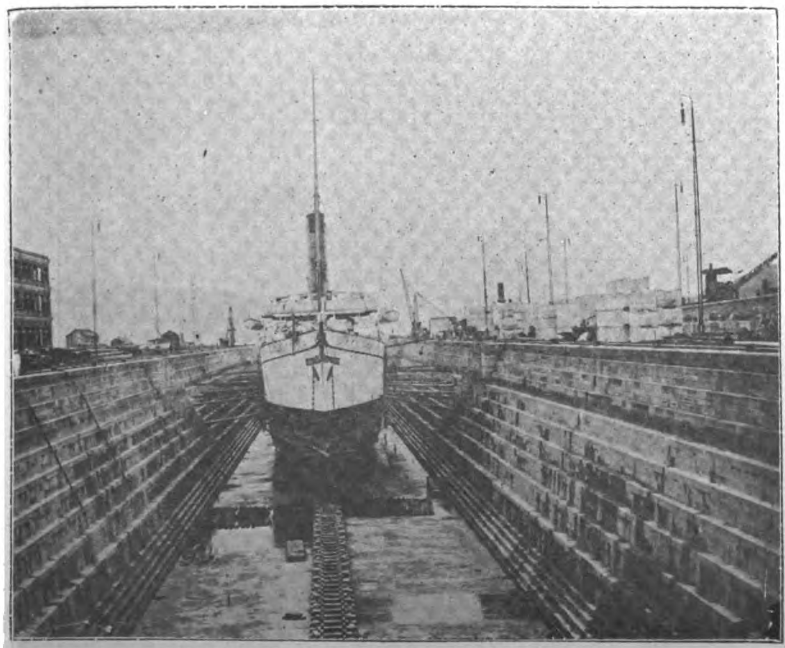
U. S. S. HELENA ON NO. 2 SLIP



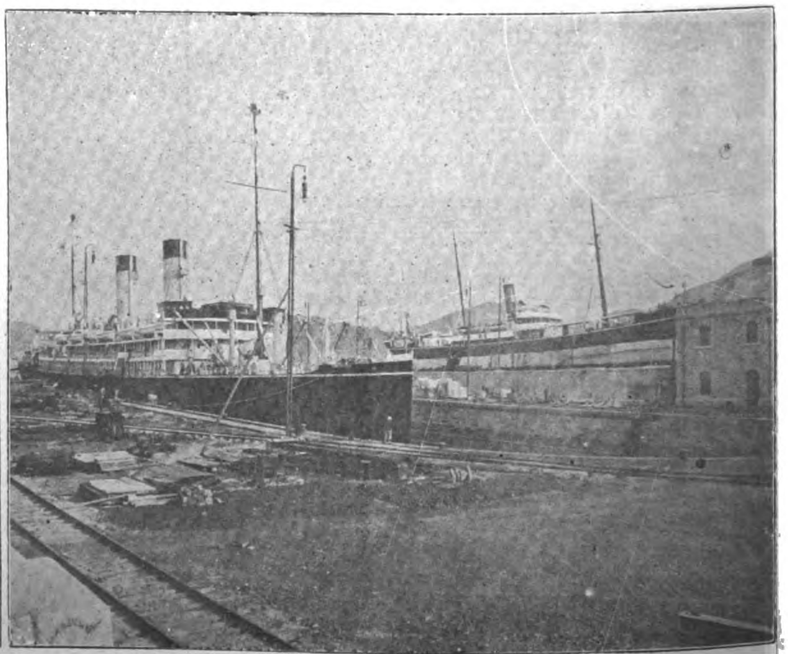
T. S. S. "NIPPON MARU" IN DOCK



S. S. "CHIYO MARU" IN DOCK

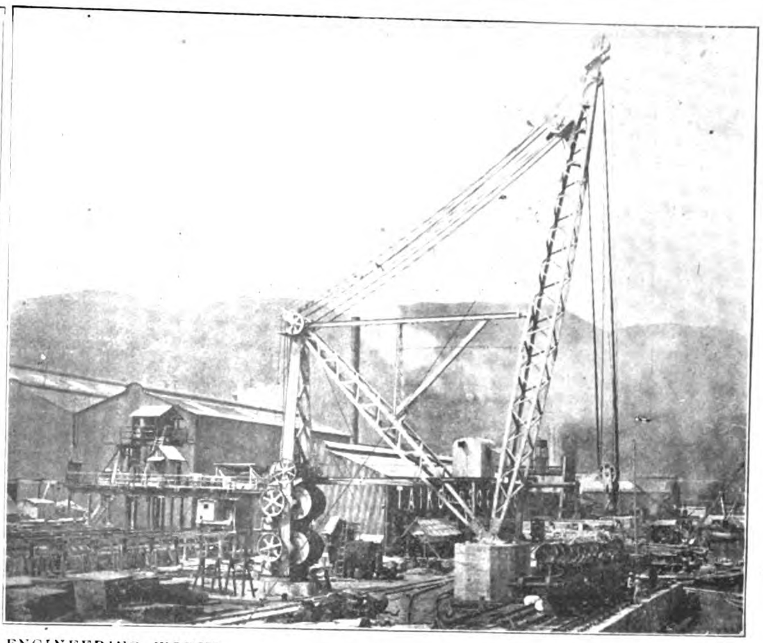


T. S. S. "NIPPON MARU" IN GRAVING DOCK



S. S. "CHIYO MARU" IN DOCK

PLATER'S SHEDS



TAIKOO DOCKYARD & ENGINEERING WORKS

100-TON CRANE

The following are a few interesting facts concerning it:

It is built to British Admiralty requirements.

It is founded on a solid rock bottom, and built of cement concrete lined with granite throughout.

It can be filled in 45 minutes and pumped out in 2 hours and forty minutes.

Its dimensions are: 787 ft. extreme length, 750 ft. on the blocks, 120 ft. width at coping, 77' 6" width at bottom, 88 ft. width of entrance at top, 81' 0" width of entrance at bottom, 34' 6" depth over centre of cill at high water spring tides, 31' 0" depth over side of cill at high water spring tides.

Caisson.—A feature of the dock is the caisson which is of the new box sliding type, built by Messrs Hanna Donald & Wilson of Paisley.

It is electrically driven, and can be hauled from, and to its chamber across the sill in 4½ minutes.

A collapsible bridge is fitted to the top of the caisson which folds down automatically to allow the caisson to enter its chamber.

The Dock Pumps.—These consist of two sets of "Conqueror" parallel type, made by Messrs. W. H. Allen, Sons & Co., Ltd., of Bedford, having suction and discharge branches of 54 inches diameter, each driven by an electric motor of 600 H. P., 2 sets of 54 inch sluice valves, with motors for operating, an electrically driven air pump for charging same, and a 10" drainage pump.

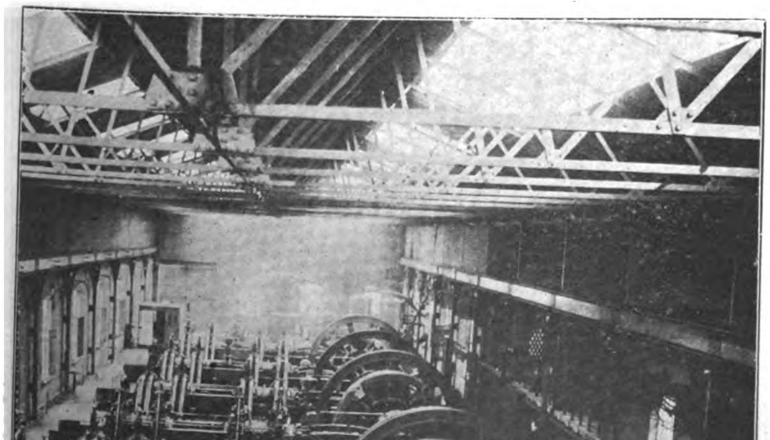
THE SLIPWAYS.

The No. 1 Slipway.—This is 1,030' long and 80' wide. It is capable of taking up steamers 300' long, drawing 18', and of 2,700 tons displacement. The hauling rope is 14" steel and the drum (7 ft. diameter) for winding the rope, weighs 36 tons. A vessel of 2,700 tons displacement can be hauled up in 2 hours and a small coaster in one hour. The depth at the entrance at high water is 28' 6", the length of slip above high water is 437' on rail level; above low water is 593' on rail level.

The Nos. 2 and 3 Slipways.—These are each 993½' long and 60' wide.

They can each take up steamers 290' long, drawing 17', of T. 2,000 displacement. Vessels can be hauled up in 1¾ hours. The hauling ropes, as in the No. 1 Slipway, are of 14" steel. The cradles are operated by electric motors of 200 B. H. P. each, and so arranged by means of underground shafting that either motor can operate either slip.

The depth of these slipways at high water is 27' 6".



INTERIOR OF POWER HOUSE

The length above high water is 405' on rai level and above low water 561' on rail level.

Steel Pierheads.—These give a fair lead to ships entering all slips.

Patent slips are recognized as affording superior facilities and favorable conditions for painting with the best preservative results, owing to the free circulation of air under and around vessels in their elevated position on the slips, and advantages of this nature have already been remarked on vessels painted on the Taikoo Slips.

The Building Yard.—The building yard is 550' long, 300' wide, and is fully equipped for the construction of all classes of floating craft. Ranged round the building yard are the platers shed, moulders loft, joiners and pattern makers shops and the necessary shipbuilding stores.

The Chief Motive Power is electricity generated by means of gas engines described later under the heading of "Power House."

Gas Producers.—Gas is produced from three Double Shell Mond Gas Producers made by the Power Gas Corporation of Stockton-on-Tees, capable of generating gas equal to 4,000 B. H. P. of which 3,000 is for the gas engines and 1,000 for the furnaces, etc., throughout the yard. This gas plant is situated on the Northern side of the yard adjoining the sea wall

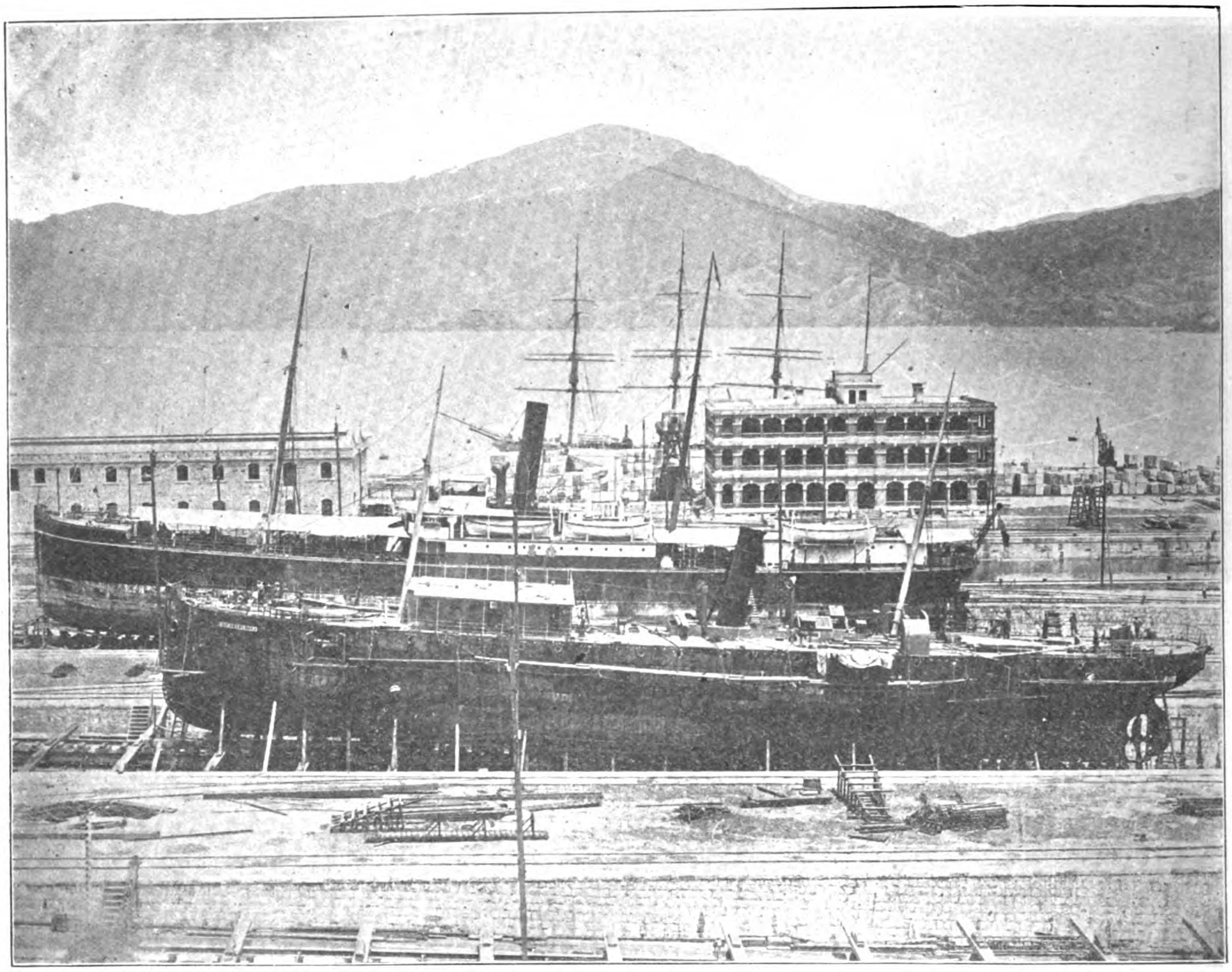
Power House.—The power house consists of a building 280 feet long by 57 feet wide in which are installed the following:

Two tandem double acting gas engines of the Cockerill-Westgarth type manufactured by Messrs. Richardsons, Westgarth & Co., Middlesborough, each capable of giving 550 B. H. P. coupled direct to two 375 K. W. Compound wound continuous current generators.

Two twin tandem double acting gas engines of the Cockerill-Westgarth type, each capable of giving 1,100 B. H. P. coupled direct to two 750 K. W. Compound wound continuous current generators, which transmit the power to various parts of the yard for driving machinery for all purposes.

Two sets of three throw motor driven hydraulic pumps made by Fullerton Hodgart & Co. of Paisley, for a working pressure of 1,000 lbs. per square inch coupled to an accumulator, are situated here, from which are led pipes to the different shops for flanging, heavy riveting, shell and keel plate bending, joggling machines, etc., by hydraulic power.

Two sets "Sentinel" Patent Compound motor driven air compressors by Alley & Maclellan Ltd. of Glasgow, are capable of compressing 500 cubic feet of free air per minute to 100 lbs. per square inch. From these are led pipes to the dock slipways and various shops for pneumatic riveting, caulking, chipping, drilling, etc.



S. S. "UNION" IN TAIKOO SLIP SHOWING PROGRESS OF WORK ON SEPT. 5TH, 1910

The full length of the building is traversed by a 15-ton electrically operated crane.

The Main Workshops.—These comprise boiler shops, engine erecting shops, heavy and light machine shop, brass finishing shop, forge and smithy, iron and brass foundries, coppersmiths' and plumbers' shops, etc.

Other departments situated at convenient positions in the yard to the work they undertake are joiners and patternmaking shops, timber stores and saw mills.

The Cranes.—The electric sheers, manufactured by Messrs. Geo. Russell & Co. of Motherwell, situated on the sea wall, lift 100 tons at a 70' radius and smaller weights at a larger radius, with an increased speed.

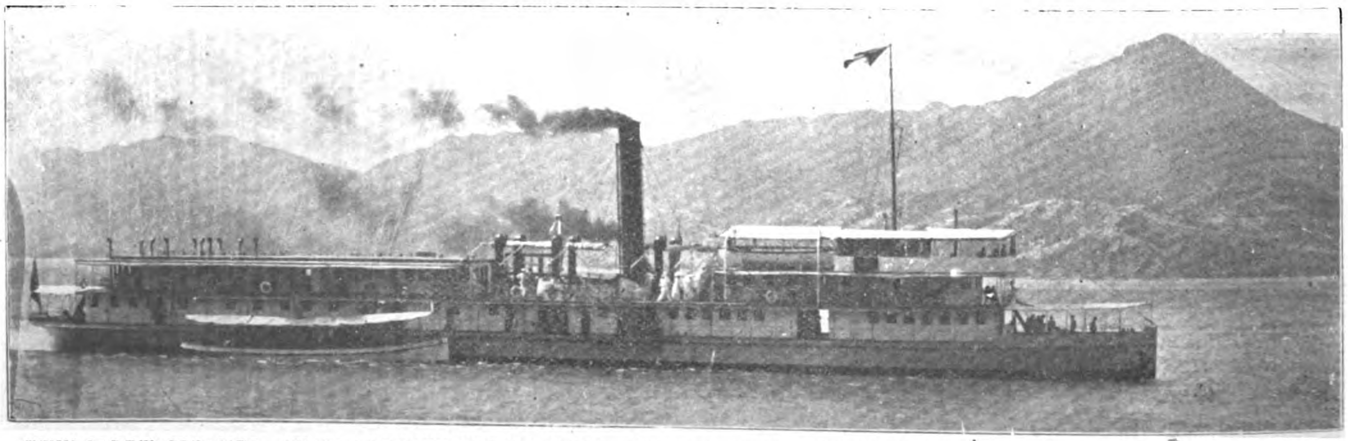
The various workshops are fitted with electric overhead travelling cranes for dealing with weights ranging from 5 tons in the shops for light work to 100 tons in the boiler shop, and there are locomotive cranes and derricks throughout the yard.

The Sea Wall.—There is a depth of water of 39 feet at high water spring tides for the greater part of the length of the wall which will enable ships of any size to berth alongside for the removal of fitting of heavy boilers, machinery, etc.

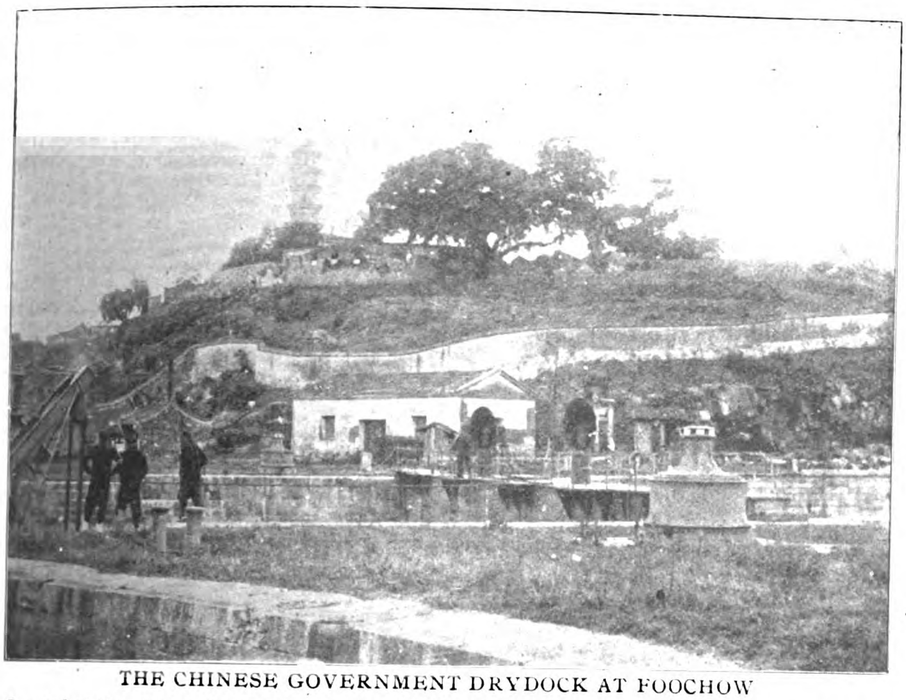
In addition to the 100 ton sheers, waggon and cranes roads are installed at the quay side, so that other cranes can deal with lighter loads at points along the wall.

The Offices.—These are a substantial block of buildings overlooking the harbor on the one side, and the entire dock premises on the other. They are 3 storeyed fire-proof and built of brick and cement concrete floors comprising accommodation for the management and secretarial staff, counting house and drawing and time offices.

The Dwelling Houses for managers of departments are commodious buildings erected on hill sites commanding a complete view of the yard and sea approaches. There are blocks of foremen's houses overlooking the yard, and native houses have been erected in the vicinity capable of accommodating over 6,000 workmen.

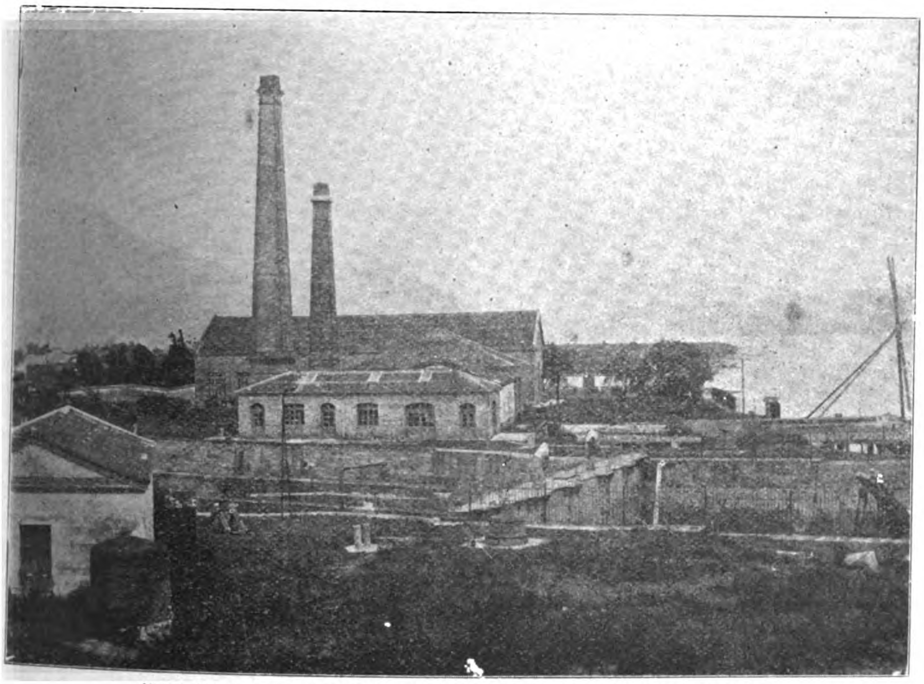


TWIN SCREW STEAMER "SHASI." LENGTH 245' 40" BEAM, AND 10' 6" DEPTH, BUILT BY THE TAIKOO DOCKS FOR THE CHINA NAVIGATION CO., LTD., FOR PASSENGER AND CARGO TRAFFIC ON THE YANGTSZE



THE CHINESE GOVERNMENT DRYDOCK AT FOOCHOW

Located at Pagoda Anchorage a mile distant from the Arsenal. Its entrance is silted up and has to be dredged to permit of docking a ship



THE FOOCHOW DRYDOCK.—DOCK ENTRANCE AND PUMP HOUSE

THE FOOCHOW ARSENAL AND DOCKYARD

This important Imperial Naval Arsenal and Dockyard is situated at the Pagoda Anchorage in Foochow and is known locally as the Mamoi Arsenal. This institution was first built under French direction in 1875, and by a singular turn in international relations was almost destroyed by the French Fleet under Admiral Courbet in 1884 as well as all the fortifications and Fokien naval forces. Since that time the arsenal has been restored and in addition a new dock was ordered constructed in 1887 on Losing Island. This dock is over 300 feet in length and modernly equipped. It has very powerful pumps and a steel caisson making it a very important yard for the repair of Imperial vessels and for the construction of small craft. The reconstruction and direction has been carried on largely under French experts. The extension of the present establishment is now under consideration, and last year the Peking Government sent a deputation abroad to study shipbuilding and the management of naval yards in foreign countries and arranged for the purchase of a large site in addition to the present works for the construction of additional buildings for machine shops and foundry.

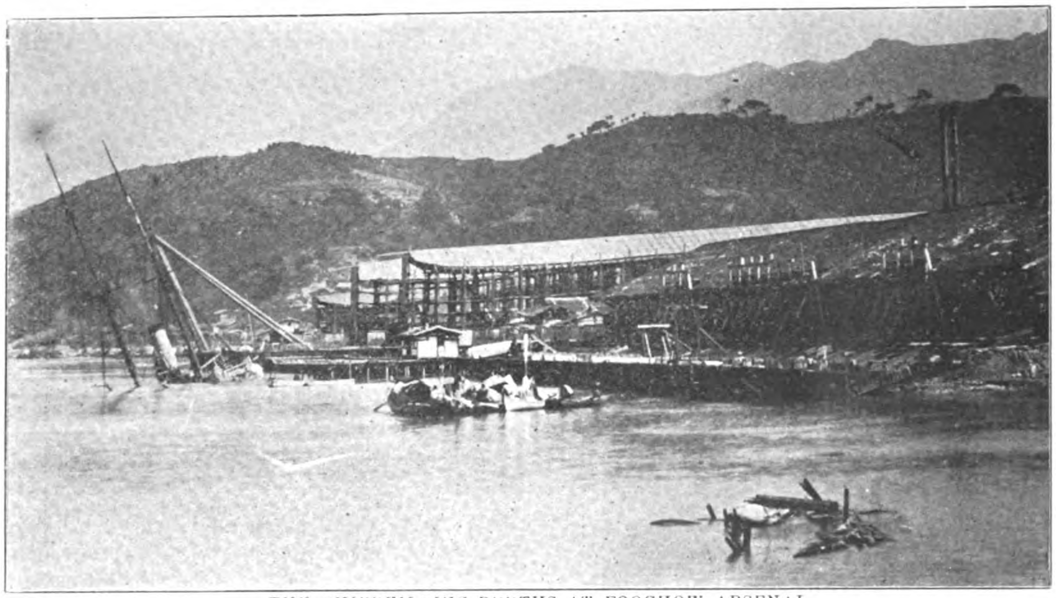
Of the recent vessels turned out by this dockyard was the S. S. *Ning Shao* for the Ningpo, Shaoshing S. N. Co., for the service between Shanghai and Ningpo, that made her initial trip July 19th of last year.

This vessel is 240 feet in length with a 42 foot beam and draught of 10 feet loaded. She makes 13.5 knots an hour; is equipped with twin screws, and built of steel throughout. Electric light is installed and every modern convenience provided in her appointments. This gives an idea of the growing capacity of the dock to turn out modern work and with the proposed reorganization and the expenditure of large sums of money in expansion by the Federal Government, the Arsenal and Dockyard promise to take a prominent part in the development of China's navy and merchant marine.

THE WHAMPOA DOCK AND NAVY YARD

The Whampoa Dock and Navy Yard Naval Yard is about all that remains at Whampoa of any special interest, but its importance must not be overlooked for the reason that it is the naval headquarters for the South China Gunboat squadron where all the repairing is done. It is also the location of the Government torpedo school.

THE SHIPBUILDING BERTHS AT FOOCHOW ARSENAL



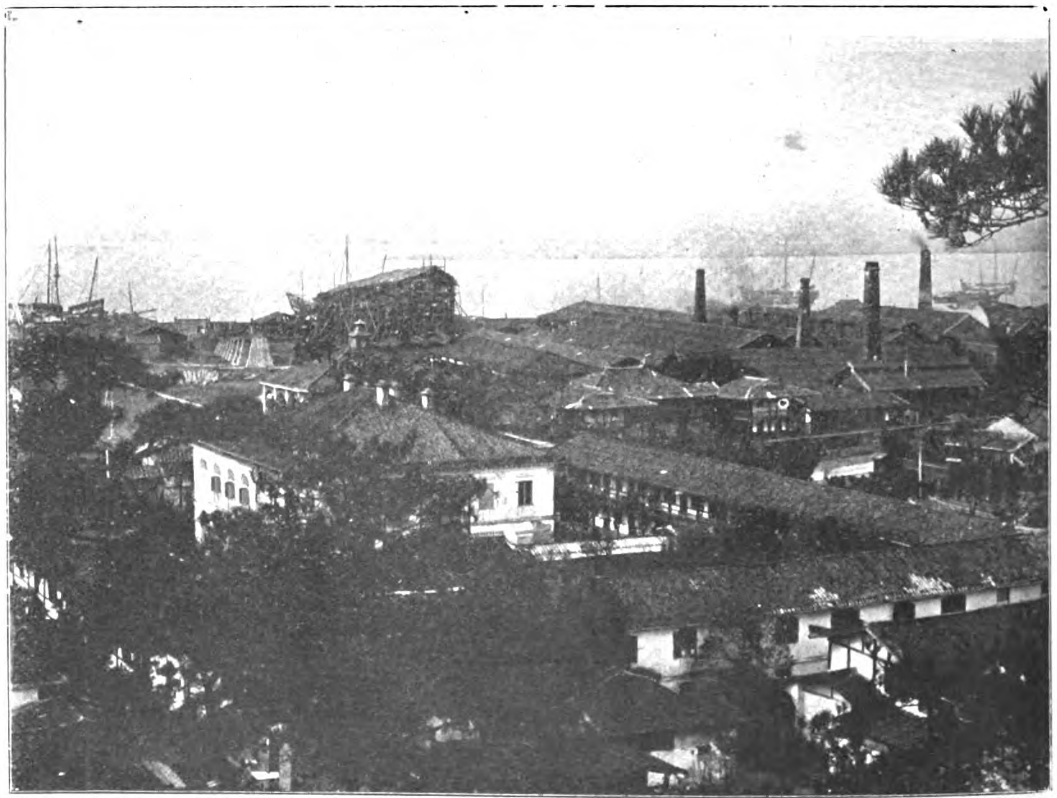
THE SHIPBUILDING BERTHS AT FOOCHOW ARSENAL

There were mud docks at Whampoa owned by Chinese long before Hongkong became a British port. They were utilized for the repair of sailing craft in the early days of the shipping trade, but foreigners were not satisfied with the facilities or the supervision of the repairs by Chinese and finally the P. & O. paved the way for foreign supervision by arranging that Mr. John Couper should supervise all the work done on the company's vessels. Later Mr. Couper leased the mud docks and added the Couper Dock which was much larger and built on more modern lines. In the clash over the Lorcha Arrow Affair between the British and the Chinese, the latter destroyed the Couper Dock in part and Mr. Couper was kidnapped. In 1863 Couper's son, who secured part of the indemnity for his losses, sold his interest in the Couper Dock to Messrs. Douglas, Lapraik & Co. and the Hon. Thos. Sutherland. This transaction initiated the formation of the present Hongkong & Whampoa Dock Co. Ltd. The mud docks which were included in this sale were resold to the Chinese Government and with some improvements since added are now known as the Whampoa Dock and Naval Yard. It is expected that the Chinese Federal authorities will provide funds for the extension and further modernizing of this station when the reorganization of the navy is under way.

W. S. BAILEY & CO.

This firm of engineers and shipbuilders was founded at Hongkong in 1897 by Mr. W. S. Bailey, who began business as consulting engineer and importer of engineers' requisites. In 1900 Mr. Bailey was joined in partnership by Mr. E. O. Murphy, and the present works at Kowloon Bay were established.

The works occupy about six acres, and have a sea frontage of 450 feet, so that eight vessels may be laid down at the same time. When established only three years, the company received the order for the Canton River steamer Kwong Chow (now the Kwong Sai) of 600 tons displacement and 200 feet in length. The boat was completed a year later, and up to that date was the largest steel vessel built in the Colony. In 1905 the firm undertook the construction of the steel twin-screw steamer the Kwong Tung, the steel cruiser Loong Sheung (Flying Dragon) for the Imperial Chinese Navy, a steel twin-screw lighter, a steel oil barge 150 feet in length for the Standard Oil Company of New York and the steel buoys for the Manila Government. The firm erected large oil tanks at Haiphong and Saigon for the Standard Oil Company, and similar installations at Hongkong. In seven years the firm have turned out over eighty vessels, including sternwheelers, light draught vessels, and motor boats, both twin and single screws.

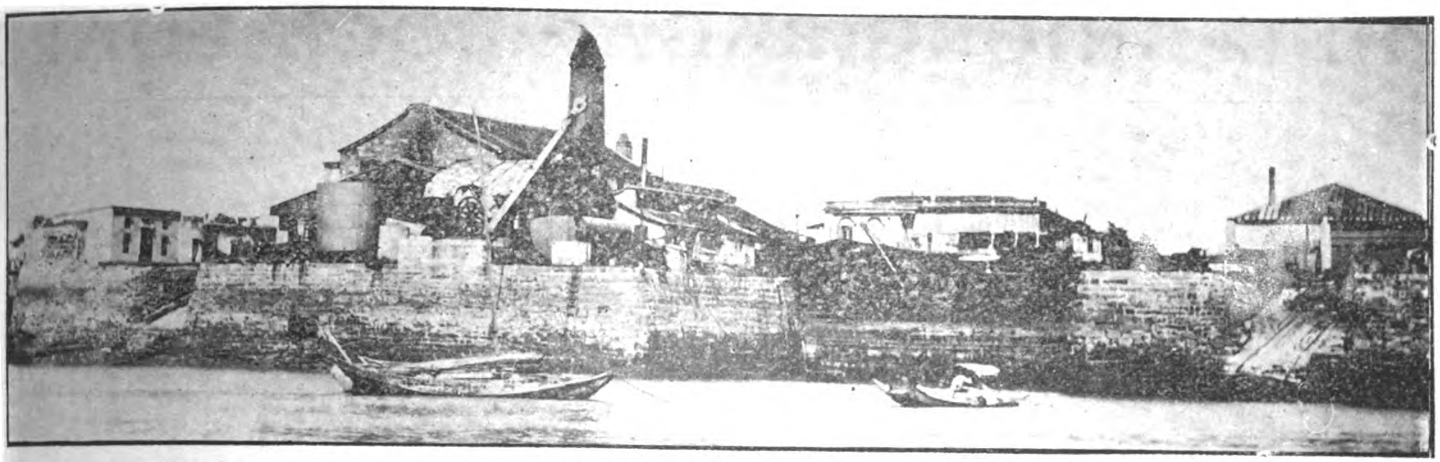


CHINESE IMPERIAL ARSENAL AND MINT AT FOOCHOW, ERECTED AND MANAGED BY FRENCH ENGINEERS, EQUIPPED THROUGHOUT WITH FRENCH MACHINERY. A YANTSZE RIVER STEAMER ON THE WAYS UNDER CONSTRUCTION.

MACDONALD & CO.

One of the leading engineering firms of Hongkong is that of Messrs. Macdonald & Co., who were the first to undertake the construction of steel piers and wharves. The firm was formerly known as Kinghorn & Macdonald, but in 1903 it was established under its present style. The offices of the Company are in York Buildings, Hongkong, and the works are at Kowloon. The equipment of the works enables all classes of harbor and repair work and the construction of marine engines up to 200 horsepower to be carried out. The site occupied forms part of the land that has been reclaimed in the bay, and adjoins the Kowloon-Canton Railway station yard. It has a good water frontage of 400 feet in length, and a slipway capable of taking vessels up to 150 tons. The firm has carried out a large number of important contracts, including the building of wooden and steel lighters, steam launches, steel jetties and steel piers at Canton (one for the Hamburg-Amerika Linie), the principal workshops at Messrs. Butterfield & Swire's new dockyards at Quarry Bay, two piers at Tai Kok Tsui for Messrs. Arnhold, Karberg & Co., and a pier for the Standard Oil Company at Lai-chi-kok. Under contract with the Government, the firm also built Blake Pier, Hongkong's principal landing place. They removed

STEAM LAUNCH "HARBOR NO. 1." FOR MANILA, BUILT BY MACDONALD & CO.



GENERAL VIEW OF THE NEW AMOY DOCK CO.'S PROPFRTY

the stone barriers in the Canton River which were put down during the first war to prevent foreign ships from entering the river, and, under contract with the Imperial Maritime Customs, constructed several lighthouses in the Canton and West Rivers. After the great typhoon of September, 1906, they were called upon to repair many of the lighters and launches that had suffered damage.

Mr. Donald Macdonald, M. I. Mech. E., M. I. M. E., the head of the firm, has had a long and valuable training in various engineering works. He is surveyor to the Bureau Veritas, British Corporation, and other registers.

Among the recent important construction by Messrs. Macdonald & Co. was the steam launch "Harbor No. 1" built for the Philippines Custom Service which suffered from an accident while proceeding under its own steam to Manila through the carelessness of the engineer. This vessel is 62 feet over all; beam, 11 feet; depth moulded, 6 feet. The boiler is 6 feet in length and 5 feet 9 in. in diameter, working pressure 150 lbs. per sq. in. It supplies steam to a set of compound surface condensing engines having diameter of cylinders 8 in. and 16 in. with 10 in. stroke. This vessel was given exhaustive and satisfactory trials in the presence of the Supervising Inspector of Machinery of the Insular Bureau of Customs and accepted before it left for Manila. The statement of A. Gillan, Master Mariner who was in charge of the launch on the voyage, is conclusive that the engineer had by his carelessness ruined the boilers and when he discovered the seriousness of his fault jumded overboard. No fault can be charged to the construction or installation.

Another important feature of this company's activity was the construction of an oil lighter with a capacity of 120 tons of oil in bulk now employed in the local Hongkong and Canton trade. The dimensions are: Length over all, 97 feet; beam, 18 feet; depth moulded, 6 feet. The motive power is generated by a 76 b. h. p. Kromhout marine type twin cylinder kerosine engine. On this vessel's first trip to Canton fully loaded a mean speed of 7.5 knots was attained, one-half knot more than her estimated speed. A powerful three throw pump is installed for dealing with the cargo and is driven by a belt from the crank shaft of the motor.

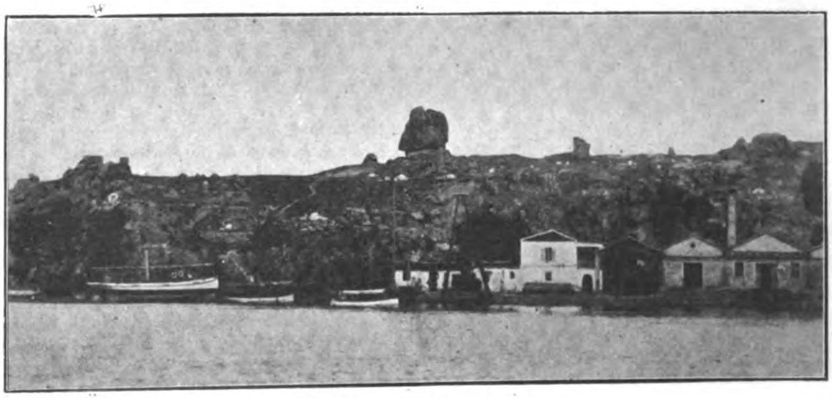
Besides this firm's shipbuilding activity it has secured the contract for the construction of the Swatow water works and is now doing the preliminary work on this project.

THE NEW AMOY DOCK COMPANY, LTD.

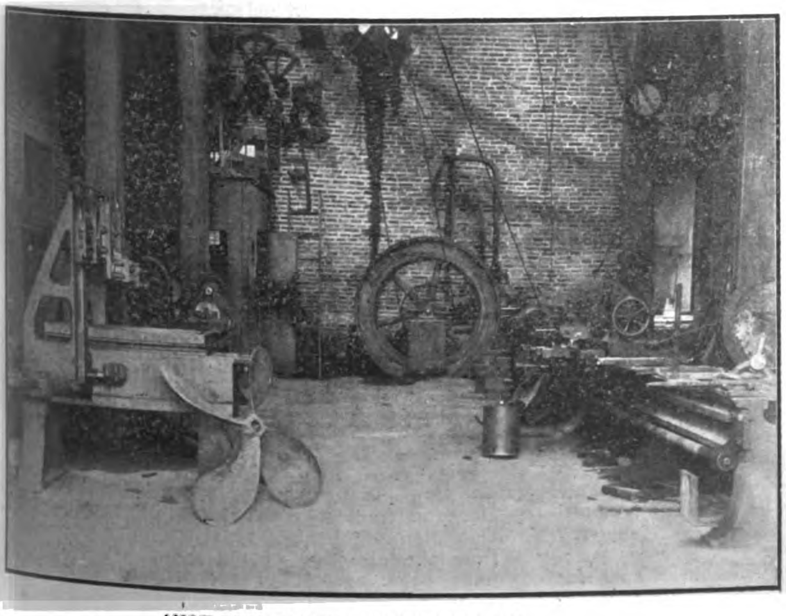
The dock owned by the New Amoy Dock Company has been in existence since 1858, but the Company, as at present constituted, was floated in 1892, being registered in the British Colony of Hongkong with a subscribed capital of $67,500.

Since that time nearly $100,000 have been invested in new machinery and upon improvements to the property.

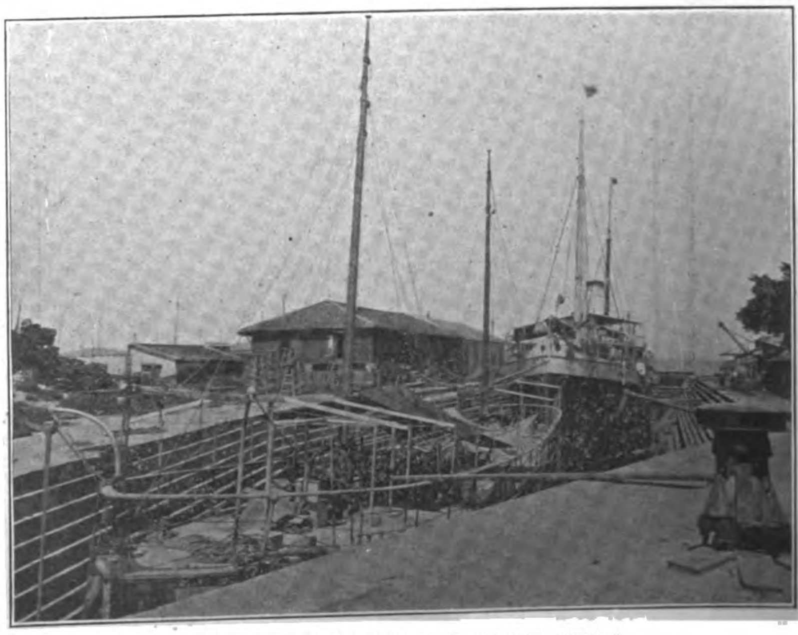
The company carries on the business of marine, mechanical, and electrical engineers, shipbuilders, boiler-makers, and iron and brass founders. They possess a well-constructed granite dry dock, capable of taking vessels up to 310 feet between perpendiculars; machine shop, foundry, boiler shed, smithy, and carpenters' shed, equipped with modern machines;



AMOY ENGINEERING WORKS

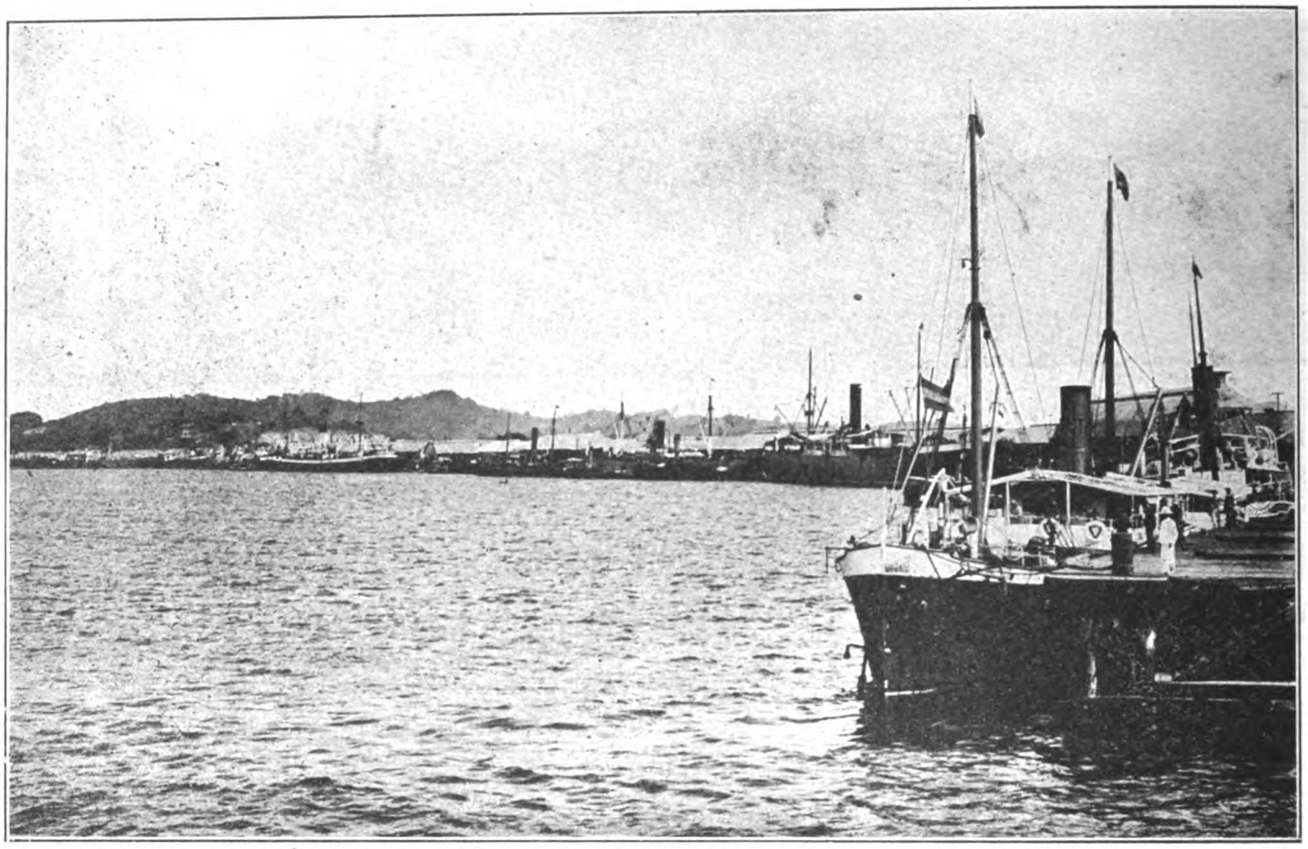


AMOY ENGINEERING CO.'S WORKSHOP



GRANITE DOCK OF THE NEW AMOY DOCK CO.

THE TANJONG-PAGAR DOCK BOARD



GENERAL VIEW OF THE TANJONG-PAGAR DOCK WHARVES

This government institution succeeded in 1906 to the property of the Tanjong Pagar Dock Company of Singapore and extensive plants including harbor work and dockyard extension placed under its direction. Among the important works included having reference to Far Eastern Shipbuilding was the construction of a new dock 860 feet in length, with at entrance 100 feet, and depth, 35 feet, in addition to four large graving docks then in operation. Besides the docks the Board controls the Tanjong Pagar Wharf two miles in length and the Keppel Harbor Wharf 300 feet long. These wharves are equipped with powerful sheers and cranes with lifting capacity] of 45 tons. Bodegas with a capacity of over 300,000 tons are provided for cargo. The equipment for salvage work is very comprehensive and a fleet of tugs, launches and lighters is engaged in the service of the Board.

The following is a description of the docks and shipbuilding yards of the Board:

Graving Docks.—Victoria Dock (Tanjong Pagar), opened in 1868, was built of granite. It is 450 feet long, 65 feet wide at the entrance and has 20 feet of depth in water on the sill at highest Spring tides.

Albert Graving Dock.—(Tanjong Pagar) was opened in 1879 and is constructed of concrete. Its length is 480 feet; width 60 feet at entrance and its depth 21 feet on the sill at highest Spring tides.

No. 1 Graving Dock (Keppel Harbor).—Opened in 1845 and constructed of granite; 415 feet in length; 42 feet wide at entrance; depth, 15 feet on the sill at high water tides.

No. 2 Graving Dock (Keppel Harbor)—Opened in 1869 and constructed of granite; 444 feet in length; 65 feet wide at entrance and 19 feet in depth on the sill at highest spring tides.

Graving Dock (Prye, Province of Wellesley).—This dock is 340 feet long, 50 feet wide at the entrance with a depth of 15 feet on the sill at Spring tides; also Patent Slip at Prye is capable of accommodating vessels up to 110 feet on the keel.

In addition to these docks there is now a new dock 860 feet in length. All the docks are equipped with powerful centrifugal pumps and may be emptied in from two to four hours as required. The workshops fitted with steam and hydraulic machinery of the most modern type and equipped with every description of tools required for the construction and repair of ships and machinery, adjoin the several docks.

Machine Shops.—The machine shops are fitted with a large variety of modern labor-saving appliances. The lathes are capable of boring cylinders 100 inches in diameter, turning pistons 9 feet in diameter, and shafting up to 45 feet in length.

Each department has suitable cranes for handling weights, with every appliance required for the efficient and expeditious construction or repair of hulls and machinery of iron, steel, or wooden vessels.

Extensive Blacksmiths' shops adjoin the machine shops, with appliances capable of making forgings for crank shafts of 12 inches in diameter, and welding shafting up to 11 inches in diameter.

The Foundries are fitted for making every description of iron, brass and bronze castings, propellers and cylinders up to 10 tons in weight.

The boilermaking shops are fitted with the latest hydraulic machinery, overhead travelling cranes, &c., capable of constructing boilers up to 50 tons.

Repairs to boilers are executed with the utmost despatch. Hydraulic jacks to lift 150 and 300 tons, suitable for raising the furnace crowns of marine boilers, are part of the equipment.

Telephone Service.—Every section of these gigantic works may be reached by telephone, instruments having been installed in all the wharves, docks and offices and the system is made available to the public without charge.

Shipbuilding Yards—These yards are suitable for building steel, iron, composite or wooden vessels of any size, and the Board will furnish plans, specifications, and all requisite information on application. There are a number of steam launches always in course of construction, ready for completion at short notice.

The development of this splendid system of docks, so closely identified with the history of Singapore, originated in the early enterprise of the Tanjong Pagar Dock Company. The original premises of the company were situated about a mile westward of the city, but in 1900 the company purchased the property of the New Harbor Dock Co. situated about three miles farther westward of the city. In 1904 the government decided to take over the whole of the property and in 1906 the award was made and the transfer consummated. The award amounted to about £3,000,000. Since that time the direction of the docks has been under the control of the Tanjong Pagar Dock Board.

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and a 20-ton crane on the sea-wall for the handling of heavy substances. Among the machines are a plate-rolling machine, capable of rolling plates up to 18½ feet; a punching and shearing machine, which can take 1¼ inch plates; and some up-to-date lathes, upon one of which the largest tail-shaft can easily be manipulated.

The company can undertake pratically any repairs which coastwise shipping may demand. It has been fairly successful, from a financial point of view, from the start, and its future prosperity seems to be assured.

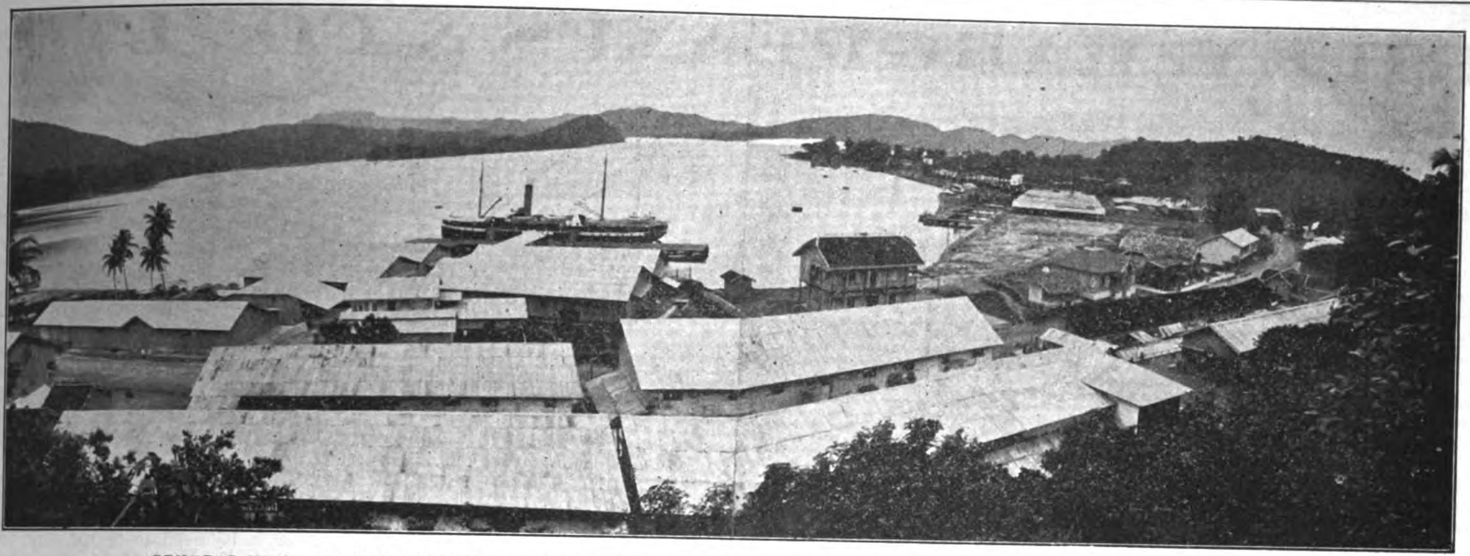
The works are superintended by Mr. Robert W. Black, an engineer possessing a wide and varied experience.

THE AMOY ENGINEERING COMPANY, LIMITED

Chinese capital controlled and directed by a British engineer is the combination behind the Amoy Engineering Company, Ltd., of Kulangsu, Amoy.

The undertaking was registered in Hongkong, in 1893, as a limited liability company, with a capital of $30,000. The Company builds and repairs launches, repairs steamers in harbor, and does general engineering work. Its slip for building launches, tugs, etc., is 110 feet in length, and its patent slipway 290 feet. It has also a double-power capstan, and sheers capable of raising anything up to ten tons.

The managing director and superintendent of the works is Mr. J. D. Edwards.



GENERAL VIEW OF THE PORT OF SABANG, UNDER CONTROL OF THE SABANG BAY HARBOR AND COAL COMPANY

SABANG BAY HARBOR & COAL CO.

Up to about 1893, Sabang Bay, in Sumatra, and the Island of Pulo Weh, in which the harbor is situated, was inhabited by only a small number of natives. In this year the advantage of Sabang as a base for the numerous Dutch gunboats, etc., then occupied in subduing the Achinese, became recognized, and with this in view a workshop fitted for ordinary repairs to steamers was erected, and a Government floating dock with a lifting capacity of 3,000 tons was installed, and is in use at the present time. It is only, however, within the last five or six years that the situation of Sabang as a port of trans-shipment for the rapidly-growing trade of the northern part of Sumatra, and as a coaling port for steamers proceeding through the Straits of Malacca, has been appreciated.

From the inception of its commerce, the Port of Sabang has been under the control of a private concern. The Sabang Bay Harbor and Coal Company, which, under the immediate auspices of the Netherlands Trading Society, has shown commendable energy in pushing the fortunes of its undertaking. This private company has built the entire stretch of wharves which now line a large part of the bay, from its own funds without Government subsidy.

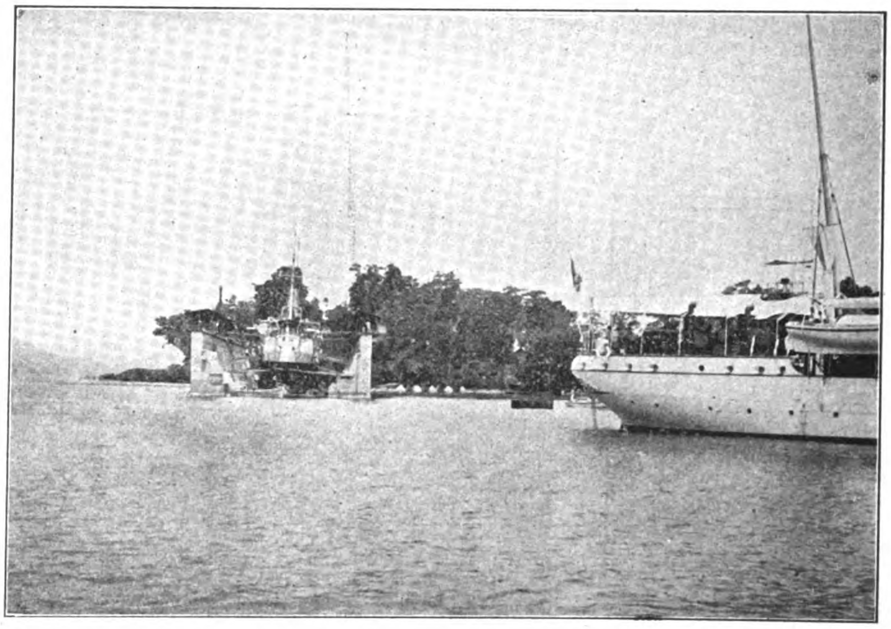
As a coaling port, the geographical position of Sabang brings it in the track of all vessels proceeding to or returning from the Far East, either *via* the Suez Canal, or the Cape of Good Hope.

The company has installed a plant consisting of four electric transporters, each weighing 120 tons, running on rails all along the numerous coalsheds, 24 in number, and when discharging a cargo, iron buckets containing 25 hundredweight of coal are filled in the holds of the colliers, thence lifted and carried by travellers above the sheds from which points they are lowered through hatches and automatically capsized upon touching the coal heap.

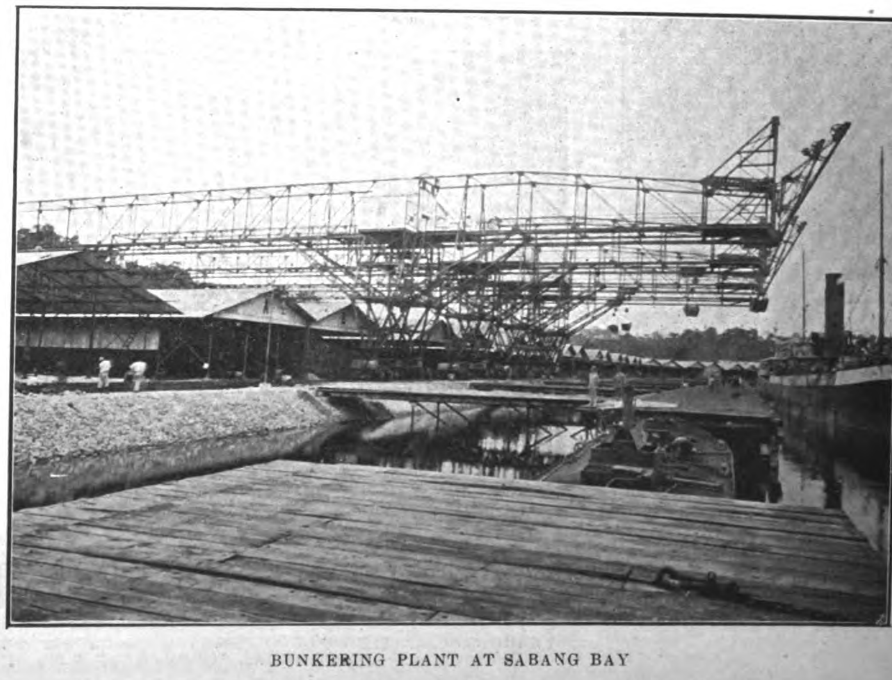
In the reverse operation of bunkering, buckets are also used wherever possible, but owing to the construction of steamers it frequently happens that part, at any rate, of the coal must be placed on board with baskets. In such cases the baskets are filled in the sheds and carried on board by the travellers where they are deposited in the most suitable spot for the completion of the operation by the force of coolies employed by the company.

These transports have now been in use for more than two years, during which time they have worked to the satisfaction of the company, and also to the satisfaction of the steamship owners using the port, who have benefited by the quick despatch obtained.

The company has from the first made no charge for harbor dues, pilotage, etc., on steamers calling for bunkers, all such charges being invariably included in the prices quoted for coal. This absence of charges involves also a complete absence of many of the formalities and petty delays so irksome to captains and owners.



FLOATING DOCK AT SABANG BAY



BUNKERING PLANT AT SABANG BAY

RILEY, HARGREAVES & CO., LTD.

The firm of Riley, Hargreaves & Co. was originally started in quite a small way as far back as 1865, and has since developed into one of the most noteworthy concerns of its kind in the Far East.

It was converted into a Limited Liability Company in 1899, with a capital of $1,000,000.00, Straits currency. It possesses branch works and establishments in the five leading towns of the prosperous Federated Malay States, and has agencies throughout the neighboring Dutch Islands, Siam, Indo-China and the Philippines. The company is in the unique position of owning the only privately managed ship building yard in Singapore.

Its shipbuilding establishment is situated on a spit of land known as Tanjong Rhu, about three miles from Singapore town, with a frontage to the sea on the East side and facing the mouth of the Gaylang River on the West side.

On the East side there are three slips, the largest of which is capable of taking vessels up to 170 feet, there is also a wharf and steam sheerlegs with a lifting capacity of 40 tons. On this side is an extensive saw mill fitted with modern labor saving machinery, and large stocks of selected teak and other hardwoods all ready seasoned and fit for immediate use are stored.

On the West side there are 10 berths suitable for building ships in steel or wood from 30 to 300 feet long. There are also the well equipped blacksmiths', boilermakers' and fitting shops well stocked stores, and the moulding loft.

The yard is under skilled European supervision and the work turned out compares favorably with that of home establishments.

Riley, Hargreaves & Co., Ltd. are at present devoting much attention to the design and construction of motor lighters, river launches and stern wheel steamers, which are in great demand by the many rubber companies whose properties are situated in places only accessible by water.

Among vessels built and engined by the Company may be mentioned the "Seamew" (the steam yacht built for the Governor of the Straits Settlements), length 197 feet, Engines of Triple Expansion Condensing Type 15", 25" and 40"×24", and the "Sarie Borneo" length 195 feet, Engines of Triple Expansion Condensing Type 17", 27", and 43"×33".

In addition to its shipbuilding business the firm has separate departments and establishments in which are carried out civil, mechanical and electrical engineering.

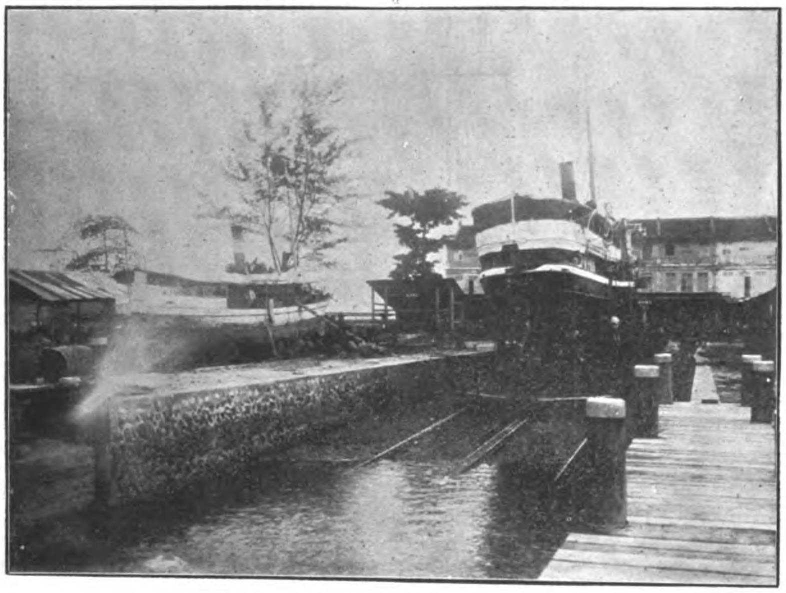
The town stores situated in Battery Road are replete with every class of ships' and engineering stores, and captains or owners of vessels calling at Singapore may confidently rely upon their requirements being fulfilled with promptitude and despatch.

The firm's launch meets each incoming steamer, and special attention is paid to any commands entrusted to its representative.

The electrical department have installed complete plants in several of the local steamers, and it speaks well for their knowledge of tropical conditions that not a single repair or alteration has been made since the plants were handed over, a great difference from the installations which have been sent out by home makers, as specially prepared for the tropics, and which require considerable tuning up before they are satisfactory.

The Civil Engineering Department recently carried out the construction of a Ferro Concrete Lighthouse at One Fathom Bank, Straits of Malacca, which is believed to be the only one of its kind, built in the sea, in the world. Other work in hand includes wharves for the Siamese States Railways in the territory recently ceded to Great Britain, and the laying of a large gravitation main in connection with the new water works scheme for Singapore.

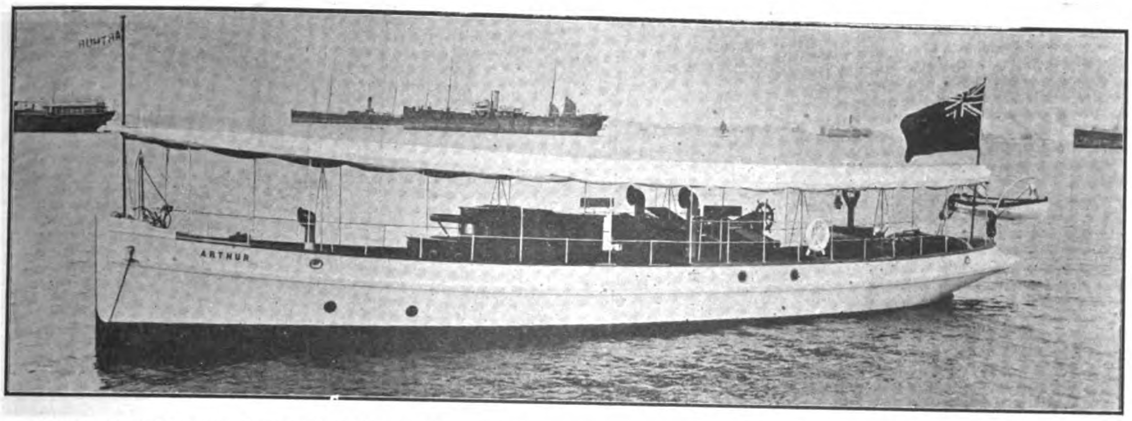
STEEL LIGHTHOUSE AT FORT CANNING, OVERLOOKING THE HARBOUR OF SINGAPORE. HEIGHT FROM GROUND TO FOCAL PLANE, 58 FEET. BUILT FOR THE COLONIAL GOVERNMENT S. S.



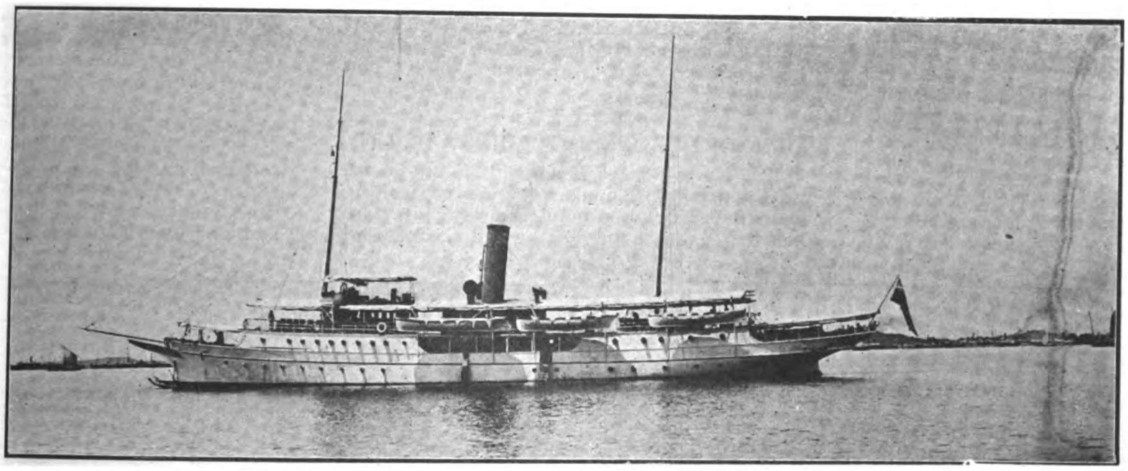
VESSELS ON COMPANY'S SLIPWAY

FERRO CONCRETE BRIDGE AT PANDAN, NEAR SINGAPORE. BUILT FOR THE COLONIAL GOVERNMENT S. S.

FERRO CONCRETE LIGHTHOUSE AT ONE FATHOM BANK, STRAITS OF MALACCA. HEIGHT FROM H. W. L. TO FOCAL PLANE, 96 FEET. BUILT FOR THE COLONIAL GOVERNMENT, S. S.



MOTOR LAUNCH "ARTHUR," LENGTH 80 FEET, BUILT BY RILEY, HARGREAVES & CO. FOR THE ASIATIC PETROLEUM CO., LTD., SINGAPORE



COLONIAL YACHT "SEAMEW," 197 FEET LONG. BUILT FOR THE GOVERNOR OF THE STRAITS SETTLEMENTS

The engineering works at Kampong, Malacca, comprise boiler fitting and blacksmiths shops, foundry and erecting yard.

The boiler shop, the power of which is derived from a suction gas engine, has one of the most up-to-date hydraulic rivetting plants in the Far East, and in addition to manufacturing all classes of boilers, many miles of light steel tested pipe lines for use in the tin mines are turned out annually.

The fitting shops are equipped with modern machinery, the largest lathe being capable of turning shafts up to 30 feet long.

The blacksmiths shops have a full range of forges and steam hammers and all kinds of light and heavy work is undertaken.

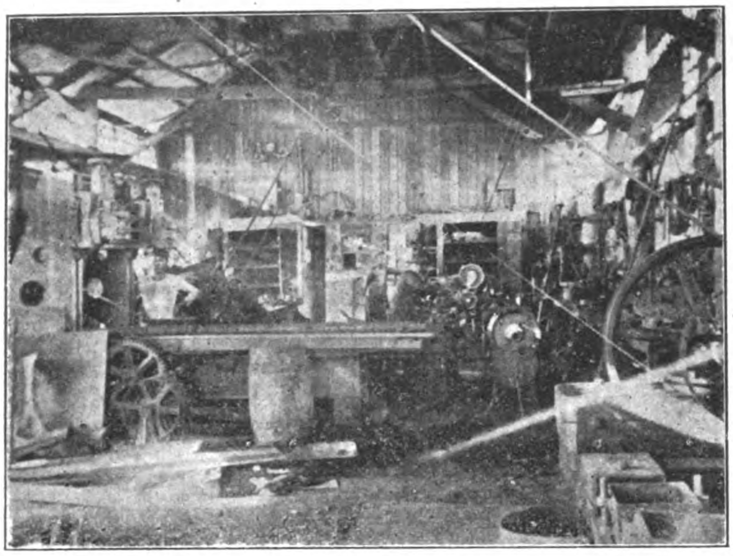
The foundry has a capacity of single castings up to 10 tons and is under efficient European supervision.

At the works, Kampong Malacca, are kept large stocks of iron and steel in all the British Standard Sections, tubes, contractors plant, mining and railway equipments, paints, oils and sundries.

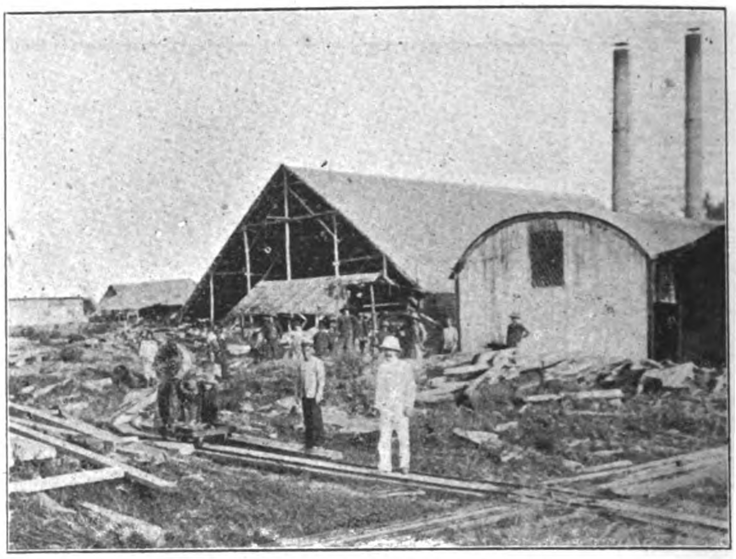
They have made a speciality of rubber machinery and accessories, and are sole Agents for the well known firm of Bertrams Ltd., Edinburgh.

Large stocks are held of suitable sections in girders, angles and tees to meet demands for the supply of Rubber Factories, Drying Stores, smoke houses, coolie lines, bungalows, etc.

ROUGH TOP ENCLOSURE BETWEEN THE NORTH BORNEO TRADING COMPANY'S MILL AND OLD WORKSHOP, SAWMILLS, SHIPBUILDING SHEDS, OFFICES, ETC., IN THE BACKGROUND



NORTH END OF ENGINEERING SHOP



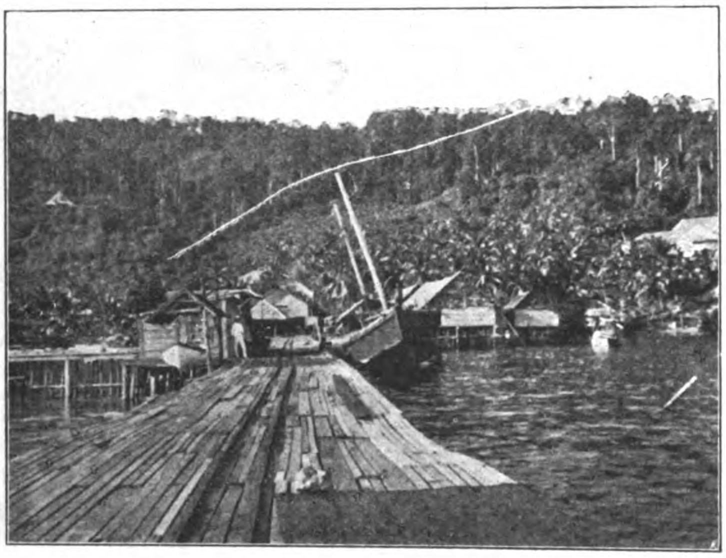
BOILER-HOUSE OF THE MILLS; SHIPBUILDING SHEDS, CORNER OF WORKSHOP IN THE DISTANCE

THE CHINA-BORNEO COMPANY, LTD., SANDAKAN

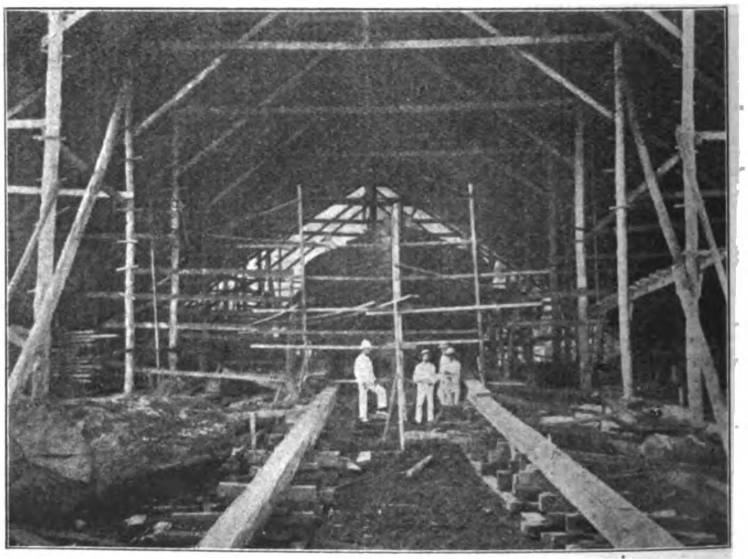
The China-Borneo Company, Ltd., was formed in 1888, but has been twice reconstructed. It has now a capital of $720,000 and has paid good returns to shareholders for years past. In Sandakan, Borneo, the Company has two large sawmills, as well as a patent slipway for vessels up to 800 tons and engineering shops. It does all its own repairs, lays its own jungle railways, builds launches and lighters, and does general engineering. The labor staff numbers about a thousand Malays and Javanese.

THE NORTH BORNEO TRADING CO., LTD.

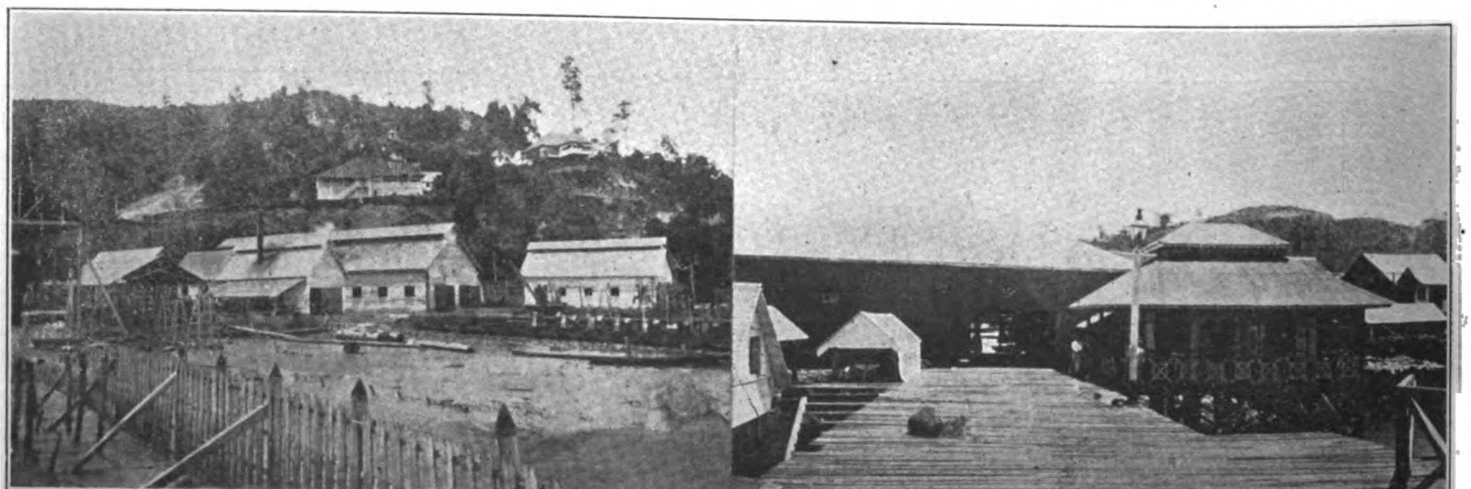
The North Borneo Trading Co., Ltd , with headquarters at Sandakan, besides controlling many departments of industry, engage in shipbuilding, general engineering and contracting. The shipbuilding yard is capable of turning out any kind of wooden vessel up to 500 tons and has turned out large numbers of steam launches, lighters and lorchas. All the machinery is imported from Great Britain. The workshop is up-to-date and engineering work of all kinds is carried on with dispatch. A certified engineer is in charge of the entire works. The company's plant is located inside Sandakan Bay and vessels drawing 18 feet may moor alongside the company's wharf.



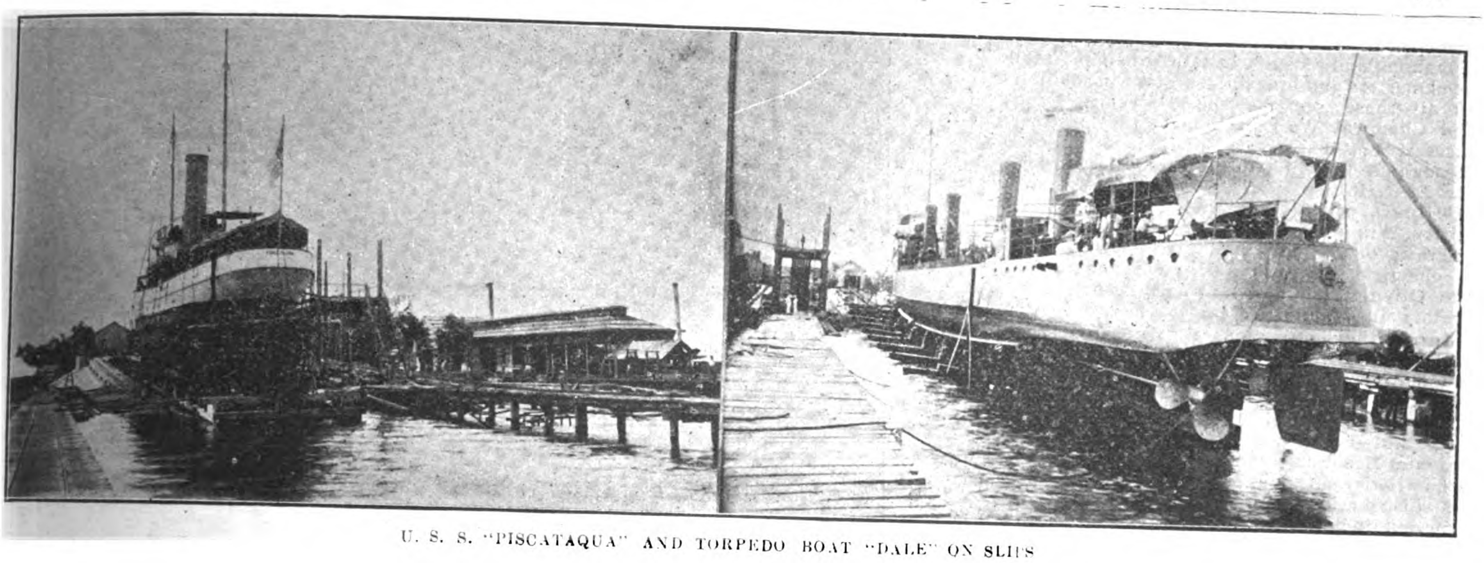
WHARF OF THE ENGINEERING SHOP



PREPARING TO LAUNCH A BIG LIGHTER

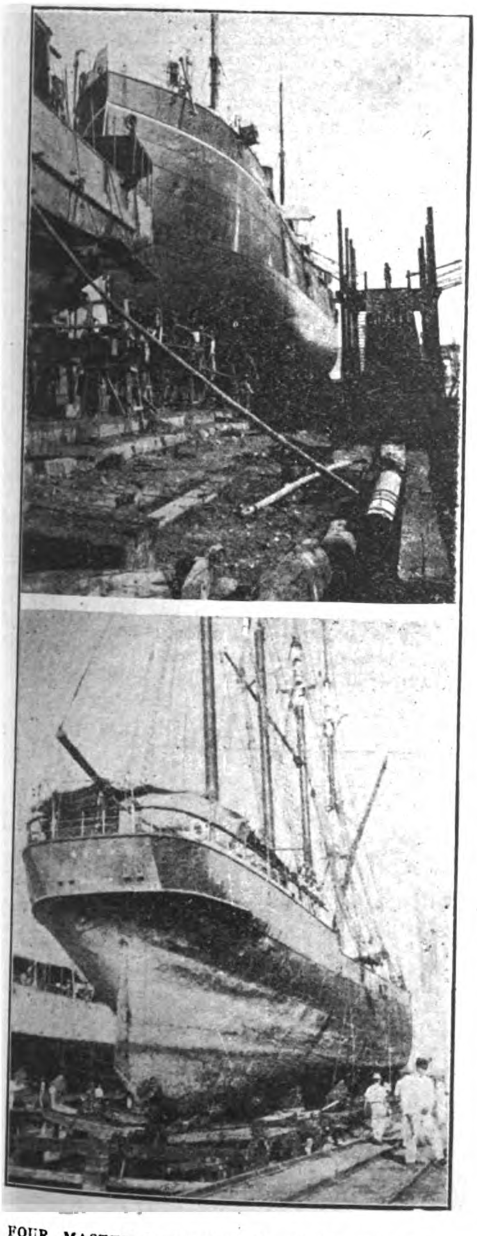


THE CHINA-BORNEO CO.'S PATENT SLIPWAY, SHIPBUILDING PLANT AND ENGINEERING SHOPS—SLIPWAY TAKES VESSELS UP TO 800 TONS ANY STATE OF TIDE.—VIEW OF THE CUSTOM HOUSE AND WHARF



U. S. S. "PISCATAQUA" AND TORPEDO BOAT "DALE" ON SLIPS

EL "VARADERO" DE MANILA



FOUR MASTED SCHOONER "ALTA" AND S. S. "MINAS DE BATAAN" UNDERGOING REPAIRS AT CAÑACAO

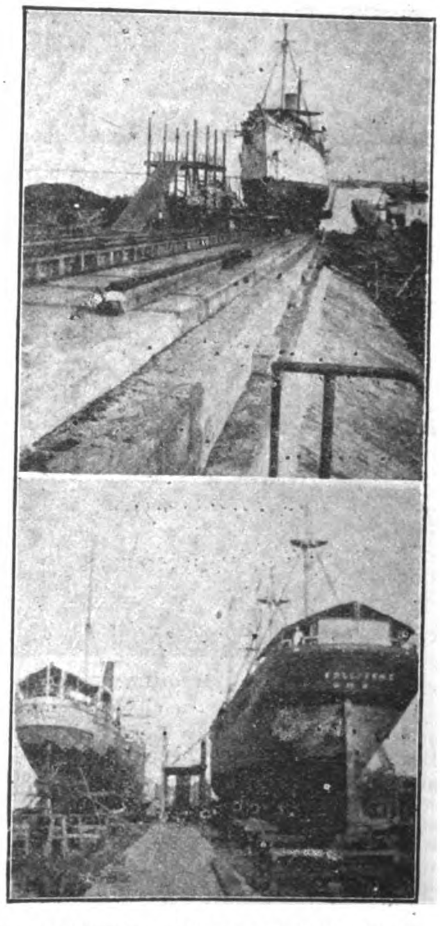
El Varadero de Manila is a limited liability company, established in the year 1884, being the oldest established in the Philippine Islands. The company possesses ship-yards, two marine railways and workshops situated at Cañacao, Cavite, capable of turning out vessels up to 2,400 tons gross register. The workshops consist of Machine shop, Foundry, Black-smith shop, Copper-smith shop, Boiler-shop, and Saw-mill, all fitted out with the most modern machinery. The firm is capable of undertaking ship-building, ship-repairs, tank construction work, etc., etc. The ship-yards and slip-way are situated in the Bay of Cañacao in close proximity to the historic battle field. The gun-boats "Callao," "Arayat," "Pampanga," "Samar," "Paragua," captured from the Spaniards by the U. S. fleet, were built by the Varadero company; and the "Callao" and "Samar" are still in service on one of the rivers of China.

The "Varadero" has proven its ability to handle its share of the government work, within its limitations, and the following war vessels have been successfully docked and repaired since the American occupation of the Islands: The United States ships "Wilmington," "Helena," "Petrel," "Castine," "Marietta," "Princeton," "Vicksburg," "Annapolis," and the captured gunboats "Isla de Cuba," "Isla de Luzon," "Don Juan de Austria," "Villalobos," "Elcano," "Quiros," "Pampanga," "Paragua," "Samar," "Callao" and "Arayat," also the large seagoing tug-boats "Piscataqua" and "Wampatuck." The transport "Pompey," "General Alava" and "Manila" have also been docked and repaired.

The gunboats "Pampanga," "Paragua," "Samar," "Callao" and "Arayat" were built for the Spanish Government during the years 1887 and 1888 at Cañacao, and the excellence of the work is attested to by the fact that the boats are still in service.

Besides the above mentioned gunboats, numerous small merchant vessels for the inter-island coasting trade, and lighters and cargo boats have been successfully built and engined from these shops. One of the gunboats, the "Bulusan," constructed for the Spanish Government was destroyed and sunk by the insurgents. The company also built 12 steel and iron coal barges for the United States navy, shortly after the occupation, to the complete satisfaction of this exacting branch of our service.

The officers of the company are: General Manager, Rafael Reyes; Acting General Manager, Alfonso Rocha; Works Manager, Alexander Young Superintending Engineer, Chas. H. W. Aitken.



U. S. GEODETIC SURVEY STEAMER "FATHOMER" AND COAL HULK ON SLIPWAYS

MARINE BOILER WATER TREATMENT

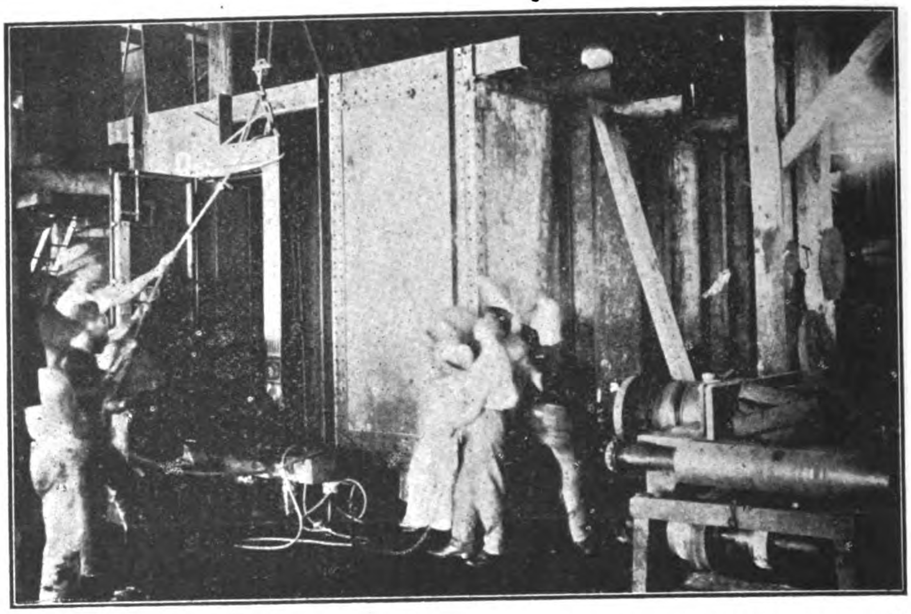
The invasion of Far Eastern territory by the Dearborn Drug and Chemical Works of Chicago in 1910 with their modern methods of treatment of feed water for all classes of boilers by intelligent application of the principles of chemistry instead of by the old "cure-all" preparations, together with their lubricants scientifically produced to give the best possible results, has been marked by the general appreciation of the shipping trade, manufacturers and other interests suffering from the serious depreciation of boilers from the action of salts and gases developed from the waters utilized. These works have established

branches at Tokyo, Tientsin, Shanghai and Hongkong and recently installed their oriental headquarters and branch laboratory in Manila. In all these sections the Dearborn Drug and Chemical Works have met with the usual success that has attended their operations throughout the United States and territories. Mr. E. C. Brown, a graduate of the University of Illinois where he took a course in Chemistry, is in personal charge of the Far Eastern interests of the firm and Mr. F. O. Smolt, a chemical engineer, is now in charge of the Oriental Headquarters and Branch Laboratory in Manila.

In all their operations the Dearborn Drug and Chemical Works include twenty-four active branches and they are naturally expansionists. The work of manager Brown in less than a year in the Orient has been most successful and with the establishment of the Oriental Headquarters in Manila, he is taking the initiative in making that American port his distributing center for the East. The program includes an invasion of the Straits and Federated Malay States extending the Dearborn circle of branches until no part of the globe is neglected.

Having special reference to Marine Boiler Water Treatment which is of the greatest interest to the extensive shipping interests of the Orient it may be noted that the Dearborn Drug and Chemical Works have given special attention to the treatment of waters used as supplies for marine boilers so as to prevent scale or incrustation and when it is remembered that a treatment satisfactory when applied to feed waters of one character would serve no good purpose if prescribed for another, the adaptation of treatment arrived at by careful chemical tests must appeal to those who have suffered from the "cure-all" faker who prescribes the one kind of treatment for all the different water defects.

The Works have a central laboratory in Chicago in connection with their manufacturing department and the former is to the latter what the prescription druggist is to the physician. In the laboratory samples of water are analyzed in order to combat successfully the evils of scale, deposit, priming, foaming, pitting, grooving, corrosion, etc. The Branch Laboratory in Manila will serve the same purpose for the Orient as the Chicago Laboratory for the United States. Mr. F. O. Smolt who is in charge is a chemical engineer, and thoroughly conversant with the company's methods and products. A large stock of lubricants is also kept in stock.



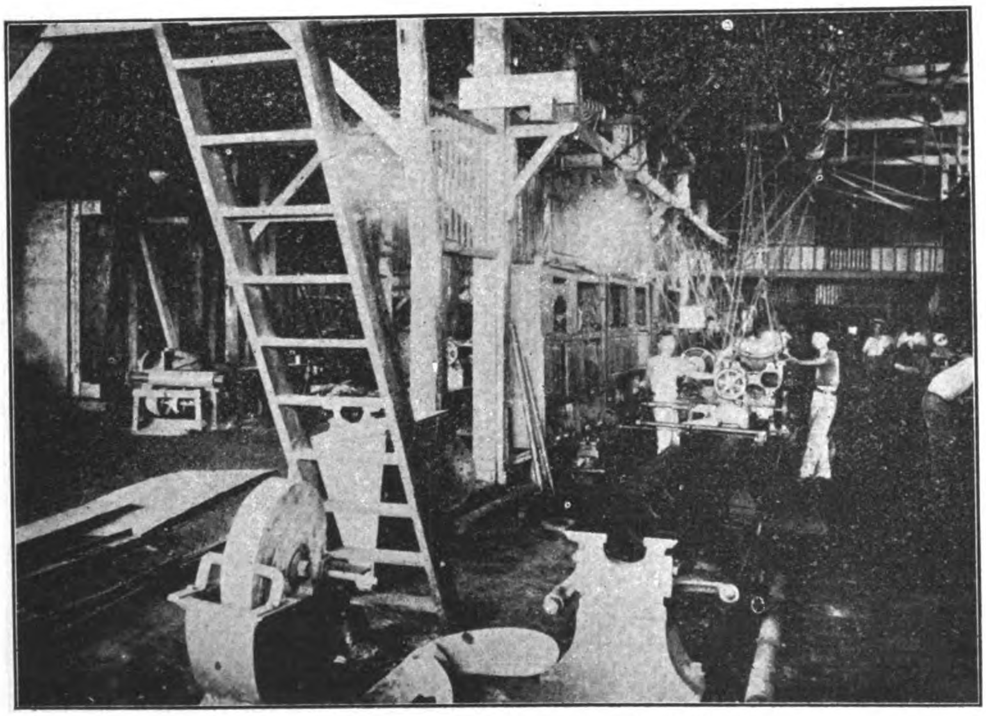
SAN NICOLAS IRON WORKS: STEEL SAFE DEPOSIT VAULT MADE FOR MORO PROVINCE

THE SAN NICOLAS IRON WORKS, LTD.

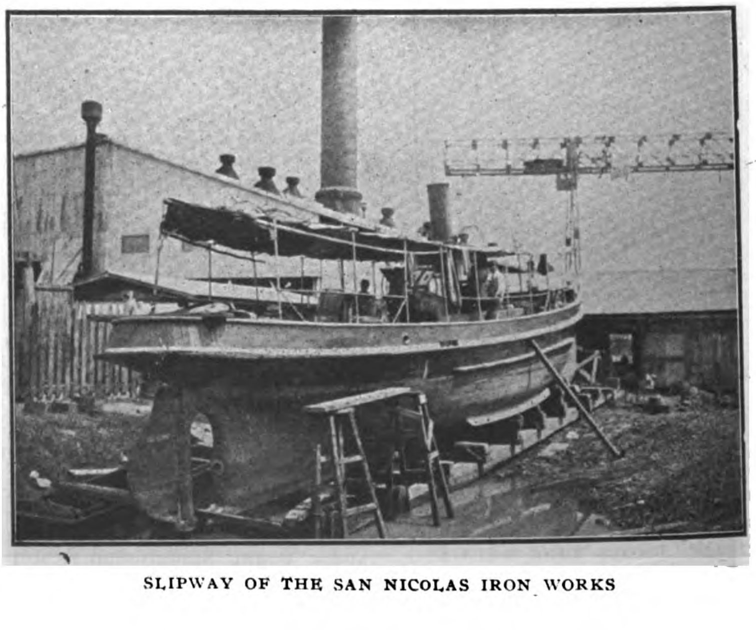
This company was organized in 1900 with a capital of ₱300,000 and established an up-to-date plant in San Nicolas district, Manila. Messrs. Smith Bell & Company are the General Managers and the enterprise has met with marked success from the beginning. The company has a large engineering repair patronage and its machine shops and foundry are capable of handling all classes of construction. In the shipbuilding department only small vessels are built and repaired, but as this class of vessels predominate in local shipping the slipway is rarely empty.

The foundry and machine shops are equipped with all the most modern facilities for expeditious handling of orders. Recently a two-ton casting was turned up on the lathes in these works for the Philippine Government, a most difficult undertaking for a plant of this capacity, but which was promptly and satisfactorily completed, reflecting great credit on the management.

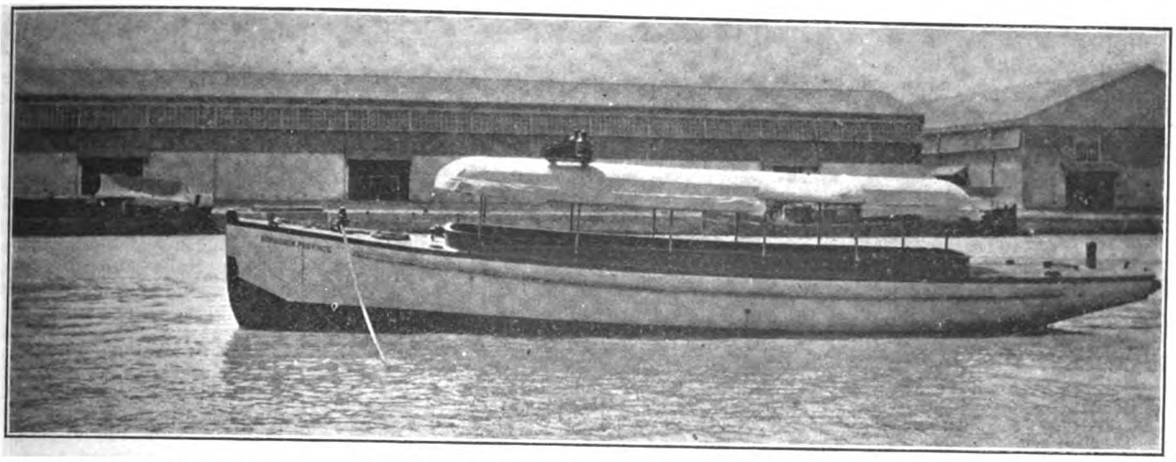
Many of the lighters used by the U. S. Army and Navy in the islands were constructed by the San Nicolas Works and several deposit vaults for the insular government constituted another feature of their activity. Mr. A. C. Sutton, the present manager, has been in charge for the last three years and his direction has been marked by ever increasing expansion of the facilities of the works to keep pace with the increased industrial activity in the archipelago.



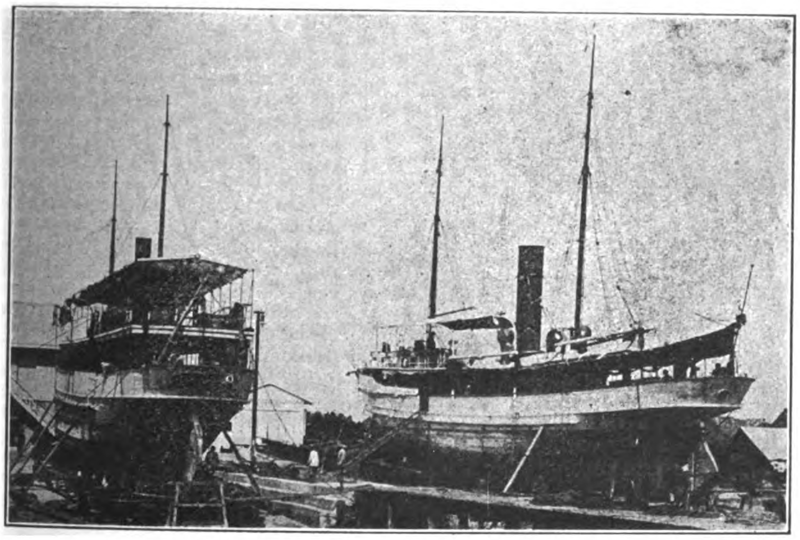
MACHINE SHOP OF THE SAN NICOLAS IRON WORKS



SLIPWAY OF THE SAN NICOLAS IRON WORKS



MOTOR BOAT IN THE SERVICE OF SORSOGON PROVINCE CONSTRUCTED BY MESSRS. R. H. COOPER & CO. AND EQUIPPED WITH MEITZ & WEISS ENGINE



MARINE SLIPWAY

MANUEL EARNSHAW & COMPANY, LTD.

The above company was incorporated for ₱1,600,000 in 1909 and succeeded to the prosperous business of Messrs. Manuel Earnshaw & Co., one of the oldest engineering firms in the Philippines. The offices of this company are located at 15 Calle Barcelona, Binondo, Manila. The company controls an extensive engineering works in Manila on Calle Barcelona besides a large iron and brass foundry at 151 Calle Reina Regente, and a slipway at Cavite. Its operations include the construction and repairs to vessels and launches, boilers and all branches of mechanical and marine engineering.

The Earnshaw firm was established by Daniel Earnshaw who came to the islands in 1864 at the request of the Spanish Government to build a marine slipway in Cavite. After this work was completed he established himself in Manila in the engineering business and foundry work. The firm took charge of much of the work for the American Government and the navy during the early days of occupation and has steadily expanded. The officers of the company are: President, Mr. Manuel Earnshaw; First Vice-President, Tomas Earnshaw; Second Vice-President and Treasurer, Mr. Daniel Earnshaw, Jr.

H. R. COOPER & CO., MANILA

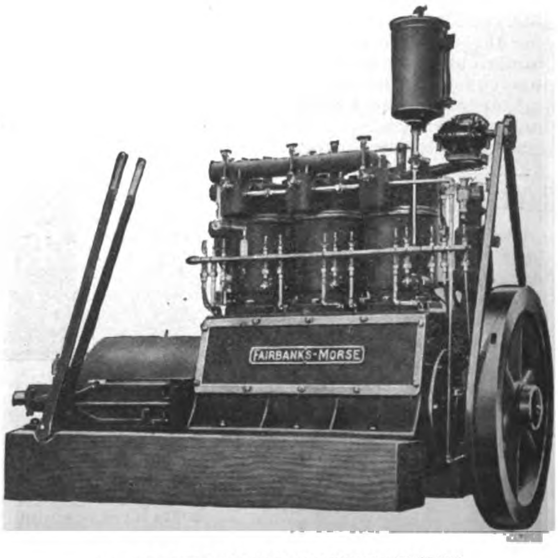
This company may be said to be among the pioneers of the modern motor boat industry in the Philippines. It has the exclusive agency for the Meitz & Weiss kerosene motor engine in the islands and perhaps no company has installed a greater number of motors in local craft than Messrs. Cooper & Co. Accompanying this sketch is the reproduction of a photograph of a launch built for a provincial government and typical of a large number constructed in Manila to the order of the company and equipped with Meitz & Weiss motors of various capacities.

The company makes a specialty of high grade construction. Only the best grades of Philippine hardwoods are used in building the frames and all the work under its direction conforms to standard specifications. The frames are copper-fastened throughout; the sheathing and deck planking is of teak and Muntz metal sheathing is utilized.

The launches are built, completely fitted, and delivered ready for sea with the exception only of fuel. The labor employed is Chinese and Filipinos. The carpentry work is done by the former and the machinery installation by native mechanics.

MESSRS. CASTLE BROS. WOLF & SONS, MANILA

Fairbanks-Morse & Co., through their Agents in Manila, Messrs. Castle Bros.-Wolf & Sons, have done quite a fair amount of



FAIRBANKS-MORSE MARINE ENGINE

THE MANILA TRADING & SUPPLY Co.

Since American occupation of the Philippines there has been an increased call for better methods of transportation than that offered by primitive sail boats and bancas propelled by paddle or pole. The call first came from Government officials who, in their inspection trips to out of the way places, found need for better and faster boats. The Government therefore placed many motor boats in service, and the advantages offered by such boats soon appealed to the natives. Today the natives in the Philippines are looking for better means of transportation, with the result that an increasing demand has been found for small internal combustion engines at moderate price.

The Manila Trading & Supply Co. was one of the first concerns to recognize the large field for motor boats, and commenced a campaign of demonstration. The importance of having a reliable engine, which, while not the cheapest, was at least within the reach of the Filipinos, was realized and the agency for the *Ferro Engine* was secured for the Philippines and Southern China. For speed work and for large boats, the agency for the *Sterling Engine* was secured.

The result of their campaign may be seen in all parts of the Islands. Shallow draft boats have been built and equipped with *Ferro Engines* for use on the rivers. Many *Ferro Engines* have been installed in bancas and other small native built boats.

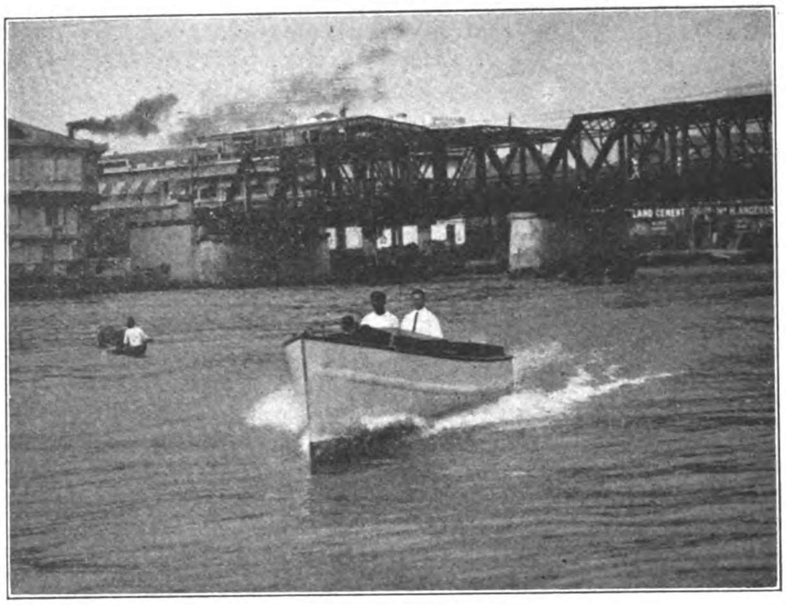


FIGURE I.—THE MANILA TRADING & SUPPLY CO.

Of the special motor boats sold by The Manila Trading & Supply Co., the boat shown in Fig. I is one of the best. This boat was built by the Hongkong and Whampoa Dock Co., and is now owned by the Customs Service, being used for night patrol work in Manila Bay. The boat is about 35 feet long and is equipped with a 25 40 H. P. Sterling Engine for speed work, an electric arc search light and dynamo, and an electric horn. The system of mufflers used makes the boat practically noiseless. The boat made on its trial trip 16½ miles per hour.

The Bureau of Customs has also had in use for about three years three converted ship's boats equipped with Ferro Engines. One of these boats has recently been dismantled and the engine, after about three years use, installed in a hull in place of a steam engine and boiler, propelling the boat better than before.

One of the prettiest and fastest boats in the Islands is a speed boat on the S. S. "Aguilar". That boat is 25 feet long and is equipped with an 18-25 H. P. Sterling engine. It makes about 18½ miles per hour. It was built at the Cavite Navy Yard. A similar boat for use on the S. S. "Rizal" is now being built at the Bureau of Navigation.

An unusual type of boat is one in use by the Bureau of Internal Revenue on the Cagayan River. That Boat has triple screws, having 7½ H. P. Ferro Engines on the two sides and a 15 H. P. Ferro engine in the center. The boat is about 40 feet long, has a cabin, and is lighted throughout with electricity. The boat was built at the Taikoo Docks. The electric lighting system is of the Dayton launch type, by which a dynamo charges storage batteries when the engines are running, thus permitting the use of the electric lights at any time, whether the dynamo is running or not.

Figure II represents a type of shallow draft boat supplied by The Manila Trading & Supply Co , such as is used on the shallower Philippine rivers. The boat is equipped with a 15 H. P. Ferro engine. There are several boats of this type in use in the Philippines.

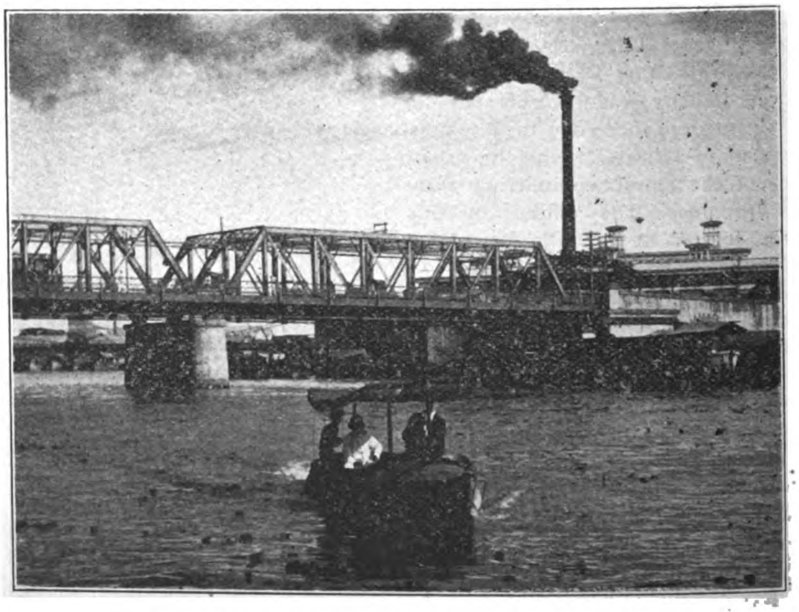


FIGURE II.—THE MANILA TRADING & SUPPLY CO.

At the present time many native bancas are being equipped with Ferro engines of small power, as such engines have been found to meet the needs of the natives in fishing boats and for transporting passengers and cargo on shallow rivers.

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business, more particularly in their stationary and vertical kerosene engines and gasoline and kerosene motors for launches—indeed, of these latter they have shipped from 3 H. P. to 100 H. P.

In addition their windmills under the mark "Eclipse" are well known throughout the Islands.

It is some four years since they first introduced their Duplex Steam pumps for tanks and boiler feed and their success has been more than satisfactory.

Owing to the difference in price between kerosene and gasoline the motors and engines operated by the former are much more in demand and the low consumption combined with the steady work of the Fairbanks-Morse Motors, whether under full power or less, strongly recommends them to the operator.

NEW RUSSIAN REVENUE CUTTERS

Five new motor boats are under construction by the Russian Government for revenue service on the Amur River. The power equipment is to be Fairbanks-Morse three cylinder heavy duty Marine Engines developing 30 horsepower on kerosene.

It is interesting to note that the order for these engines resulted from the sale of a 15 horsepower Fairbanks-Morse Marine Engine to the Russian Government some time ago, and which gave such reliable service that the new boats were ordered to be equipped with the same make of engine.

The manufacturers have just issued a beautiful new catalog describing all types of Marine Engines, which will be sent free to all of our readers who will write to Fairbanks & Morse Co., Chicago, Ill., U. S. A.

GOVERNMENT DOCKS AND ENGINEERING WORKS, MANILA

Among the most important works in the Philippines are those established on Engineer Island at the mouth of Pasig River and operated by the Bureau of Navigation. Under control of this Bureau are three slipways, two located on the South of Engineer Island served by marine railways with a capacity for receiving vessels of 1,000 tons and 200 tons respectively, while located on the North side of the Pasig is a drydock capable of receiving vessels up to 150 tons.

The slipways served by the marine railways are utilized for the repair of the vessels of the Bureau of Navigation fleet as well as outside work. The 1000-ton dock being used for the larger vessels and the 200-ton for the repair and construction of the smaller craft including river, bay, and sea going launches, cutters, ketches, etc. As the fleet of the Bureau comprises over 46 vessels besides numerous small craft, these slipways are very active.

The dry dock on the North side of the Pasig is utilized by the Division of Port Works for keeping its dredges, launches, etc., in repair and there is now being constructed a 100-ton snag boat which, when completed, will be utilized for removing snags from the Cagayan River. Its equipment will include dredging machinery, derricks, and other machinery for removing the obstructions. The cost is estimated at 75,000 pesos.

Besides these slipways a special division has been established for the construction of motor boats for government service. There is now being constructed a thirty-foot motor launch with six-foot beam for the Governor General as part of the equipment of the s. s. Rizal of the Navigation fleet. A 24 h. p. Sterling engine will provide the motor power and the vessel is designed to make 20 knots drawing 12 inches.

A large number of motor boats have been built on the Island for the different departments of the Government, ranging from ten to eighteen knots. Invariably the engines installed are the Ferro, Sterling, Meitz & Weiss, the Gray and the Remington.

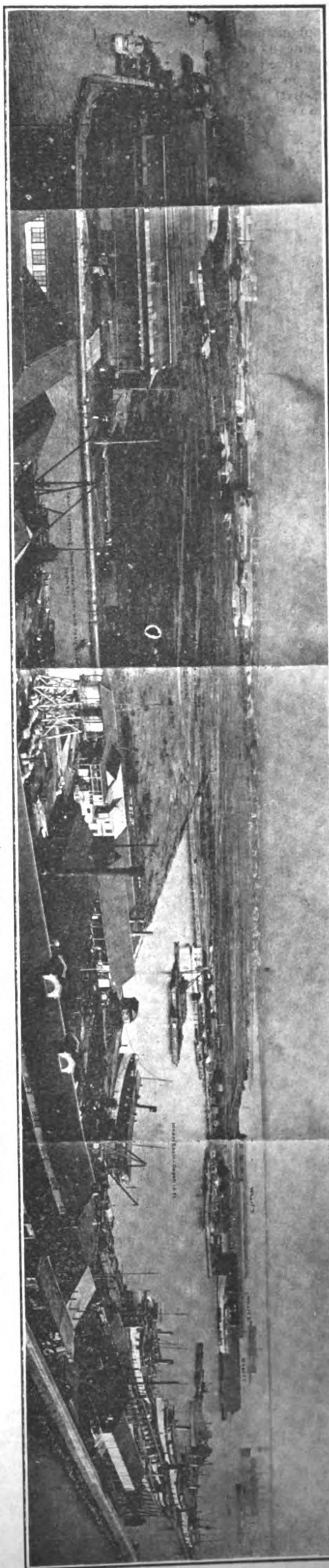
In connection with the shipbuilding and repair plants are large and modernly equipped machine shops and sawmill in which all the necessary machine and wood work covering the construction and repair of vessels is turned out with expedition. Besides the marine work the Light House Division operated by the Bureau of Navigation in conjunction with the shops on the Island provide the most modern facilities for the construction of lighthouse equipment.

The shops are equipped to cast all the propellers for the cutters up to 8.5 feet in diameter from tip to tip with 12 foot pitch. In the steel construction section all the steel towers for the lighthouse service are made. Among the machinery installations is a trip hammer of 100 tons capacity while the moulding and reviting and other machines are of the most modern pattern.

During the year 1910 the receipts for repair of Government vessels, etc., together with such outside work, amounted to ₱579.005. The Docks and shops employ a force of 300 men and the investment in plant alone is approximately ₱750,000.

The site of these works is ideal being situated on the New Harbor with a Pasig River frontage. As the demand for larger works increases there is every reason to believe that more extensive docks will be constructed. There have been several proposals from private capital to purchase the plant site and plant from the Government with a view to installing a modern shipbuilding plant sufficiently large to accommodate large foreign vessels calling at the port, but so far no definite action has been taken. As the works stand they are a valuable asset to the Government and very necessary for the purpose of keeping the insular fleet in repair.

The officials of the Bureau of Navigation in charge of the works are: Director, Frank P. Helm; Assistant Director, Julius S. Reiss; Second Assistant Director, L. A. Barlow; Chief Director of Port Works, K. S. Heck; Master Mechanic, Captain R. H. Robson; Inspector of Machinery, C. G. Helvering.

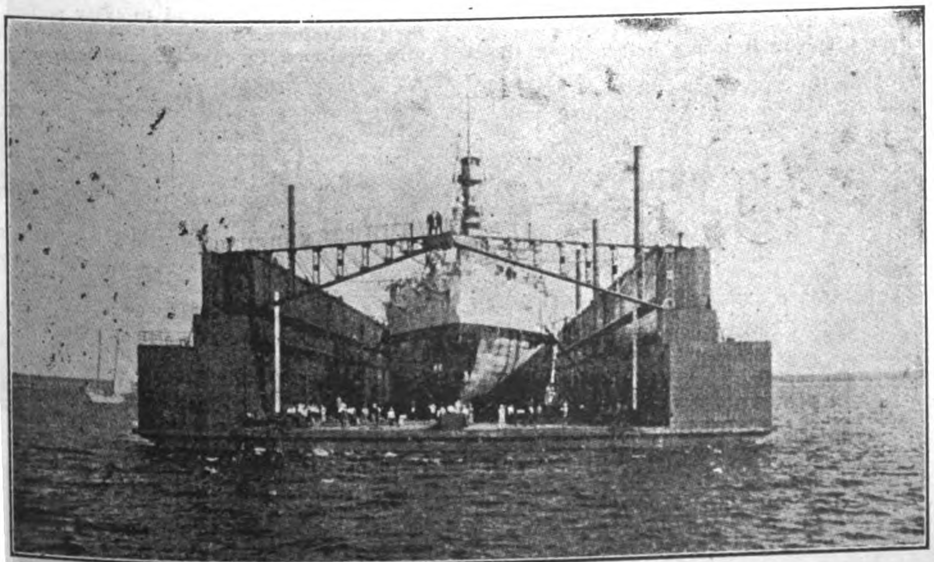


PHILIPPINE GOVERNMENT DOCKYARDS AND ENGINEERING WORKS ON ENGINEER ISLAND, MANILA

U. S. FLOATING DOCK DEWEY

This dock, which is in commission at the U. S. Naval Station at Olongapo, has a capacity to receive vessels up to 18,000 tons displacement. It has a length over all of 500 feet and the same over the blocks with a width at the entrance of 100 feet and a depth of 35 feet. The construction of this floating dock for the use of the Asiatic Squadron of the U. S. Navy was authorized by Congress in 1902 and the contract secured by the Maryland Steel Company of Sparrow's Point, Maryland, in 1903. It was completed in October 1905, and turned over to the Navy Department, by whom it was then towed to Manila making the voyage of 13,000 miles in less than five months from Maryland to Olongapo where it has been in commission ever since with the exception of four months during the year 1910 when it was mysteriously submerged and was with difficulty refloated.

The first test made before taking over was the docking of the cruiser Colorado with a



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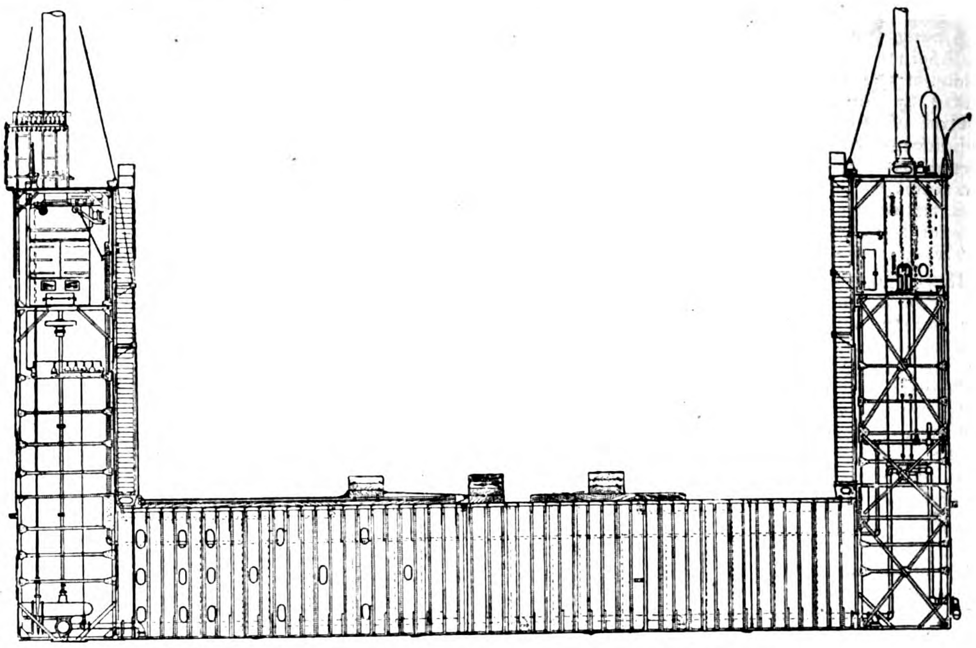
END VIEW OF DOCK, WITH BATTLESHIP ON THE BLOCKS

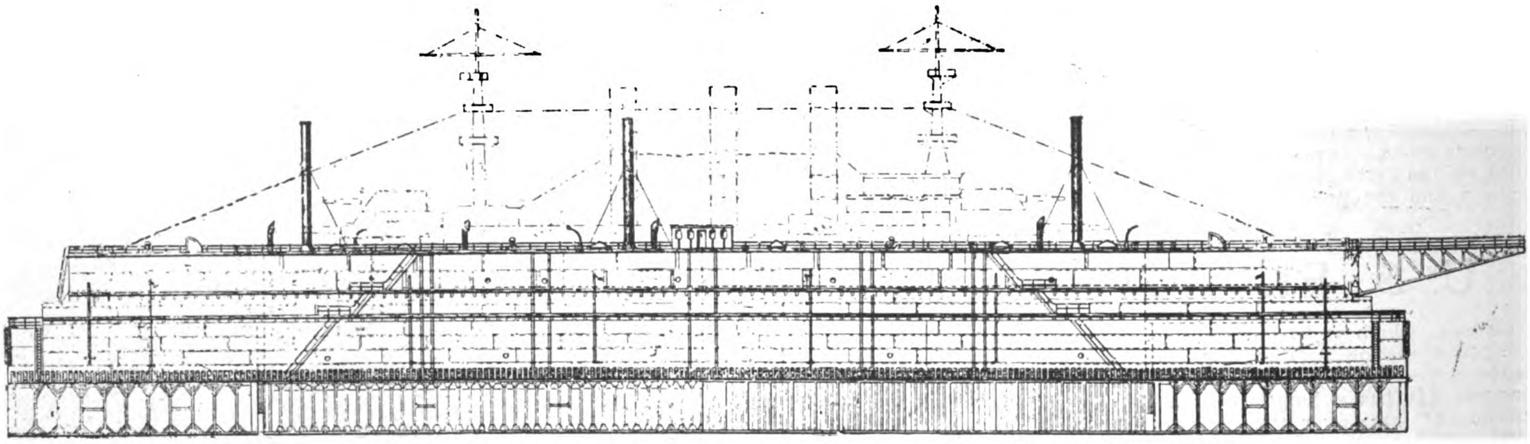
displacement of 13,300 tons distributed over a length of 500 feet. In this test the ship was lifted clear of the water in two hours, sixteen minutes. The second test was with the battleship Iowa, with a displacement of 11,600 tons distributed over a length of 350 feet. The vessel was lifted clear of the water in one hour and thirty seven minutes. Since the dock has been used at Olongapo, vessels have been docked and cleaned in six days and less.

The steam plant comprises three Babcock & Wilson boilers of the marine type, each having a grate area of 46 sq. ft. with a heating radius surface of 1,750 sq. ft. The steam is used for the main purpose of pumping the equipment for which comprises three 24-inch centrifugal and two 12-inch pumps of the same type. The former are used for the regular purpose for which the dock is designed while the latter are located in the end pontoons and are only used for self docking. The larger pumps are operated by a horizontal compound engine with 14.5 and 25 in. cylinders and 14 in. stroke. The cranks are at an angle of 135 degrees. With a steam pressure of 140 lbs. these engines develop at a speed of 225 r. p. m. about 225 indicated h. p. The smaller pumps are driven by simple engines with 12-inch cylinder and 10-inch stroke directly connected with the pump shaft. All the auxiliary machinery is operated by steam from a Babcock and Wilson Boiler with a grate surface of 18 sq. ft. and a heating surface of 750 sq. ft. and consists in the main of a 7-k. w. Sturtevant 110-volt generator driven by a simple direct connected engine 6-in. by 6 in. and a distilling apparatus with a daily capacity of 2,500 gallons.



CROSS SECTION OF CENTRAL SECTION OF DOCK

The cost of the dock under the original contract was $1,124,000 gold. The steel used in its construction weighed 11,000 tons which is held in place by 2,000,000 rivets. The total displacement is represented 30,000 tons at a draft of 16.5 feet. At light draft the dock draws 6 5 feet.



INBOARD PROFILE OF FLOATING DOCK DEWEY, WITH A BATTLESHIP ON THE BLOCKS

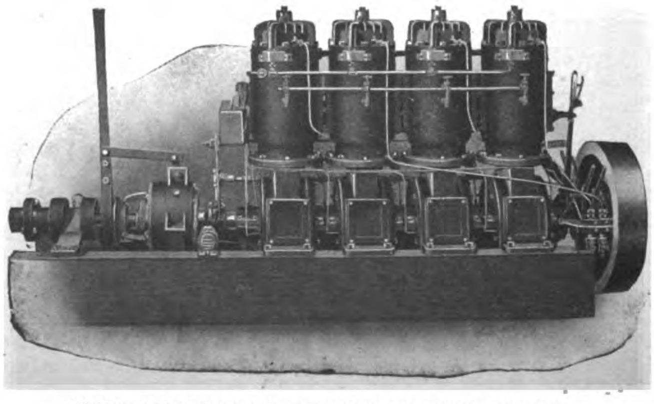
THE REMINGTON KEROSENE MARINE ENGINE.

Among the kerosene motors that have been successfully introduced in the Philippine Islands the Remington marine kerosene motor holds a prominent place. The Manila agents are F. W. Thompson and Frank L. Strong and during the year a large number of Remington marine engines have been installed besides meeting the demand for manufacturing plants throughout the islands. Among the marine installations which have proven most satisfactory is one 24 h. p. Remington installed in a 36 foot launch used for towing and bay work by the Manila Navigation Company of Manila. This vessel makes 9 knots.

A 22 h. p. Remington was installed in a 35 foot boat used for passenger and cargo service on the Cagayan River, Luzon. This vessel averages 9 knots. Another 26 foot launch equipped with a 10 h. p. Remington has been ordered for the same service.

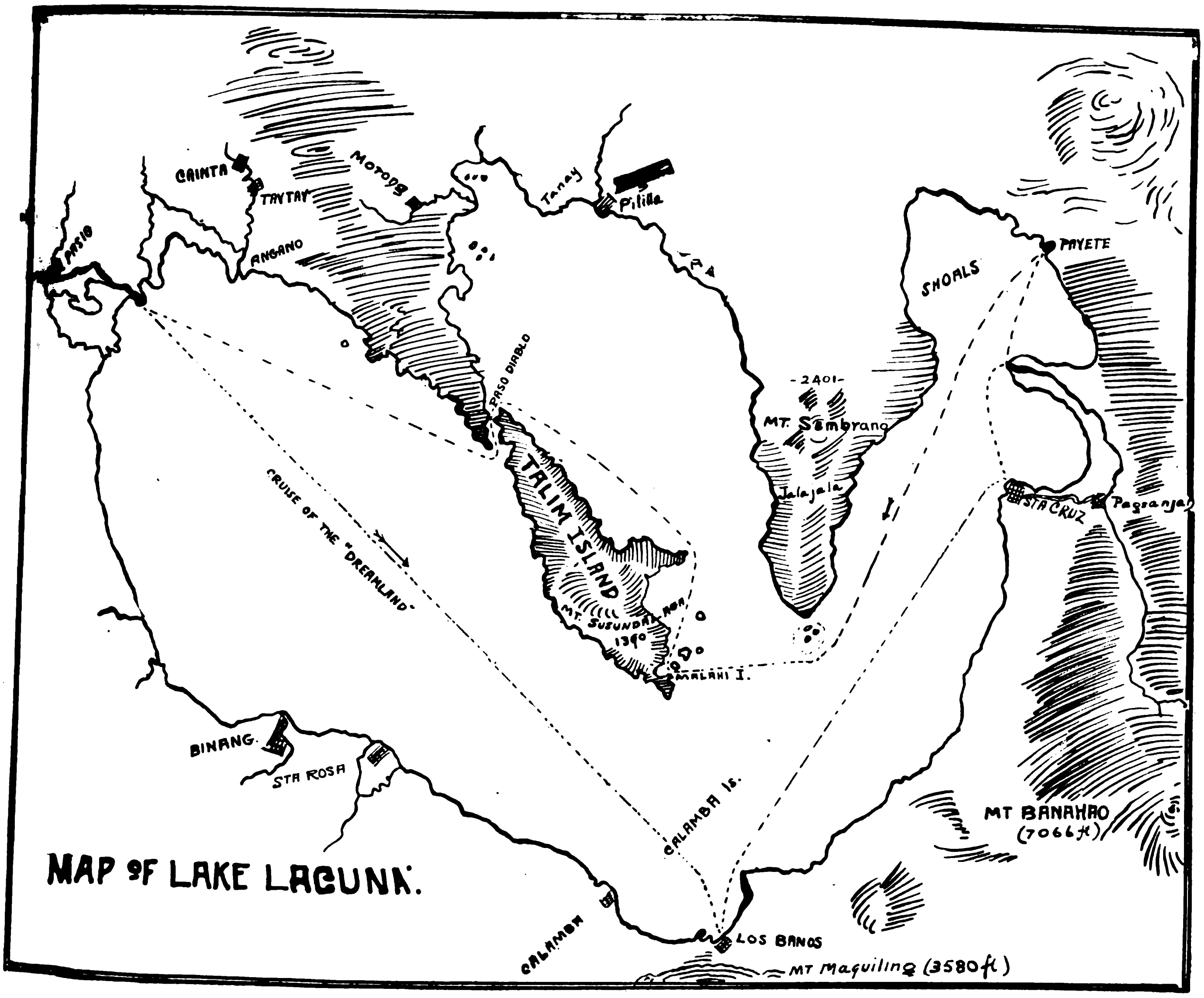
A 10 h. p. Remington has been installed on a 28 foot dispatch boat used by the U. S. Navy for dispatch service between Carabao Island and Cavite. This boat has a speed of 8 knots.

A 22 h. p. Remington marine engine is now in service in Parang, Mindanao; a 6 h. p. in Davao and 20 h. p. in Tacloban, besides a number of orders booked during the month. This engine has given general satisfaction and has a splendid future before it in the Far East as its first introduction was early last year. Messrs. Thompson & Strong are two of the leading engineering firms of Manila whose operations extend to every section of the Philippine archipelago. They are splendidly equipped to cater to insular trade.



FOUR CYLINDER REMINGTON MARINE ENGINE

THE MOTOR BOAT IN THE PHILIPPINES



MAP OF LAGUNA DE BAY WITH ROUTE OF THE MOTOR BOAT "DREAMLAND" ON CRUISE OF 150 MILES IN THE PICTURESQUE VOLCANIC REGION OF LUZON

Ten years ago there were no gasoline or petroleum motor craft anywhere in Philippine waters. Today there are hundreds. From the Northern waters of Luzon to far away Davao Gulf the internal combustion engine is now almost as well known to the native as is the larger steam-propelled vessel. In fact, in many places the gasoline or petroleum craft is the only power boat the natives have ever seen. Thus far the provinces are far ahead of Manila in the use of motor boats, and the demand for good and serviceable launches of from 18 to 26 feet is rapidly increasing. This is especially so for plantation work, where they are used not only for pleasure but for real service, such as towing products of the plantation to market and returning with supplies. It is astonishing, too, how quickly the average provincial Filipino achieves a complete understanding of the internal combustion engine. The writer knows of many instances where an engine has been shipped to a provincial customer, and the engine installation made by Filipinos who never before had seen a machine of this type, and only gained a knowledge of its working by careful study of the little book of instruction that accompanied the machine. It speaks much for the simplicity of the modern type of engine and also demonstrates the mechanical genius of average Filipino.

Of the two types of engines made the two-cycle has by far the greater lead here in the islands. Each type has its friends, and each is represented here in Manila. It is not the writer's intention to touch on the merits of any one of these engines, suffice to say that with ordinary intelligent handling any well-known make of internal combustion engine will give satisfaction.

All sorts of nondescript craft have been converted into power boats, and in some instances these have proven a disappointment to their owners. They were either too heavy for the horsepower installed or of such clumsy model that any horsepower that might have been placed in them would have proved a disappointment. Where a prospective motor boat owner has gone to the trouble to carefully select plans and build his boat accordingly, the result has been satisfactory. There has been but little attempt, except here in Manila, to build high speed boats, the general idea being to have a moderate priced boat with a fair speed. The Customs Service boasts its Flier, Sterling 45 h. p., making about fifteen knots per hour and over. At Cavite the Navy has a speedy launch, also Sterling 45 h. p., that will do perhaps a knot better. Mr. C. A. Robertson of the Supreme Court Staff has a sharp-nosed speed boat, 16 h. p. 4 cy. Brooks, that makes better than fifteen knots, and the Hon. Benito Legarda has a 26 foot Mulli that will give it a close race. To Mr. Daniel Earnshaw, of Earnshaw & Co., goes the honor of owning the speediest power-craft afloat in Manila waters. It is a 20-footer of the Viper model and was built at the Earnshaw yards at Cavite. She has a three-cylinder Gray racing type, 18 horsepower engine, and makes about 20 knots an hour.

Members of the Manila Motor Boat Club cannot boast of anything in the nature of a high-type of racing craft, and it is doubtful if the time will come when they, as a club, will care to introduce this expensive class of boats. There is so much more pleasure in the small cruising type, or the runabout, and so little expense for upkeep, that it will be hard for the racing enthusiast to break in. This club has a membership of about thirty, and is constantly increasing. Some very good boats are owned by the various

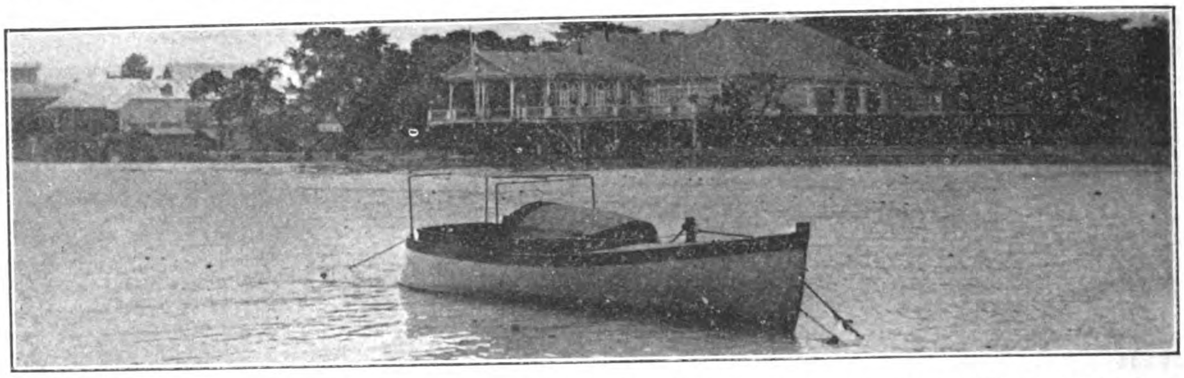
members, and as a club it has done much to stimulate the interest in motor boating in the islands. There are few week-ends that cannot account for cruising parties to the lake, or to some nearby provincial river emptying into Manila Bay. The most favored waters, however, are the Pasig with its numerous inlets from the lake, and Lake Laguna itself, that beautiful inland sea with its rugged mountain shores and its enchanted islands, a two-hour run from Manila.

The delight of cruising on these inland mountain-walled waters, is best told, perhaps, by one of a party of eight who recently made a seventeen hour cruise on the Dreamland, a handsome 40 foot cruiser, 2 cy. 12 h. p. Gray motor, owned by a member of the Manila Motor Boat Club:

"We left Manila at midnight and were soon away from the glare of electric lights and out in the cool atmosphere of the lowlands above Pasig, where the river winds like a great serpent until it opens out into the lake where it has its source. Just above the Pasig bridge, where the river sweeps deep and swift along the stone wall that protects the bank on the Pasig City side, we caught a fleeting glimpse of a belated city-bound street car, probably the last in for the night. After its lights disappeared behind the wooded heights above the towering bridge, we felt that we had really left Manila behind us.

"We had taken our blankets and pillows to the upper deck of the cruiser's cabin, and stretched out flat on our backs enjoyed to the full the cooling breeze and passed the time with stories and song.

"To fully appreciate the night beauties of this enchanted body cf water, one must actually make the trip across the lake on a night like this. There was not even the faintest intimation of a swell on the bosom of the lake, although the afternoon before a steady sou'wester had fanned it into a sea of white-headed billows. To the left the sharp crest of Talim Island showed faintly against the fainter mists of far-away Banaho on the southern shore. Above it all, and reflected in the placid waters, the dome of the sky shone resplendent with blinking stars, and like a great set piece, the Southern Cross hung low over the sleeping, mist-shrouded mountains of Laguna. Off to the west towards the low-lying shore above Taguigue, hundreds of lights flashed like restless glow-bugs and now-and-then the weird notes of the conch horn came wavering across the water. It was the lake fishing fleet in rendezvous with the night's catch. The low, steady purr of our engine in the after cabin below, and the soft swish of the waves as the sharp nose of the Dreamland cut its way through the water, was new music to most of us. It seemed unbelievable that so small an engine could propel so large a craft with such ease. The first stage of our journey was reached, when the anchor was let go a few yards off the Los Baños wharf at 4:40 a. m. Maquilin's lofty peak back of Los Baños was flooded with the rays of the morning sun when we awoke, although old



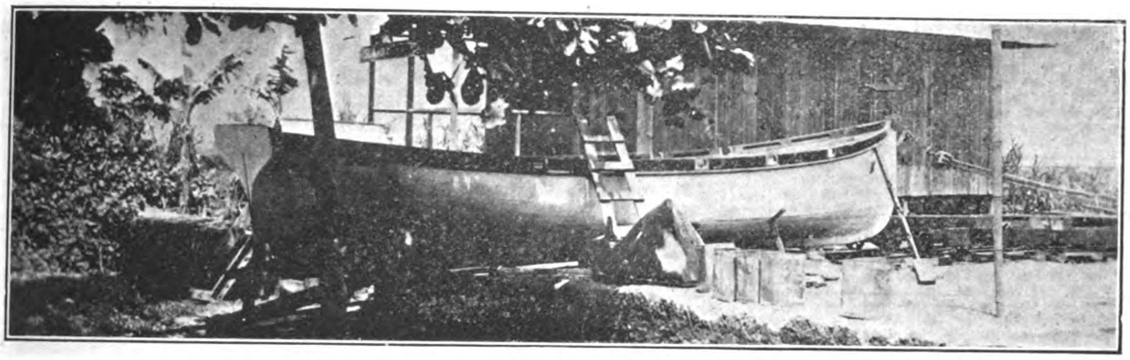
W. A. ROBERTSON'S SPEED MOTOR BOAT ENGINED BY A 16 H. P. BROOKS. SPEED 15 KNOTS, BUILT BY THE ISLAND BOAT WORKS, MANILA

YARD OF THE ISLAND BOAT WORKS, MANILA

Sol himself was hidden from our view by the lofty range to the east.

"On shore at the McElvain house we partook of a most appetizing breakfast, and some of the party wished to remain afterward and try out the famous hot mineral baths. But the cool morning breeze blowing down the channel Santa Cruz was too inviting to resist longer our eastward cruise and we were soon aboard and away. With each mile of our voyage the picture of lake and mountain took on new a night. Each shower, each day of drought, will so change the nature of its hundreds of slender falls that it never appears the same. The mighty roar of the main stream, however, is always there, singing in grand chorus where the cascade is high and tortuous, and with just the gentlest refrain where the stream glides smoothly beneath the darkened overhanging walls below.

"Three hours after leaving the cruiser we were again on board and headed for the low of which Malahi, the old military prison isle, is the largest, looked inviting across the channel to the East as we motored on down Talim's coast towards Paso Diablo. Arriving at the latter place the anchor was again thrown out, and although a heavy current was setting through the pass, caused by a high running sea on the Western arm of the lake, the passengers were soon overboard enjoying a swim.



TOW LAUNCH CONSTRUCTED BY THE ISLAND BOAT WORKS FOR THE INSULAR LUMBER CO.

loveliness as the rising sun drove back the mists and dissolved the last lingering gloom of the mountain gorges.

"We took turns studying through the glasses each distant isle or mountain peak as we motored up the south shore towards Santa Cruz and the day was still young when we finally dropped our anchor off that port. Here we again took banca for shore and, securing carretelas, made the drive to Pagsanjan. Luzon can boast of few roads like that three-mile stretch between the two Laguna towns. Of well-rolled macadam and rounded so that it is given perfect drain, it winds with picturesque curves beneath the stately coco palms that line its entire length. And the town itself: what a pretty village! There are the usual nipa homes, but somehow they seem cleaner and better kept than in the average provincial town. There are a number of substantially built residences along well-laid-out streets and the stores in the business district would do credit to a much larger place. Located as she is, on the very foot-stool of Banahao, Laguna's highest mountain, there is excellent drainage and the most latent possibilities for civic artistic arrangement of parks and thoroughfares. Less than a mile above the town, out of dark green and rugged vine-clad walls, the Pagsanjan river, born at a dizzy height back in the tropical jungle forest, comes tumbling down the cleft in the mountain's side; gleaming, silvery cascades, and then winds its shining miles peacefully beneath the overhanging trees, to mingle finally with the waters of the lake beyond.

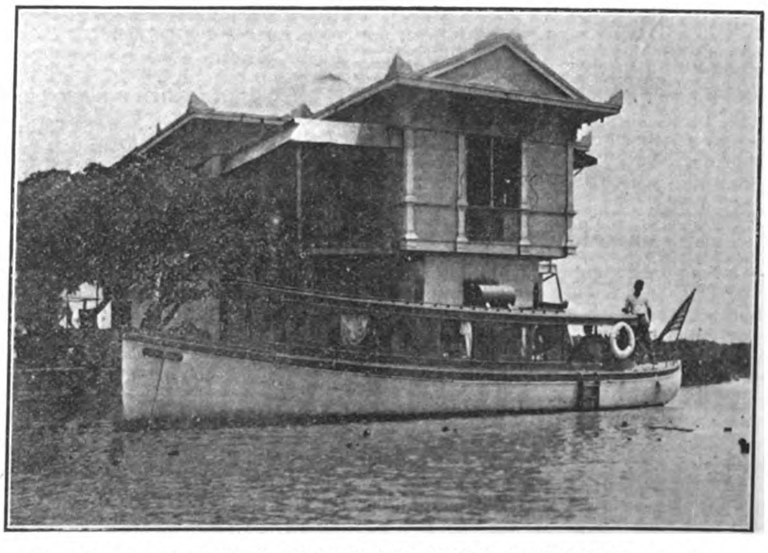
"There is no use to dwell at length on the excitement of that banca trip up the canyon for most Manilians have tried it. It was not my first trip for I had been there several times before, but like each other visit I had made, it was different. The canyon with its leaping falls will change its whole aspect in mountain range to the east where Payete, that romantic little village of wood-carvers, nestles snuggly up against the side of the flower-bedecked cliffs.

"Stepping ashore at Payete a single hour spent at this delightful mountain town only whetted our appetites for more, but with a long cruise yet before us, we reluctantly withdrew to the cruiser. Headed down the lake again, this time steering a course for Talim and the Malahi islands, we experienced a head wind that delayed all attempts at preparing tiffin. Under the lea of Talim, however, the lake was smooth, and anchorage good.

"The little cluster of green topped islands,

"The sun was still more than an hour above the western horizon when the Dreamland headed out of the pasos and into the white foam-flecked lake.

"It was a joyous trip across the 12 miles of tumbling waters to the mouth of the Pasig which we entered just as the sun dropped behind the hills bordering the Western shore of the lake. There was not a person on board who did not regret leaving that wonderful panorama of lake and mist-shrouded mountains, for, although our cruise had extended over a course of more than one hundred and fifty miles, we had not visited one half of the interesting places to be found along the shores of this Enchating Inland-Sea."



THE "DREAMLAND" AT ANCHOR OFF ISLAND BOAT WORKS, MANILA

OTHER DOCKYARDS IN THE FAR EAST

JAPAN

BINGO DOCK YARD CO. LTD.

Location, Sansho (Mitsunoho, Island of Innoshima). Stone Dock No. 1—Length: top, 410 ft.; bottom, 395 ft. Width: top, 82 ft.; bottom, 60 ft. Width at Entrance: top, 57 ft.; bottom, 52 ft. Depth: High tide, 24 ft.; low tide, 13 ft.

Dry Dock No. 2 (at Mitsunosho).—Length: top, 292'3''; bottom, 282'3''. Breadth at Entrance: 41'9''; Depth: 15'5''.

FUJIUCHI FUKUJIRO

Location—Niihama. Wood & Stone Dock No. 1.—Length: top, 120 ft.; bottom, 105 ft. Width: top, 41 ft.; bottom, 26 ft. Width at Entrance: top, 35 ft.; bottom, 35 ft. Depth: High tide, 4 ft.; low tide, 0 ft. Wood & Stone Dock No. 2.—Length: top, 100 ft.; bottom, 90 ft. Width: top, 30 ft.; bottom, 20 ft. Width at Entrance: top, 35 ft.; bottom, 35 ft. Depth: Higth tide, 3 ft.; low tide, 0 ft. Stone Dock No. 3—Length: top, 102 ft.; bottom, 90 ft. Width: top, 41 ft; bottom, 26 ft. Width at Entrance: top, 31 ft.; bottom, 31 ft. Depth: High tide, 4 ft.; low tide, 0 ft. Stone Dock No. 4.—Length: top, 130 ft.; bottom, 115 ft. Width: top, 41 ft.; bottom, 26 ft. Width at Entrance: top, 31 ft.; bottom, 31 ft. Depth: Higth tide: 4 ft.; low tide, 0 ft.

FUJIEDA SHIPYARD

Location—Osaka (Fujinagata Dry Docks.)—Description of Docks: Wood; No. 1 dock: Length on bottom, 250'; No. 2 dock: Length on bottom, 156'; No. 1 dock: Width, entrance 29'; No. 2 dock: Width, entrance 38'; No. 1 dock: Depth on Sills, 12'; No. 2 dock: Depth on Sills, 10'.

HARADA SHIPBUILDING & ENGINEERING WORKS

(Harada Juijiro)

Location—Osaka, Japan. Description of Docks: Wood, No. 1 dock: Length on bottom, 210'; No. 2 dock: length on bottom, 152'; No. 1 dock: width, entrance, 36'; No. 2 dock: width, entrance, 29'; No. 1 dock: depth on sills, 12' 6".

HATOHAMA DOCK CO.

Location—Hatohama.—Stone Dock No. 1—Length: top, 126 ft.; bottom, 120 ft Width: top, 50 ft.; bottom, 41 ft. Width at Entrance: top, 33 ft.; bottom, 31 ft. Depth: High tide, 5 ft.; low tide, 0 ft. Stone Dock No. 2.—Length: top, 156 ft.; bottom, 150 ft. Width: top, 52 ft; bottom, 41 ft. Width at Entrance: top, 35 ft.; bottom, 32 ft. Depth: High tide, 5 ft; low tide, 0 ft.

INNOSHIMA DOCK CO.

Location, Tsuchibu (at Habu, Island of Innoshima)—Stone Dock No. 1.—Length: top, 300 ft.; bottom, 300 ft. Width: top, 51 ft.; bottom, 40 ft. Width at Entrance: top, 39 ft.; bottom, 36 ft. Depth: High tide, 13 ft.; low tide, 12 ft. Rock cut open Dock No. 2.—Length: top, 364 ft.; bottom, 357 ft. Width: top, 71 ft; bottom, 49 ft. Width at Entrance: top, 49 ft.; bottom, 44 ft. Depth: High tide, 20 ft.; low tide, 11 ft.

KOMPIRA DOCK CO.

Location, Shirakata. Rock cut open Dock.—Length: top, 179 ft.; bottom, 169 ft. Width: top, 41 ft.; bottom, 35 ft. Width at Entrance: top, 28 ft.; bottom, 28 ft. Depth: High tide, 10 ft.; low tide, 0 ft.

KINUURA SHIPYARD

Location, Ohama, Japan. Wood Dock.—Length: top, 250 ft.; bottom, 210 ft. Width: top, 65 ft.; bottom, 32 ft. Width at Entrance, top, 41 ft.; bottom, 30 ft. Depth: High tide: 12 ft.; low tide, 7 ft.

IMPERIAL JAPANESE GOVERNMENT NAVAL DOCKS

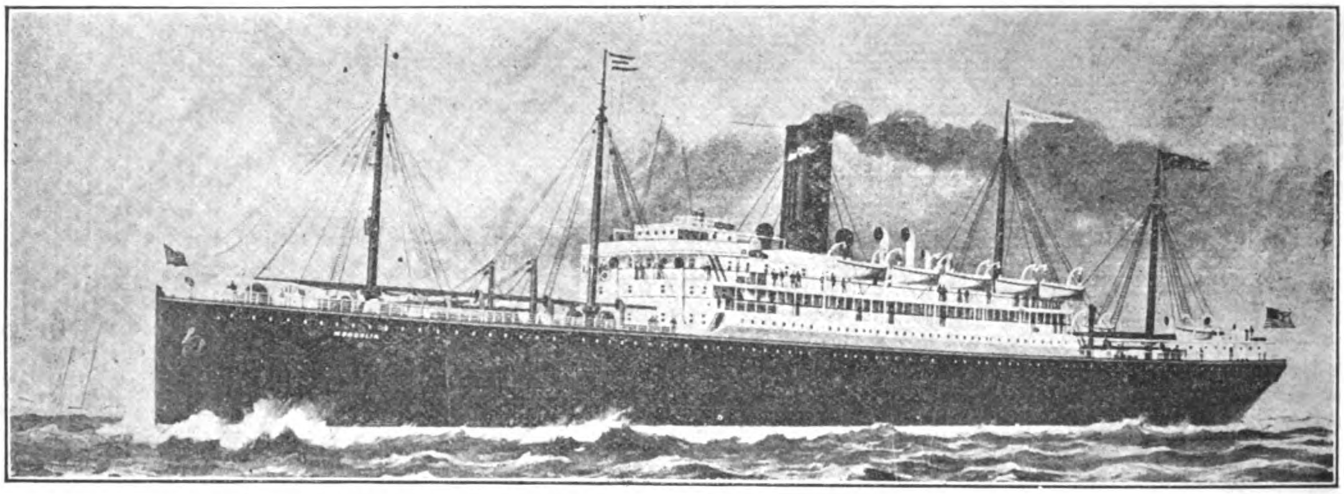
Kure: Dry Dock, No. 1.—Length: top, 464'0''; bottom, 413'2''. Breadth at Entrance: top, 79'5''; bottom, 58'5''. Depth: 28'2'' on blocks.

Kure: Dry Dock, No. 2.—Length: 485'6'' on blocks. Breadth at Entrance: top, 93'3''; bottom 81'3''. Depth: 35'9'' on blocks.

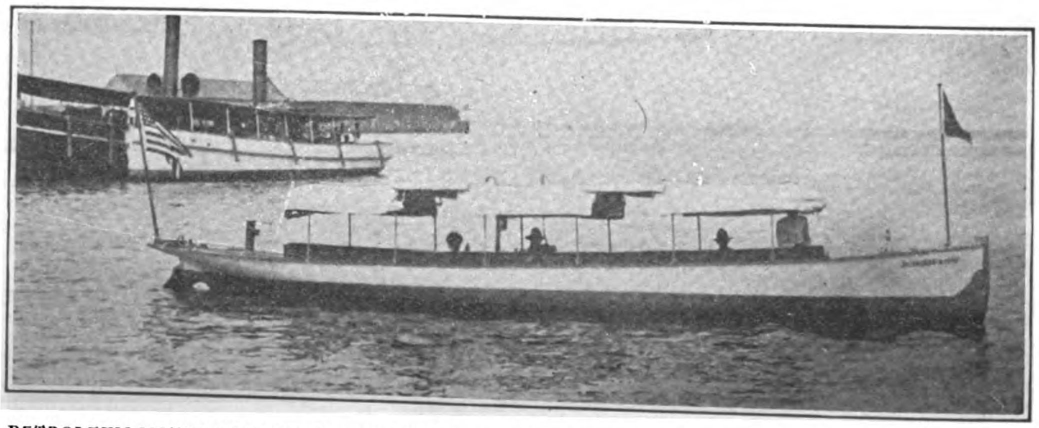
Maidzuru Naval Dockyard (Prov. Tango) Three Dry Docks: Imperial Japanese Government.

NOCHI DOCK CO.

Location, Nochi. Stone Dock No. 1.—Length: top, 202 ft.; bottom, 196 ft. Width: top, 51 ft.; bottom, 37 ft. Width at Entrance: top, 33 ft.; bottom, 29 ft. Depth: High tide, 13 ft.; low tide, 10 ft. Stone Dock No. 2.—Length: top, 149 ft.; bottom, 146 ft. Width: top, 51 ft.; bottom, 37 ft. Width at Entrance: top, 32 ft.; bottom: 29 ft. Depth: High tide, 10 ft.; low tide, 7 ft.



S. S. MONGOLIA 27,000 TONS DISPLACEMENT BUILT BY THE NEW YORK SHIPBUILDING CO



PETROLEUM MOTOR LAUNCH, "FAIRBANKS MORSE" ENGINES, 10 H. P., SPEED 8 KNOTS PER HOUR. SUPPLIED BY MESSRS. CASTLE BROS. WOLF & SONS. LENGTH 38 FT., BEAM 7 FT. DRAWS 2½ FT. OF WATER. BUILT OF PHILIPPINE HARDWOODS WITH TEAK FITTINGS AT SAN NICOLAS IRON WORKS, MANILA

MATSUO IRON WORKS AND DOCKYARD

Nagasaki (Naghama) New Graving Dock.—Length: top, 320'0"; bottom, 310'0".

Breadth at Entrance: top, 48'0"; bottom, 40'0". Depth: 17'0"

OSAKA SENKYO KABUSHIKI KAISHA (OSAKA DOCK CO. LTD.)

Location: Osaka, Japan.—Description of Docks: Wood and stone. No 1 dock: Length on bottom 254'. No. 2 dock: Length on bottom 196'. No. 1 dock: Width entrance 45'. No. 2 dock: Width entrance 45'. No. 1 dock: Depth on sill, H. W. 14'. No. 2 dock: Depth on sill, H. W. 12'

ONO SHIPYARD

Location, Osaka, Japan.—Wood Dock.—Length: top, 180 ft.; bottom, 175 ft. Width: top, 41 ft.; bottom, 29 ft. Width at Entrance: top, 28 ft.; bottom, 27 ft. Depth: High tide, 12 ft.; low tide, 10 ft.

IMPERIAL JAPANESE GOVERNMENT PONTOON

Ominato (Awomori Gulf).

ONOMICHI DRY DOCK

Onomichi (Mukaijima), Onomochi Zosensho. Length: top, 212'0"; bottom, 210'0". Breadth at Entrance: top, 32'0"; bottom 28'0". Depth: 13'0".

MATSUBA DRY DOCK AND IRON WORKS

Onomichi (Mukaijima). Length: top, 163'0": bottom 162'6", Breadth at Entrance: 27'8". Depth: 9'0".

OKAWA SHIPPING CO.

Location, Okawa. Wood & Stone Dock. Length: top, 250 ft; bottom, 230 ft. Width: top, 43 ft.; bottom, 35 ft. Width at Entrance: top, 40 ft.; bottom, 30 ft. Depth: High tide, 11 ft.; low tide, 0 ft.

AJIKAWA DRY DOCK, AJIKAWA ZOSENSHO

Osaka. Length: top, 122'0"; bottom 118'0". Breadth at Entrance: 30'0". Depth: 6'0".

SHIMODA DOCK CO.

Location, Shimoda. Stone Dock. Length: top, 147 ft.; bottom, 140 ft. Width: top, 43 ft.; bottom, 31 ft. Width at Entrance: top, 35 ft.; bottom, 30 ft. Depth: High tide, 12 ft.; low tide, 7 ft.

IMPERIAL JAPANESE GOVERNMENT NAVAL DOCKS

Sasebo: Floating Dock. Length: 280'0"; Breadth at Entrance: 38'0"; Depth: 11'6".

Sasebo: Dry Dock. Imperial Japanese Government: Length: 435'0"

Sasebo: Dry Dock. Imperial Japanese Government: Length: 377'0"

Sasebo: Dry Dock. Imperial Japanese Government: Length: 538'0"

Takeshiki (Tsushima) Pontoon. Imperial Japanese Government.

TOBA IRON WORKS AND DOCKYARD

Location, Toba, Owari Bay, Prov. Shima. Stone Dock. Length: top, 283 ft.; bottom, 279 ft. Width: top, 62 ft.; bottom, 49 ft. Width at Entrance: top, 42 ft.; bottom, 34 ft. Depth: High tide, 13 ft.; low tide, 11 ft.

ISHIKAWAJIMA S. B. & E. CO. LTD.

Tokio: Ishikawajima (Dry Dock). Length: top 299'0"; bottom 270'0"; Breadth at Entrance: top, 41'9"; bottom, 32'9". Depth: 12'0".

URAGA DOCK CO. LTD.

Uraga (15 miles from Yokohama) Dry Dock No. 1.—Length: top, 497'0"; bottom, 482'2". Breadth at Entrance: top, 70'0"; bottom, 60'0". Depth: 25'5" on blocks.

Uraga (15 miles from Yokohama) Dry Dock No 2.—Length: top, 456'10"; bottom, 448'4". Breadth at Entrance: top, 65'6"; bottom, 53'6". Depth: 24'4".

IMPERIAL JAPANESE GOVERNMENT NAVAL DOCKS

Yokohama, Yokosuka, No. 1.—Length: top, 357'7"; bottom, 297'.1". Breadth at Entrance: 82'0". Depth: 21'4".

Yokosuka No. 2.—Length: top, 452'9"; bottom, 447'1". Breadth at Entrance: 94'5". Depth: 28'11".

Yokosuka No. 3.—Length: top, 282'2"; bottom, 261'2". Breadth at Entrance: 45'3". Depth: 17'11".

Yokosuka No. 4.—Length: top, 541'4"; bottom, 538'8". Breadth at Entrance: 98'5". Depth: 31'11".

CHINA

Amoy: New Amoy Dock Co. Ltd.—Length: top, 360'0"; bottom, 340'0". Breadth at Entrance: top, 60'0"; bottom, 40'0". Depth: 19'6". Dairen: South Manchuria Railway (Japanese Government). Leased by Kawasaki Dockyard Ld. Length: top, 422'1"; bottom, 381'1". Breadth at Entrance: 42'11" on bottom. Depth: 19'9".

Foochow: Chinese Government.—Dry Dock.—Length: top, 328'0"; Breadth at Entrance: top 70'0". Depth: 20'0".

Hongkong: No. 1 Dock Imperial Government. Length: top, 568'7"; bottom, 556'9". Breadth at Entrance: top, 95'0". Depth: 39'3"

Taku: Imperial Dock and Naval Yard. Length: top, 360'0"; bottom 335'0". Breadth at Entrance: 40'0". Depth: 12'0".

Taku: Dry Dock No. 1, Taku Tug & Lighter Co. Ltd. Length: top, 335'0"; bottom, 315'0". Breadth at Entrance: 36'0". Depth: 11'0"

Taku: Dry Dock No. 2, Taku Tug & Lighter Co., Ltd.—Length: top, 300'0"; bottom, 275'0". Breadth at Entrance: 30'0". Depth: 10'0".

Taku: Dry Dock No. 3, Taku Tug & Lighter Co., Ltd.—Length: 300'0" on blocks. Breadth at Entrance: 28'0". Depth: 10'6".

Taku: Dry Dock No. 4, Taku Tug & Lighter Co., Ltd.—Length: 300'0" on blocks. Breadth at Entrance: 40'0". Depth: 10'6".

Tongku: Dry Dock No. 1, Etablissement Docks & Appontments de Tongku.—Length: 260'0". Breadth at Entrance: 50'0". Depth: 9'0".

Whampoa: Cooper's Dock: Chinese Government. Length: 430'0". Breadth at Entrance: 65'0". Depth: 16'0".

Whampoa: Locksun Dock: Chinese Government.—Length: 450'0". Breadth at Entrance: 75'0". Depth: 18'0".

PHILIPPINE ISLANDS

Cebu: Patent Slipway: Manuel Novo.
Iloilo: Patent Slipway: Cho Hanlin.
Manila: (Cavite) Arsenal Slip: U. S. Government.
Manila: (Malabon) Patent Slipway: Luis R. Yangco.
Manila: Patent Slipway: Luis R. Yangco.
Manila: (City) Dry Dock: Length: 105'0". Breadth at Entrance: 24'0". Depth: 7'6".
Manila: Patent Slipway: Juan Rodriguez.
Manila: Patent Slipway: Insular Government.

SIAM

Bangkok: Dry Dock No. 1: Bangkok Dock Co., Ltd.—Length: top, 300'0"; bottom, 260'0". Breadth at Entrance: top, 45'0"; bottom 40'0". Depth: 11'6"

Bangkok: Dry Dock No. 2: Bangkok Dock Co. Ltd.—Length: top, 110'0"; bottom, 100'0". Breadth at Entrance: 23'0". Depth: 7'6".

Bangkok: Dry Dock No. 2; Government.—Length: top, 321'7"; bottom, 302'5". Breadth at Entrance: 48'0" Depth: 14'6".

Bangkok: Dry Dock No. 2. Samsen Dock & Engineering Co. Ltd.—Length: top, 215'0"; bottom, 205'0". Breadth at Entrance: 33'0". Depth: 13'0".

Bangkok: Patent Slip: Howarth, Erskine, Ltd.

SIBERIA

Vladivostock: Floating Dock: Government. Length: top, 301'0"; bottom, 301'0". Breadth at Entrance: 74'6". Depth: 26'0".

Vladivostock: Dry Dock: Government. Length: 572'0" top; 512'0" bottom. Breadth at Entrance: 90'0". Depth: 30'0".

Vladivostock: Dry Dock: Government. Length: top, 625'6"; bottom, 618'6". Breadth at Entrance: 90'0". Depth: 34'6".

STRAITS SETTLEMENTS

Penang: Patent Slip: Eastern Shipping Co., Ltd.
Penang: Patent Slip: Eastern Shipping Co., Ltd.
Selangor: Patent Slipway: Government.
Singapore: Tanjong Rhoo Slipway No. 1. Singapore Slipway and Engineering Co., Ltd.
Singapore: Tanjong Rhoo Slipway No 2. Singapore Slipway and Engineering Co., Ltd
Singapore: Tanjong Rhoo Slipway No. 3. Singapore Slipway and Engineering Co., Ltd.

SUMATRA

Belawan: Nil.
Deli: Nil.
Olehleh: Nil.
Padang: Nil.

TONKIN

Haiphong: Patent Slip: Marty & d'Abbadie.
Saigon: Dry Dock: Government.—Length: 530'0". Breadth at Entrance: 72'0". Depth: 30'0".
Saigon: Small Dry Dock for Gunboats. Government. Length: 236'0". Breadth at Entrance: 32'5". Depth: 12'0".
Saigon: Floating Dock: Government. Length: 135'0". Saigon Three Slips, each.—Government.

INDIES, EAST

Java: (Batavia) Floating Dock: Droogdok Maats. Tandjong Priok. Length: 324'0". Breadth at Entrance: 67'0".
Java (Batavia) Patent Slip: Droogdok Maats. Tandjong Priok.
Java: (Sourabaya) Iron Floating Dock: Government. Length: 328'1". Breadth at Entrance: 62'3". Depth: 24'6".
Java: (Sourabaya) Three Pontoons: Government.
Java: (Sourabaya) Patent Slip: Government.

BIDS OPENED AT MANILA ON CONSTRUCTION OF INTER-ISLAND SEAGOING TRANSPORT.

Bids were opened at the Office of the Chief Quartermaster for the construction of an Inter-island sea-going transport as follows:

The Honkong & Whampoa Dock Co., Ltd., of Hongkong, $347,625 U. S. C.; Shanghai Dock & Engineering Co., Ltd., $314,000 U. S. C., and the Taikoo Dockyard and Engineering Co., Ltd., of Hongkong, $310,796 25, the last being the lowest bid. The first two bidders asked for 12 months to deliver and the Taikoo, 13 months.

The following are the specifications:

A twin screw transport steamer of the awning deck type, length over all 300 feet; length between perpendiculars 285 feet; beam 45 feet, and depth 28 feet. Power will be furnished by two sets of triple expansion, surface condensing steam engines, to have boilers approximately 12 feet in diameter and 12 feet long. These engines to be capable of developing power for a speed of 12½ knots.

J. J. CHOLLOT
INGENIEUR DES PONTS ET CHAUSSEES
CIVIL ENGINEER, SURVEYOR AND ARCHITECT
53 QUAI DU YANG-KING-PANG, SHANGHAI

A. J. MORSE & SON, INC.
221 High St., Boston, Mass., U. S. A.
ESTABLISHED 1837
DIVING APPARATUS
Special Apparatus built to order
FRANK L. STRONG, Agent -:- 24 Calle Echague, Manila, P. I.

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American Steel and Wire Co 57
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Brown & Co., John, Ltd. 52
Cadwallader-Gibson Lumber Co 7
Castle Bros Wolff Sons 97
Chee Hsin Cement Co., Ltd 58
China Import Export Lumber Co 75
China Merchants Steam Nav. Co 54
China Mutual Life Insurance Co 59
China and Manila S. S. Co 31
China General Engineering Co 33
Chinese Eng. & Mining Co 2
Cia. General de Tabacos Filipinas 52
Cia. Trasatlantica 52
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Clarke, M. A 60
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Cooper H. R. & Co. 96
Cramp., William & Sons 91
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Defiance Machine Works 27
Detroit Engine Works 43
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Dollar, Co, The Robert 55
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Eastern Engineering Co 43
El Varadero de Manila 38
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Gray Motor Co 43
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Hupeh Cement Co 58
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International Banking Corp. .... Cover
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Island Boat Works 95
Inter'l Correspondence Schools 64
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Johnson-Pickett Rope Co 70
Kawasaki Dockyard Co. Ltd 7
Kiangnan Dock & Engineering Works 8
La Prueba 53
Lima Locomotive Works 21
Lodge & Shipley Machine Tool Co. 81
Macdonald & Co. 77
Malthoid 70
Manila Trading & Supply Co 78
Manila Railroad Co 92-93
Melchers & Co 15
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Mitsu Bishi Dockyard & Eng Works 38
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New York Shipbuilding Co 89
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North British Locomotive Co. Ltd. 19
Olsen & Co., Walter E .... Cover
Osaka Iron Works 85
Pacific Mail S. S. Co 53
Pacific Tank and Pipe Co. 102
Paraffine Paint Co 102
Philippine Islands 2
Port Banga Lumber Co 15
Priestman Brothers, Ltd 59
Racine, Ackermann & Co 57
Remington Typwriter Co 49
Remington Oil Engine Co 100
Riter-Conley Mif'g Co 18
Rose, Downs & Thompson, Ltd 76
Russo Asiatic Bank 1
Rendrock Powder Co 15
Riley, Hargreaves & Co., Ltd 41
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Shewan, Tomes & Co. 28
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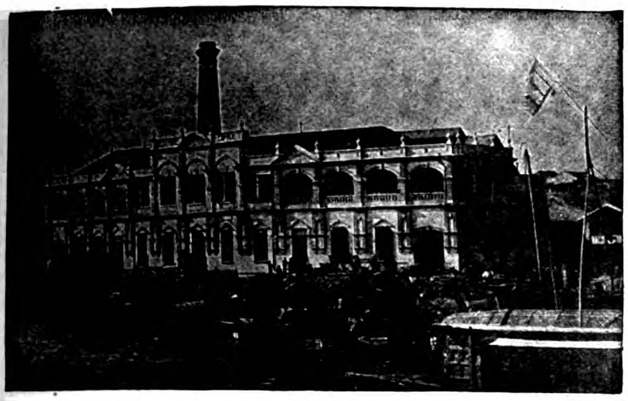

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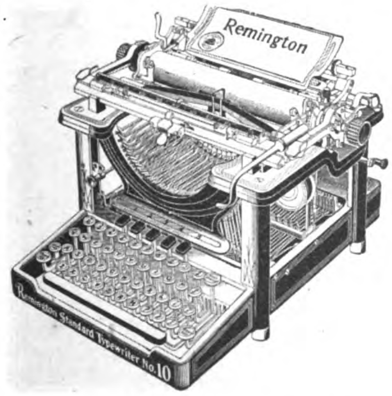

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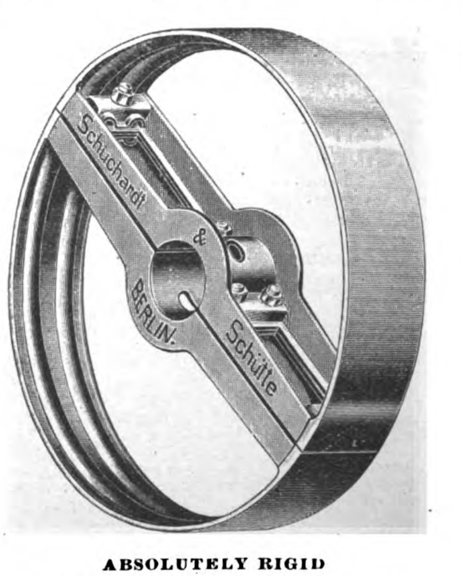

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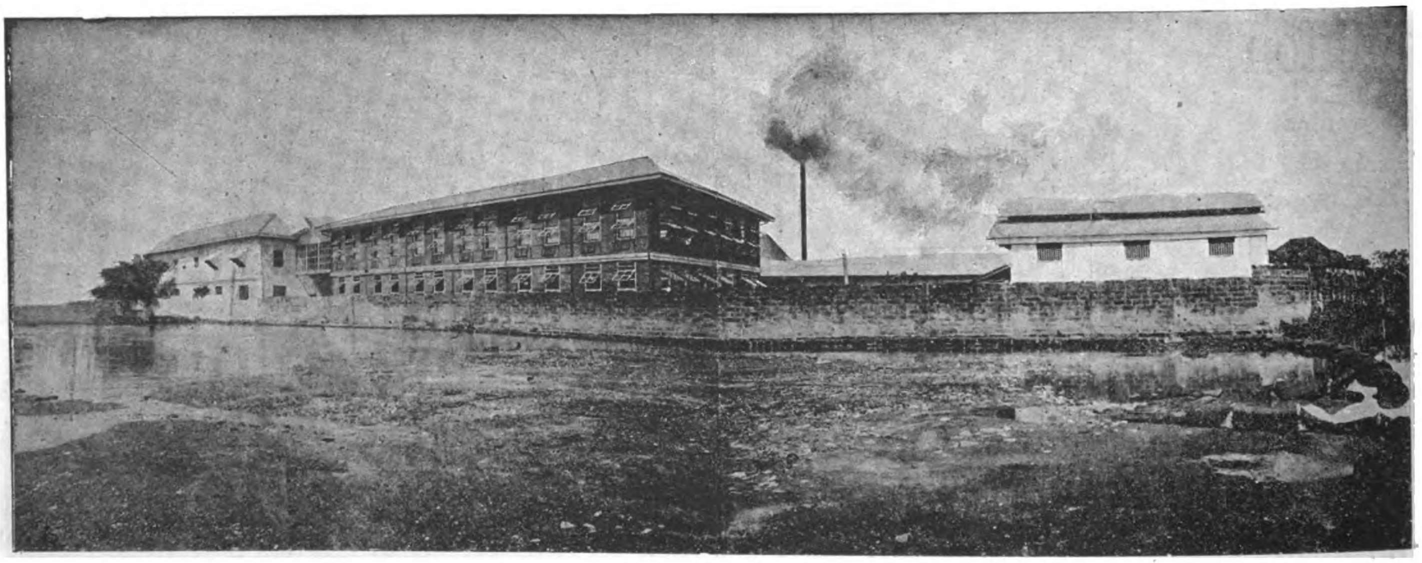

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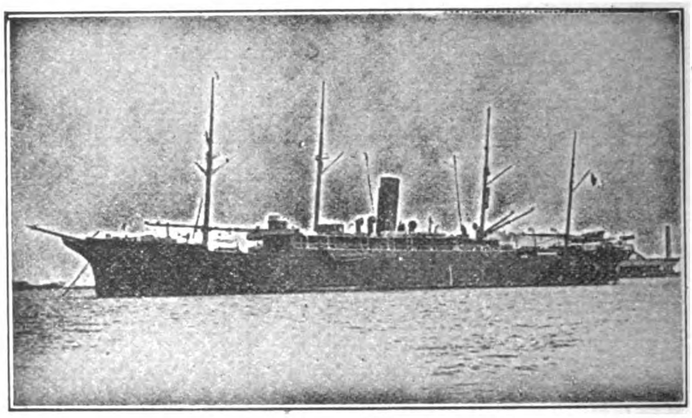

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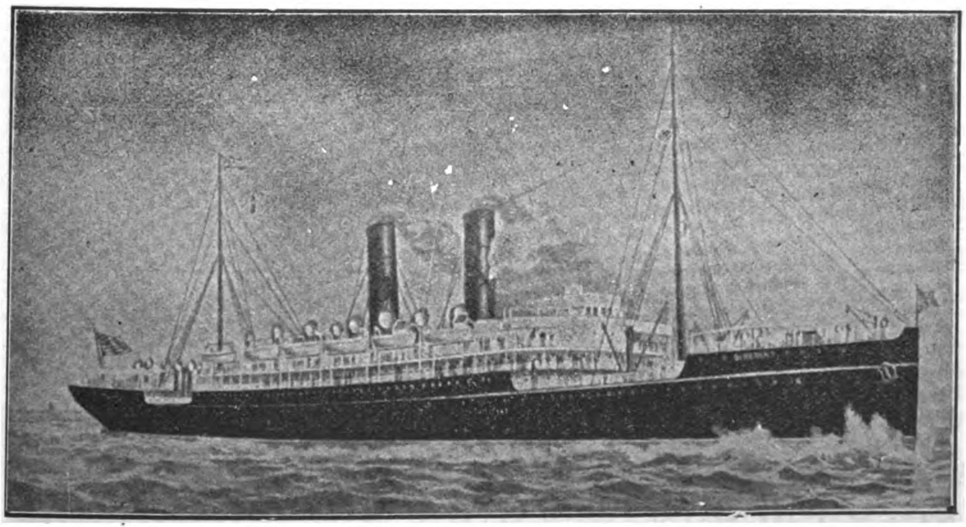

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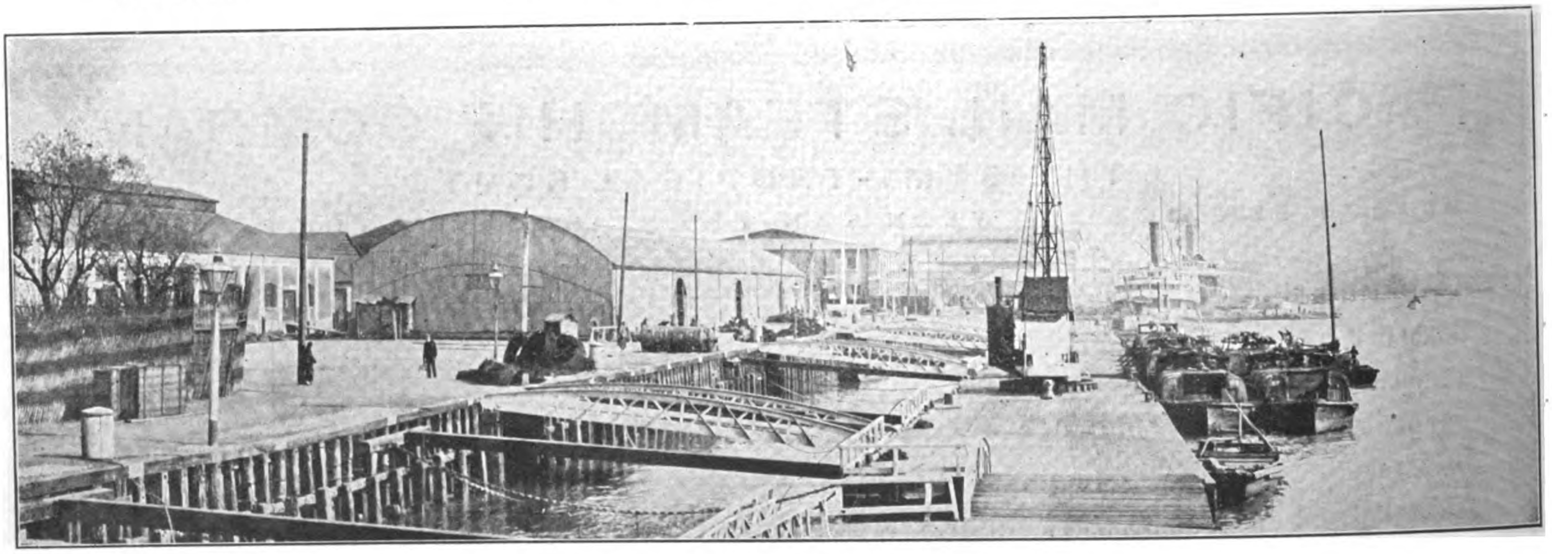

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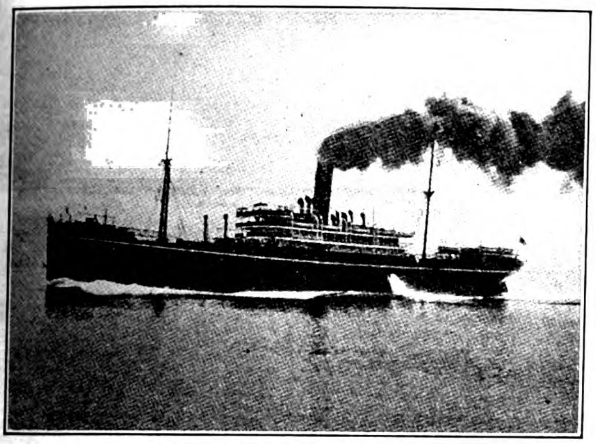

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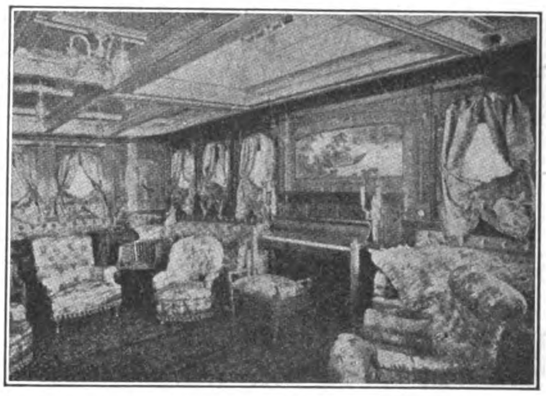

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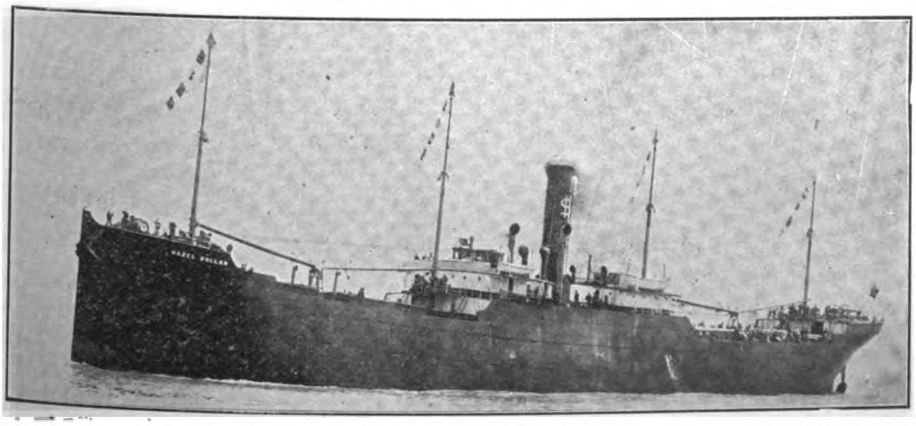

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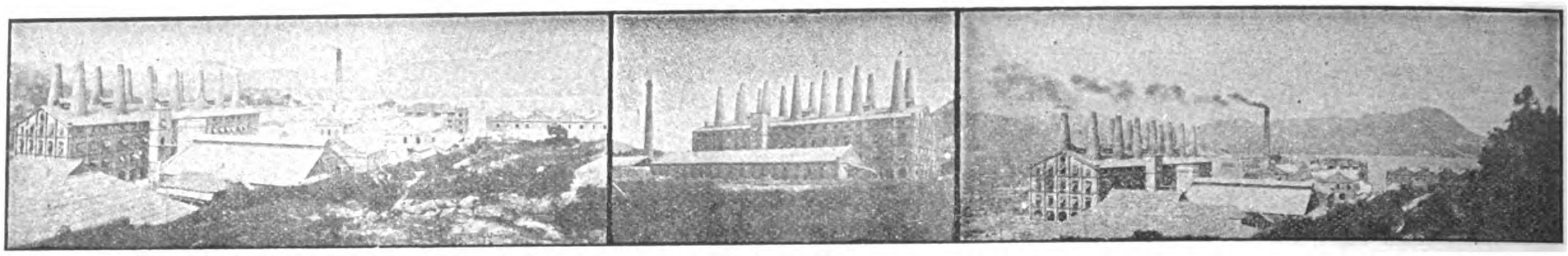

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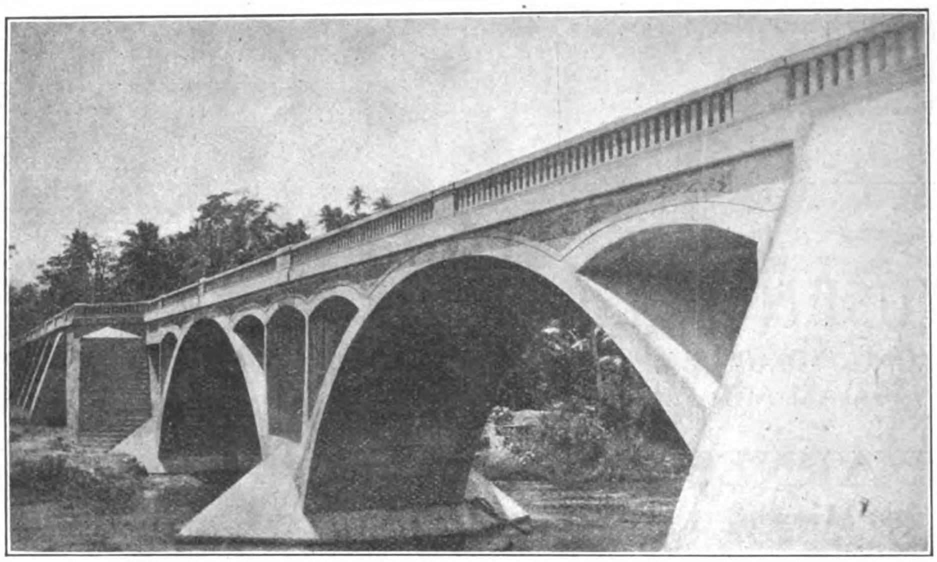

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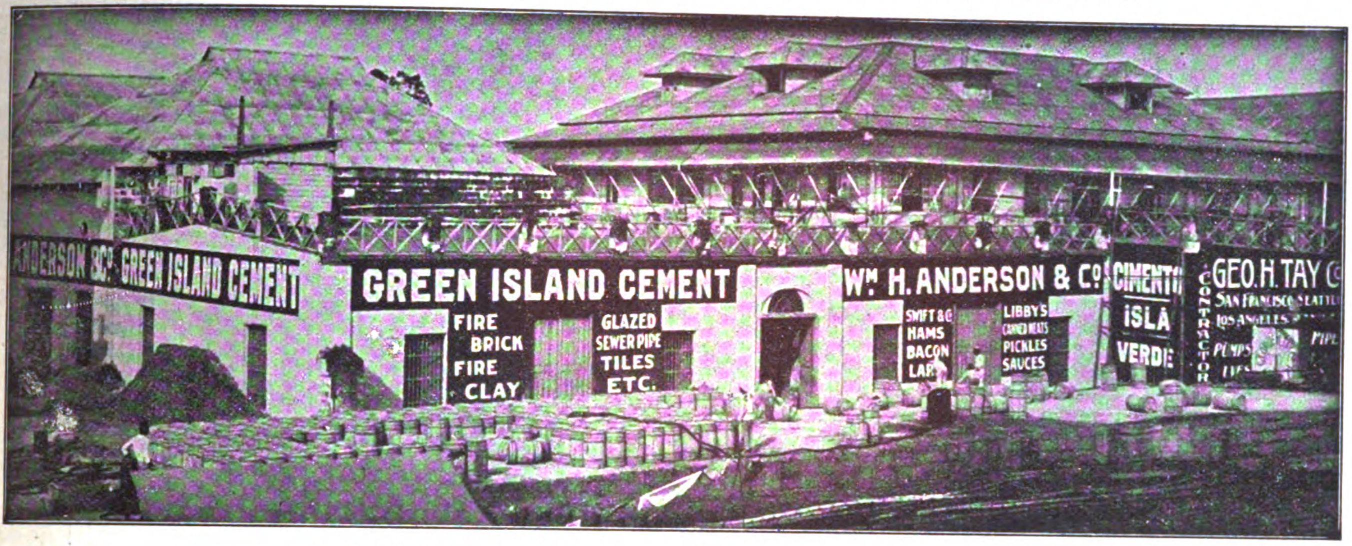

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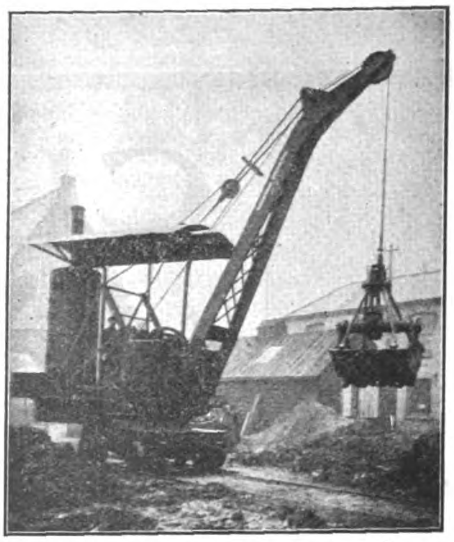

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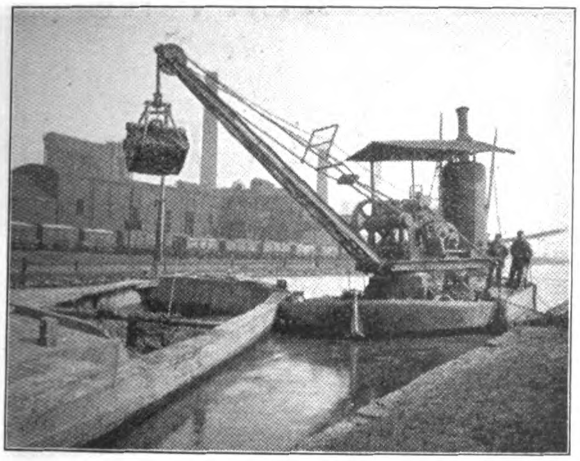

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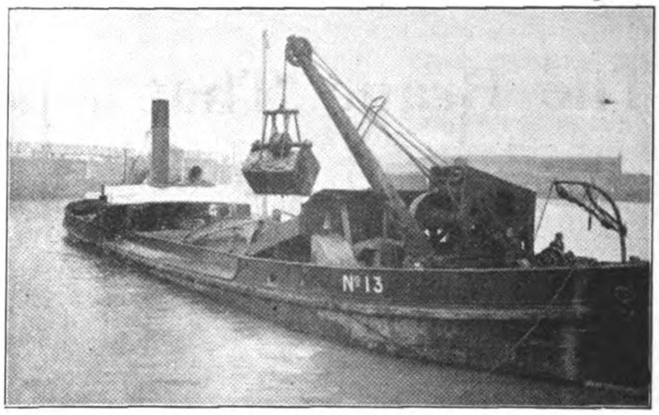

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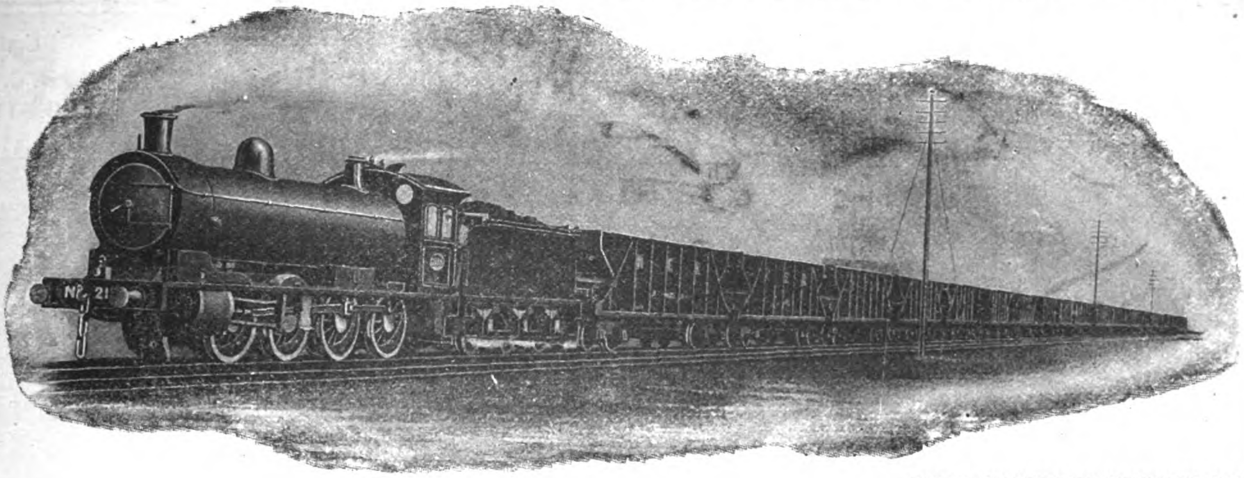

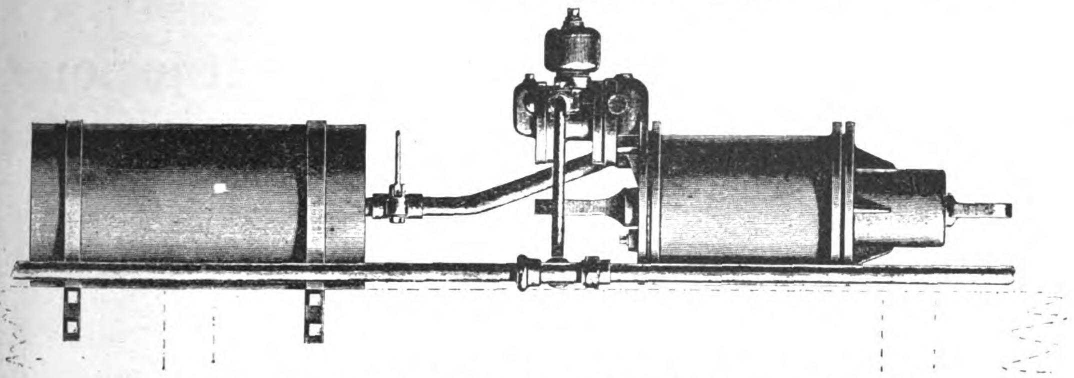

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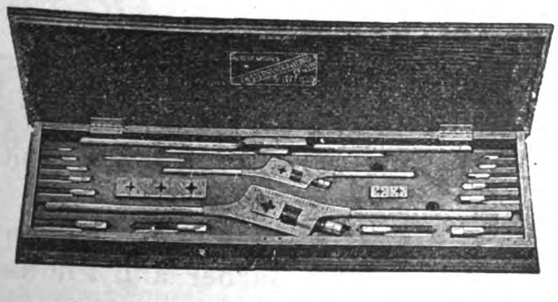

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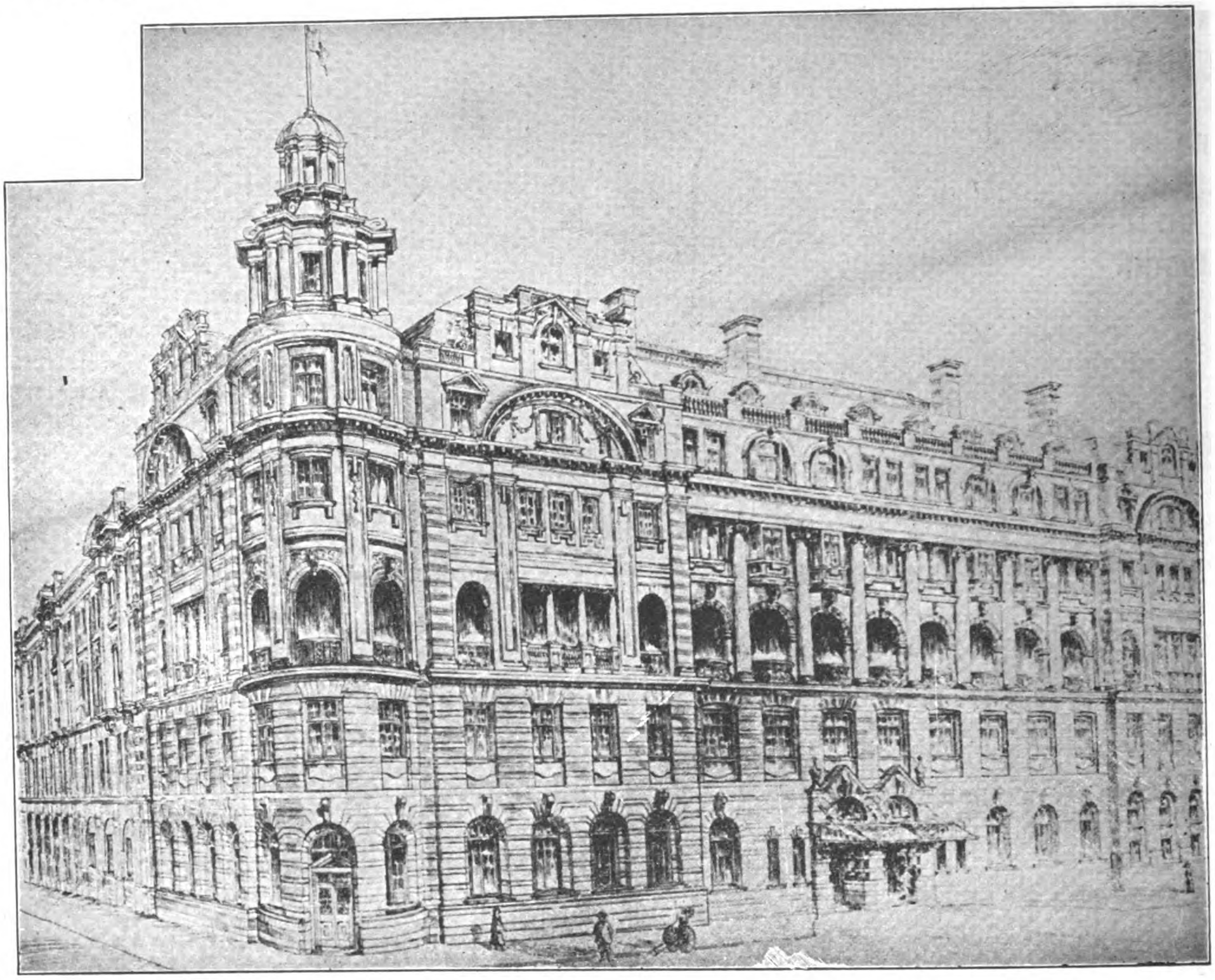

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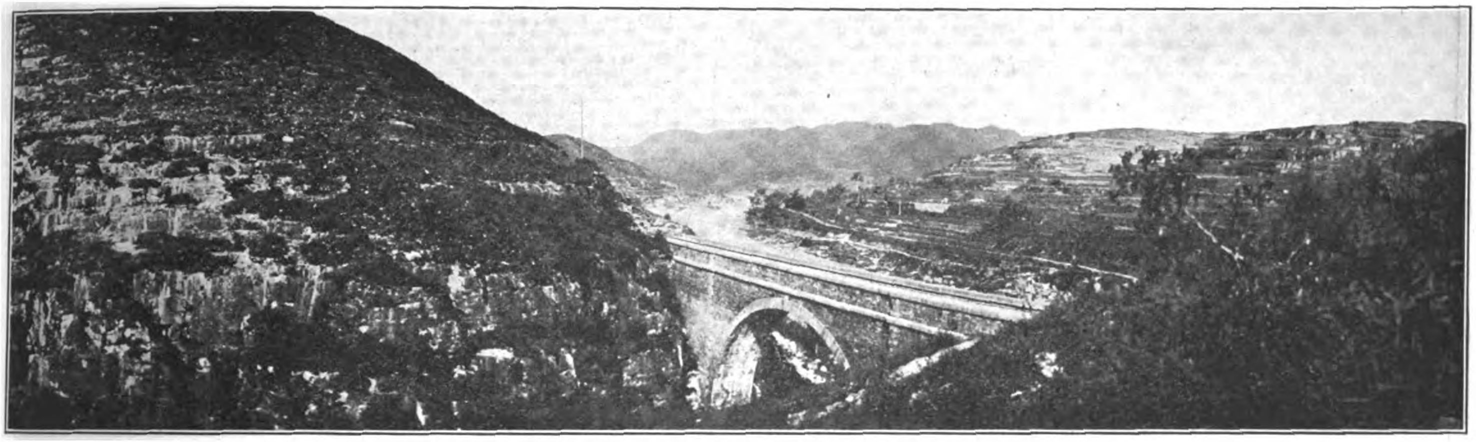
The Cheng-Tai Railway

(IMPERIAL GOVERNMENT SHANSI LINE—CHENGTINGFU TO TAIYUANFU)

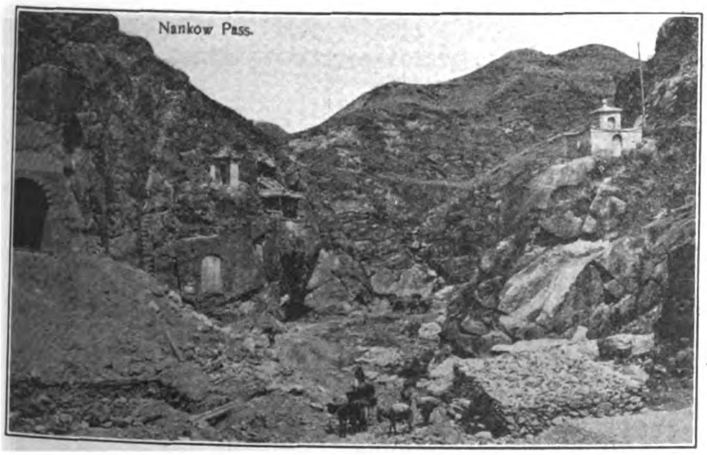


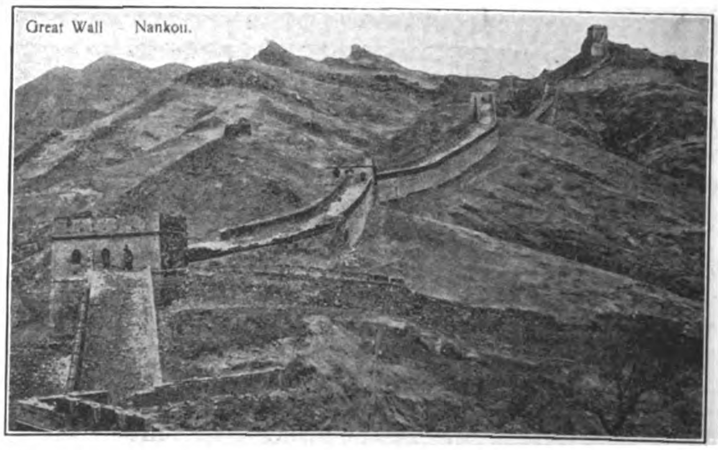
VIEWS ALONG ROUTE OF CHENG-TAI RAILWAY.

The trains of this line connect with the through service of the Peking-Hankow Railway, affording Travellers the opportunity of seeing the most picturesque part of China. The line passes through a mountainous section of country, rich in Mineral Resources to the Provincial Capital of Shansi at Taiyuanfu. This interesting city is a great educational center, and famous for the fine quality of its artistic embroideries.

The Peking-Kalgan Line

"THE ROAD TO THE GREAT WALL"





This line follows the ancient caravan route and military highway from Mongolia into China by the way of the historic Nankow Pass. This pass is the Key to Peking, and Kalgan is the gate of the Empire. From here the great camel caravans set out on their long journeys across Mongolia to Siberia and Central Asia. This old frontier mart, retaining its time-honored characteristics, one of the most interesting sights of the Old World, is made accessible by the new railway. The line also carries the passenger in two hours from Peking to Nankow, when the Great Wall of China and the Ming Tombs may be seen. A foreign hotel is operated by the railway authorities at Nankow, where chairs and guides may be secured for the Tombs.

TAOTAI JEME TIEN-YU, Director General

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This line passes through the Heart of the Empire and enables the traveller to and from Europe to catch a glimpse of Old China. Ancient walled cities, temples and pagodas are seen from the comfortable seats of the weekly trains de luxe operated by this line. From Peking, the great capital of the oldest civilization in the world, the train departs from the famous Chien-Men and carries the traveller through the historical and legendary portions of the Empire, to the modern industrial center at Hankow—the Chicago of China. Connections are made with the Cheng-tai Railway at Chengtingfu, with the Tao-Ching Line at Sin Siang-sien, and at Chengchowfu with the Pienlo Line.

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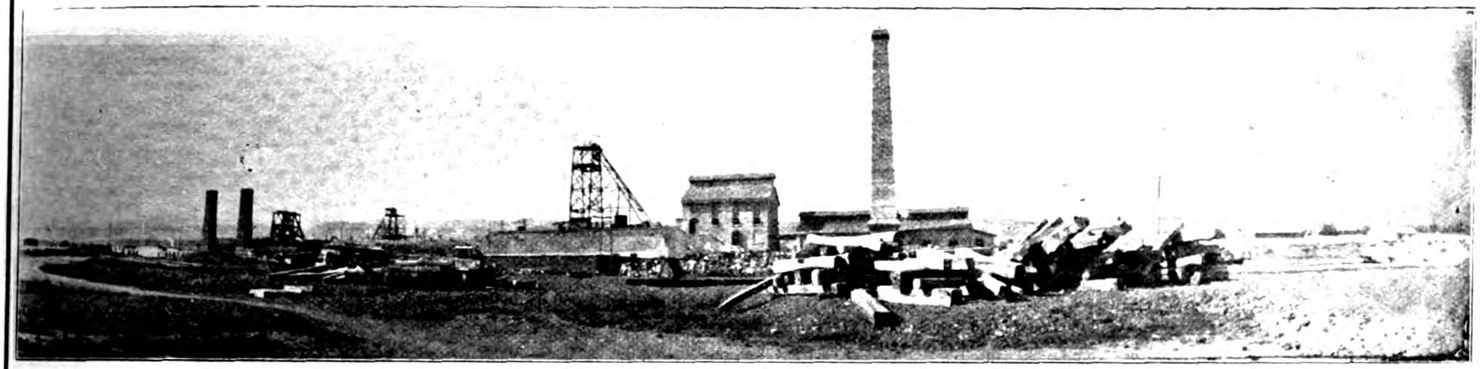
IMPERIAL CHINESE RAILWAYS

THE TAO-CHING RAILWAY

TAOKOU TO CHINGHUA

(Imperial Chinese Government Honan Line)



GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

"China's Road of Anthracite"

THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

THE PIENLO RAILWAY

(KAIFENG-FU TO HONAN-FU)

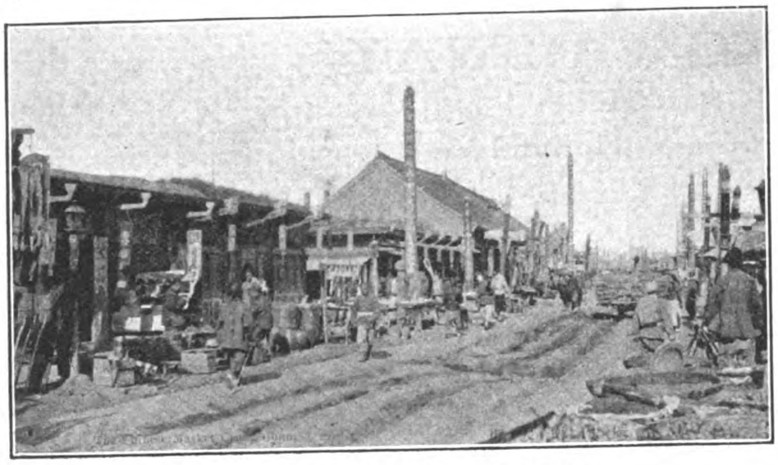
"THE FIRST SECTION OF THE PROJECTED CENTRAL TRUNKLINE"

CHUNG-HUAN TEMPLE, KAIFENG-FU.

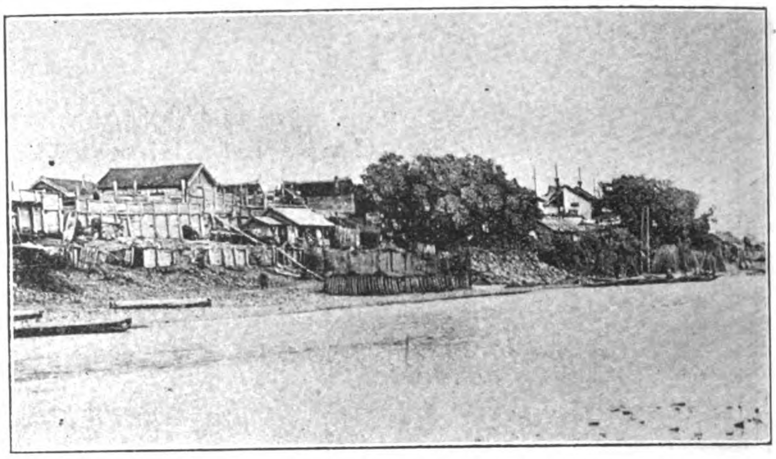
This line connects with the through service of the Peking-Hankow Railway at Tcheng Tchéou, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

IMPERIAL CHINESE RAILWAYS

KIRIN-CHANGCHUN LINE



CHINESE MARKET AT CHANG-CHUN



VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

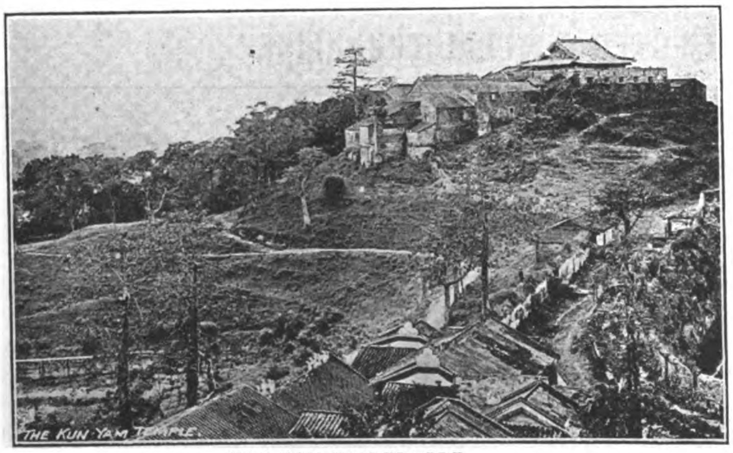
TIME TABLE

The Kirin-Changchung Railway

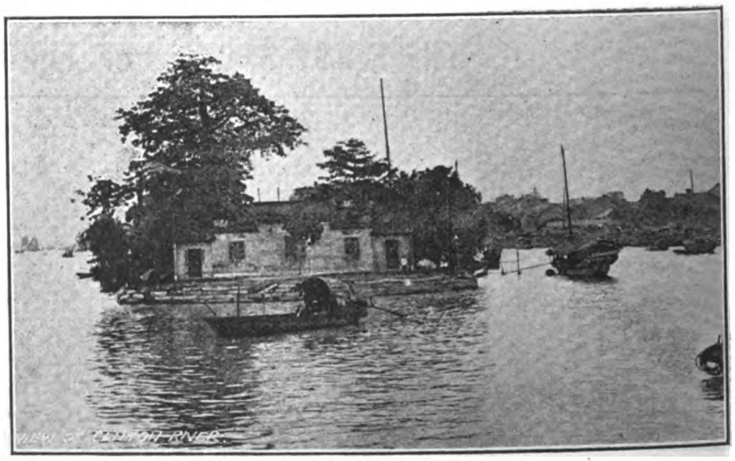
DOWN TRAIN			UP TRAIN		
Station	*No.* 1	*No.* 2	*Station*	*No.* 2	*No.* 4
	a. m.	a. m.		a. m.	p m.
Changchung	7:00	12:00	Coran	10:00	5:00
Coran	8:17	1:17	Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS

CANTON-KOWLOON LINE



THE KUN YAM TEMPLE



VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 10th JANUARY 1911 UNTIL FURTHER NOTICE.

Canton (Tai Sha Tou) to Sien Tsun.

Miles	STATION		Daily Passenger Trains. No. 1	No 3
			A. M.	P. M.
	Canton (TAI SHA TOU)	dep	7.30	2.00
3.63	Shiek Pai	arr	7.39	2.09
		dep	7.42	2.12
7 90	Che Pi	arr	7.53	2-23
		dep	7.57	2.27
12 58	Wu Chung	arr	8 08	2.38
		dep	8.11	2 41
17.09	Nam Kong	arr	8.22	2 52
		dep	8.26	2.56
21.67	Sun Tong	arr	8.38	3.08
		dep	8.41	3.11
23.61	Tong Mei	arr	8.46	3.16
		dep	8.50	3.20
25.54	Nga Yeo	arr	8.55	3.25
		dep	8.58	3.28
29.00	Sien Tsun	arr	9.07	3 37

Sien Tsun to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2	No. 4
			A. M.	P. M.
	Sien Tsun	dep	9.25	4.00
3 46	Nga Yeo	arr	9.34	4.09
		dep	9.37	4.12
5.39	Tong Mei	arr	9.42	4.17
		dep	9.46	4.21
7.33	Sun Tong	arr	9 51	4.26
		dep	9.54	4.29
11.91	Nam Kong	arr	10.06	4.41
		dep	10.10	4 45
16.42	Wu Chung	arr	10 21	4.56
		dep	10.24	4 59
21.10	Che Pi	arr	10.35	5.10
		dep	10.39	5.14
25 37	Shiek Pai	arr	10.50	5.25
		dep	10.53	5.28
29.00	Canton (TAI SHA TOU)	arr	11.02	5.37

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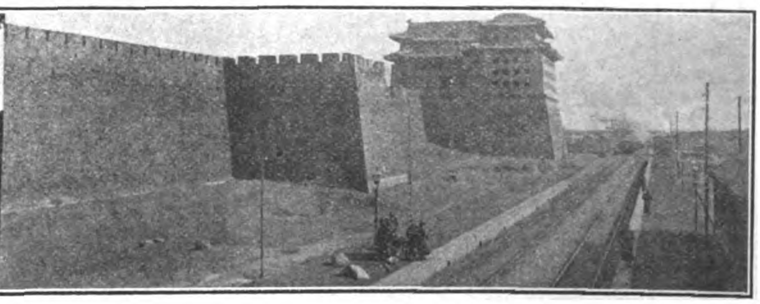
STREET SCENE AT SHANHAIKUAN



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J. E. FOLEY, Traffic Manager

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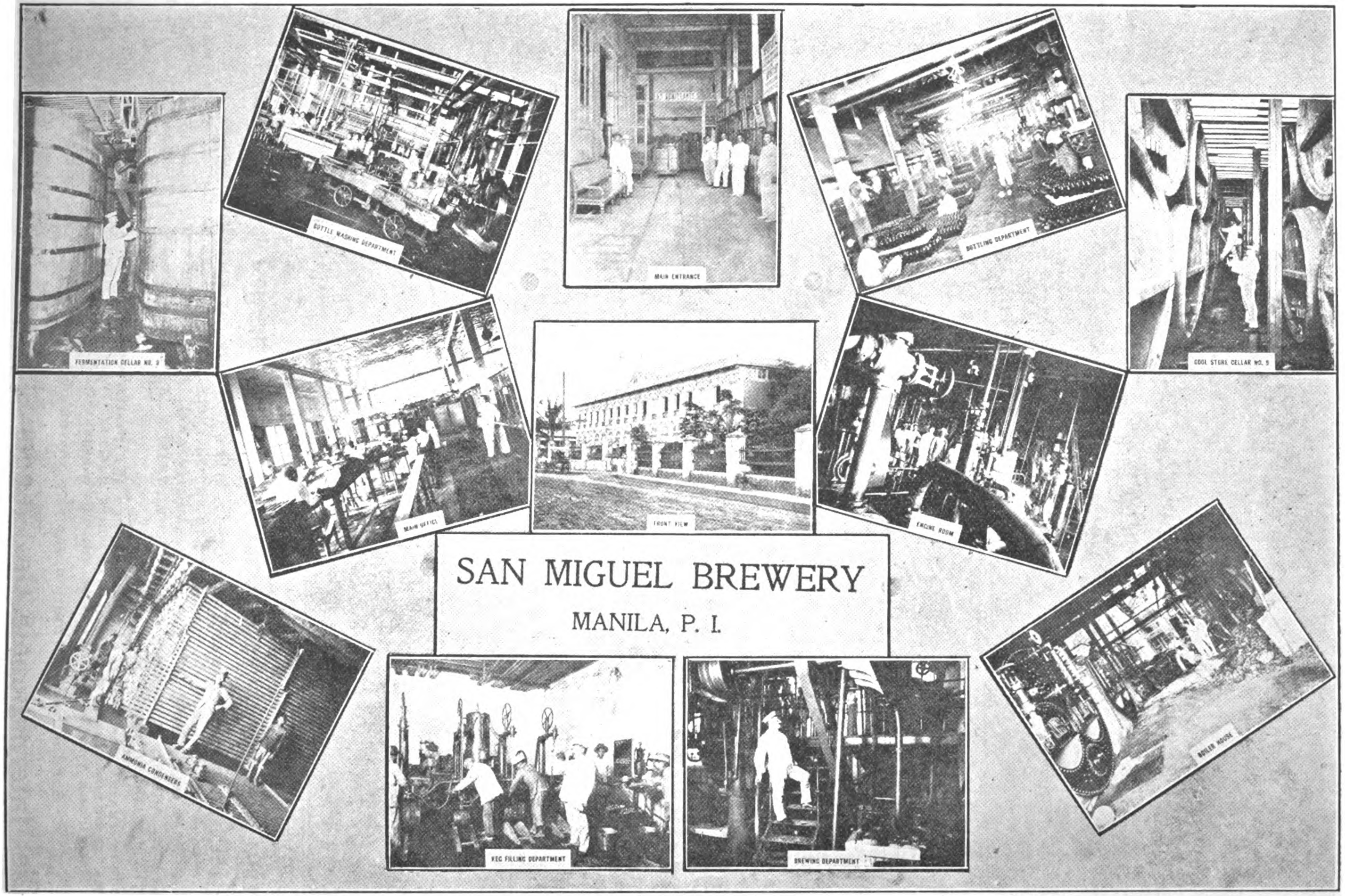

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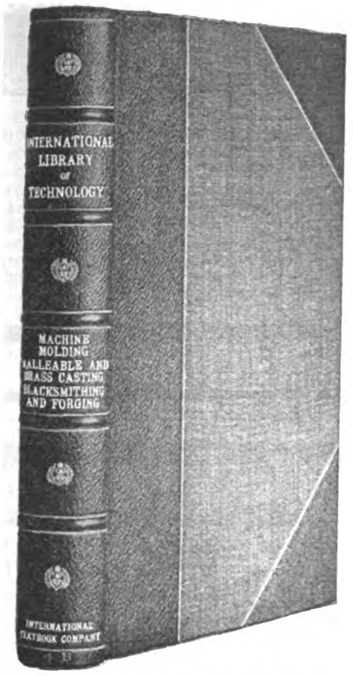

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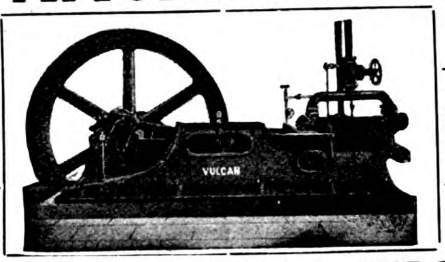
VUL  CAN

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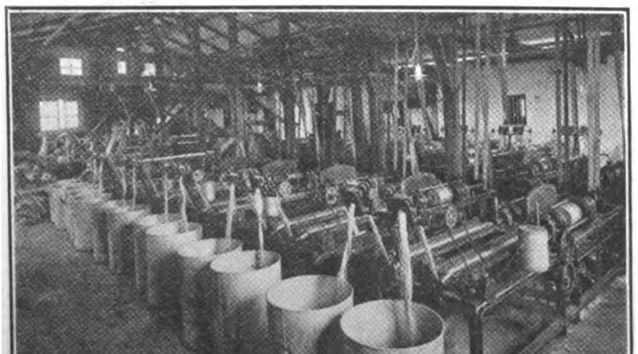

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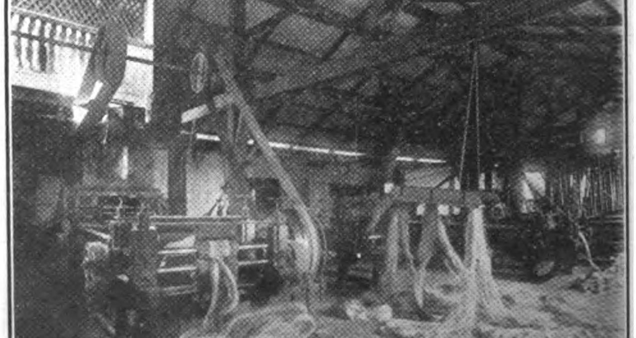

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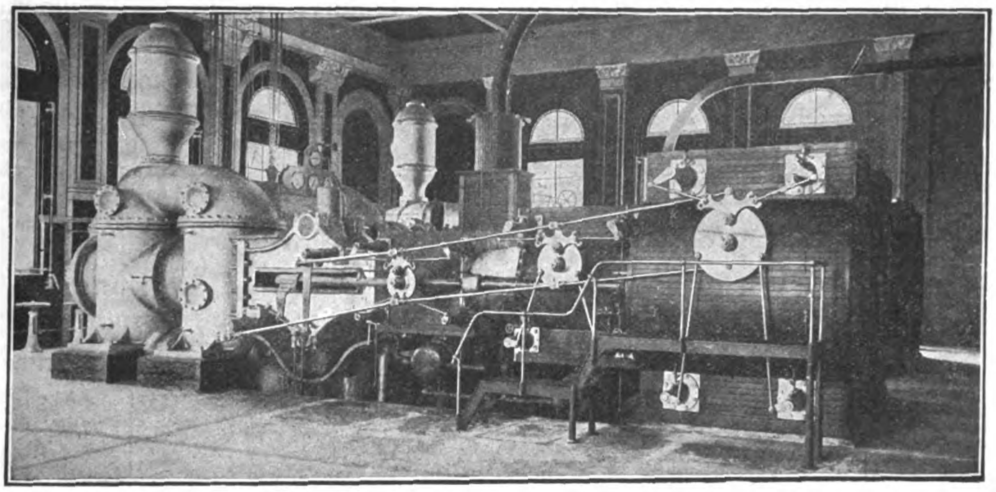

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TAYEH IRON MINES—situated in Tayeh on the Yangtsze River 72 miles below Hankow.

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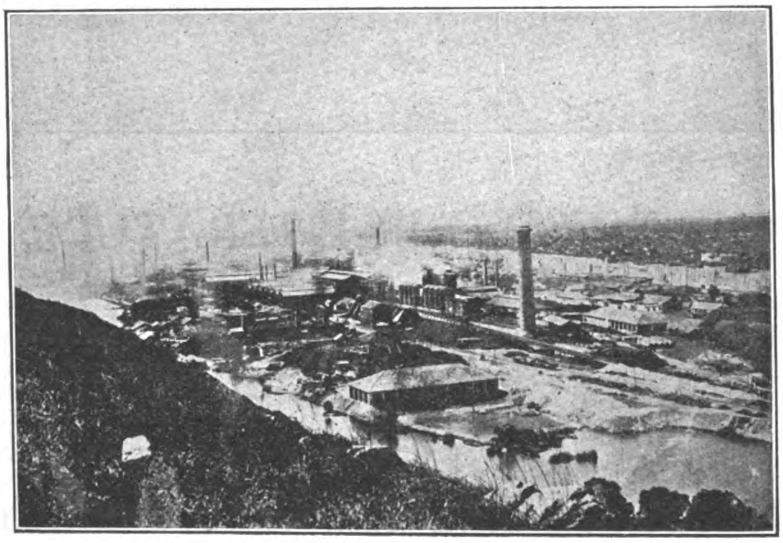

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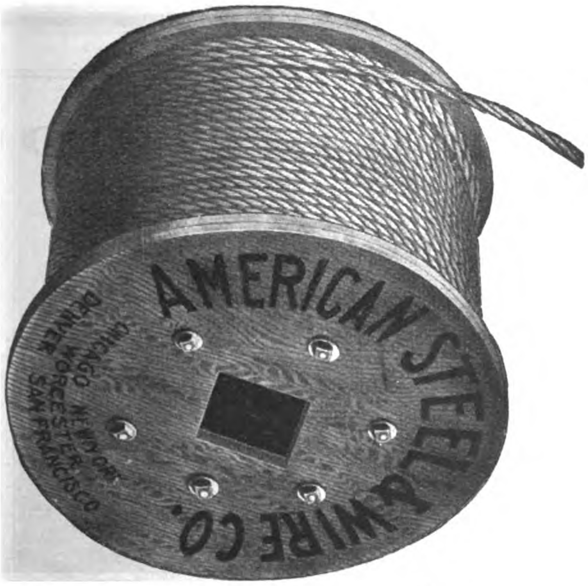

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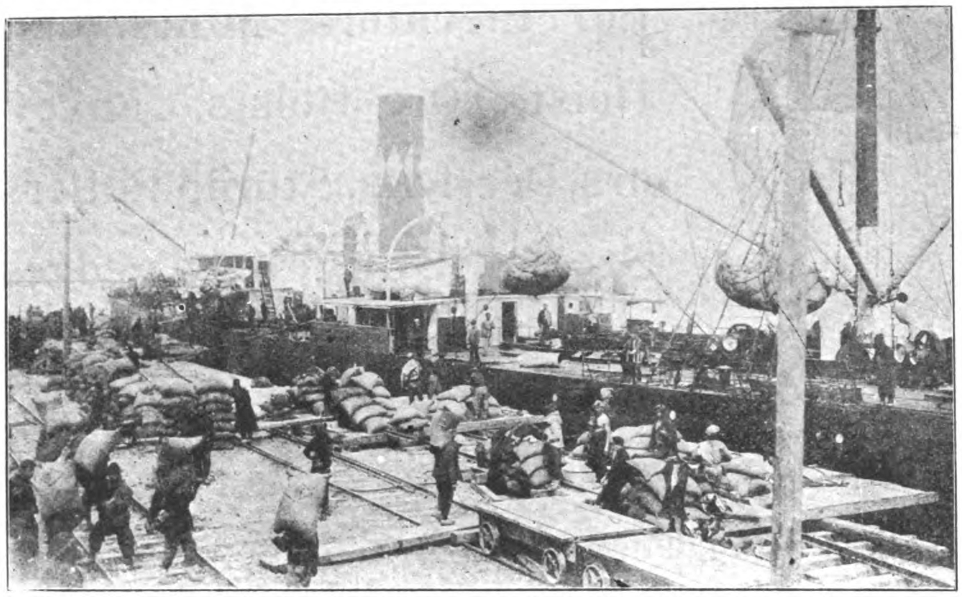

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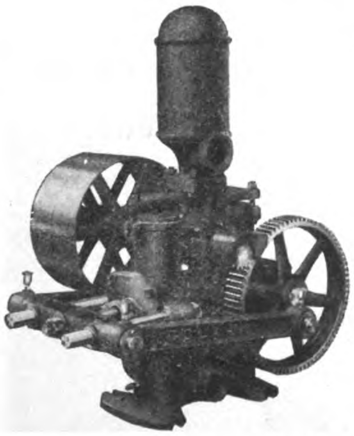

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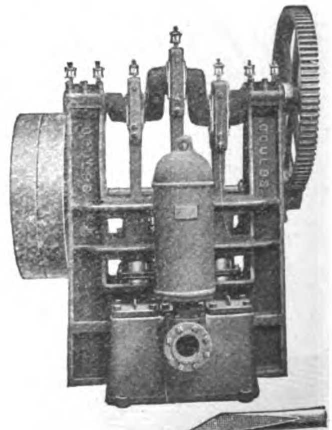

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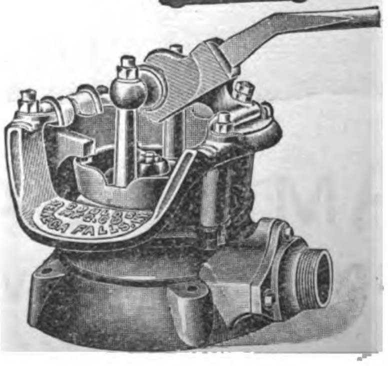

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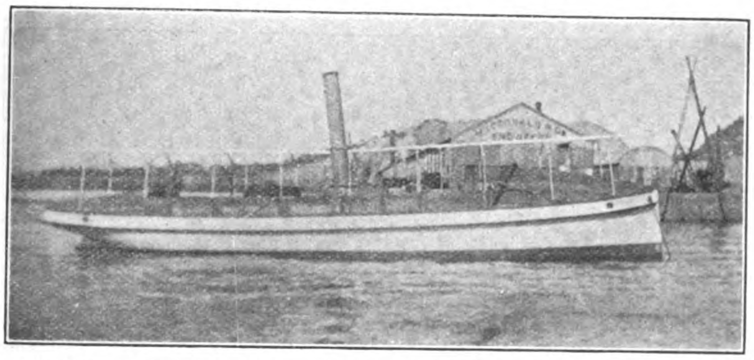

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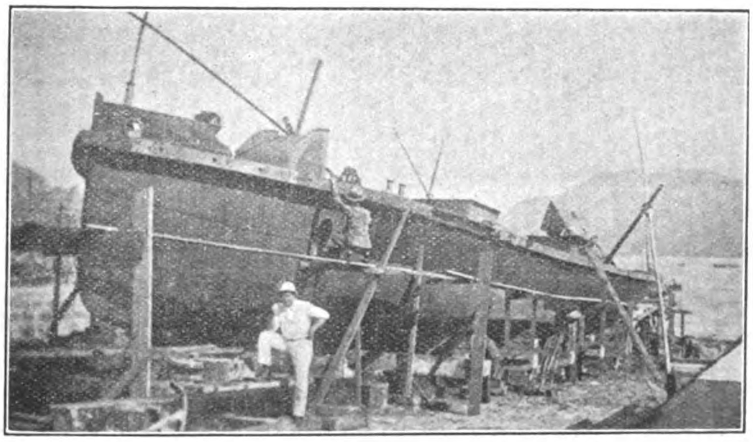

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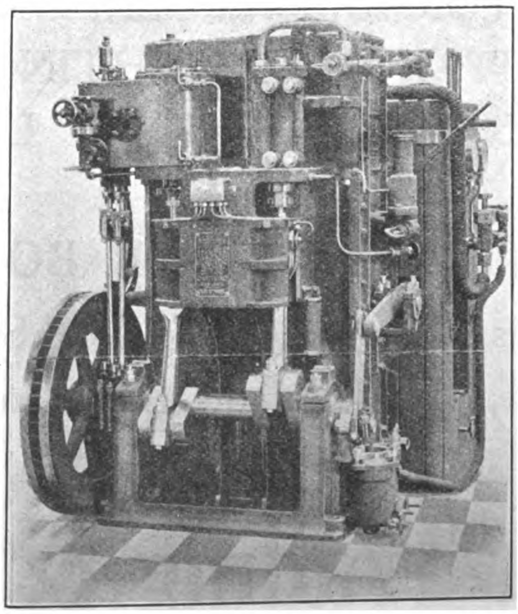

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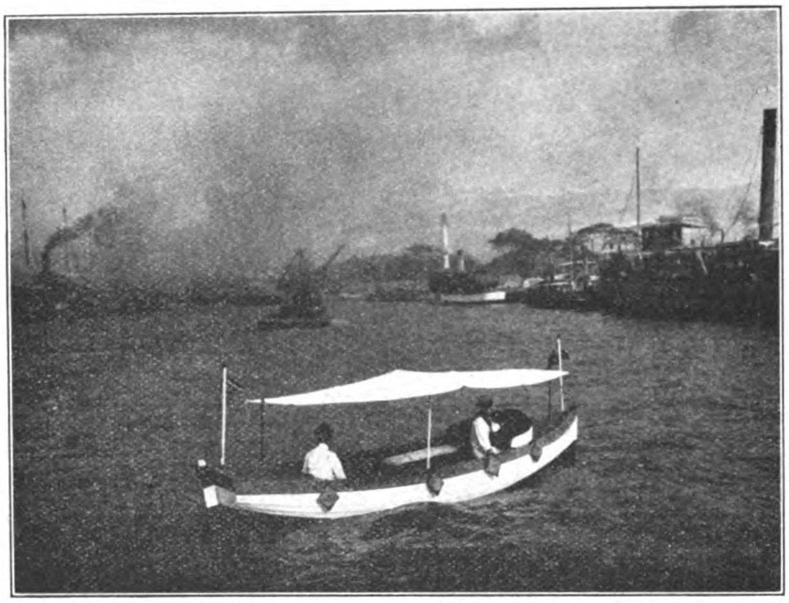

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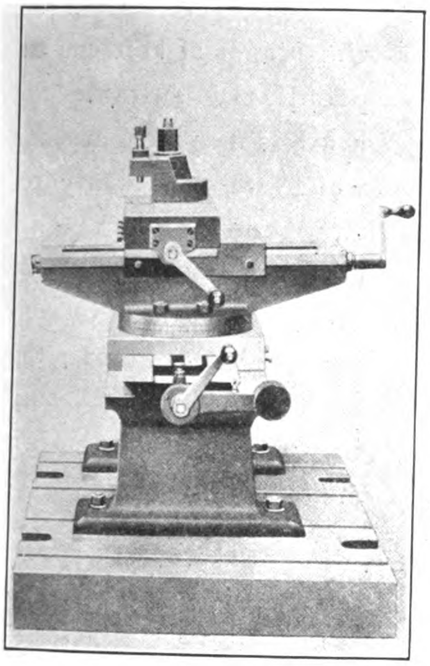

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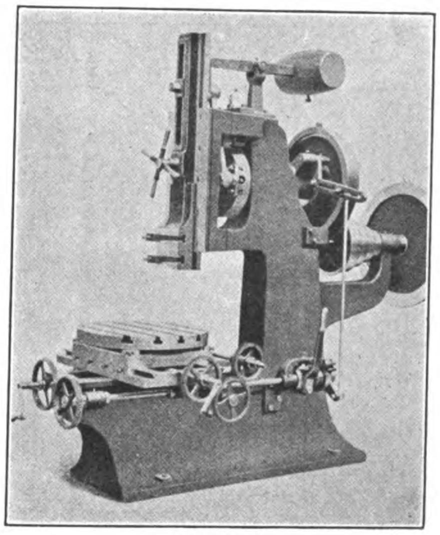

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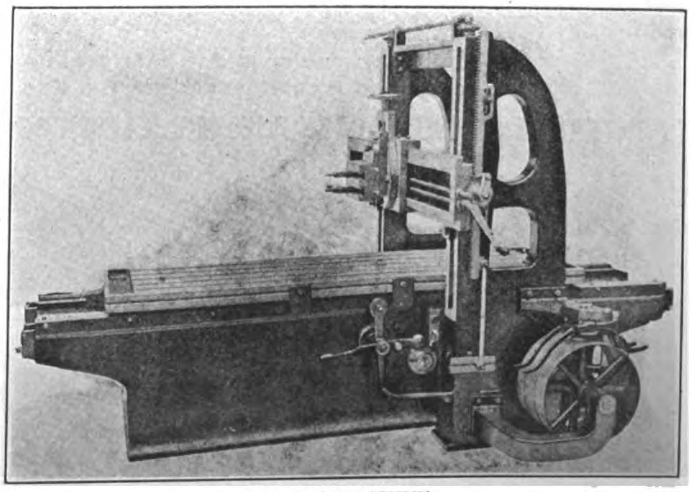

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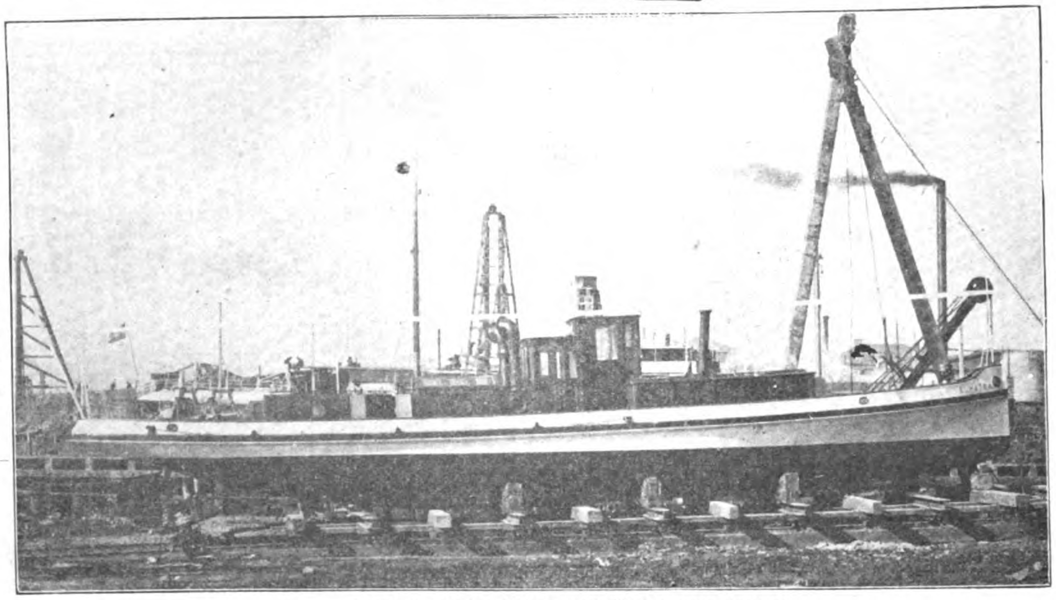

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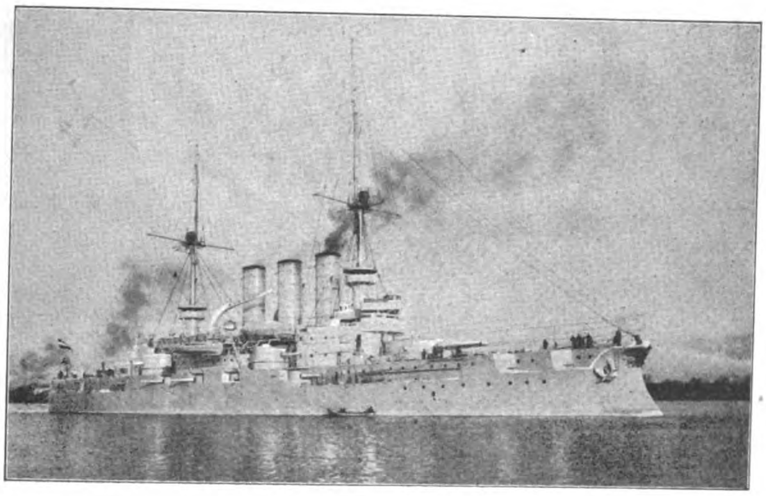

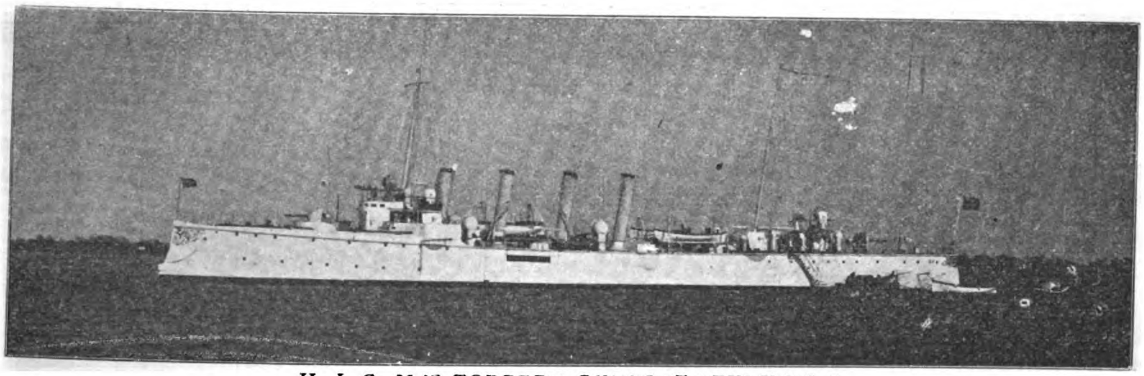

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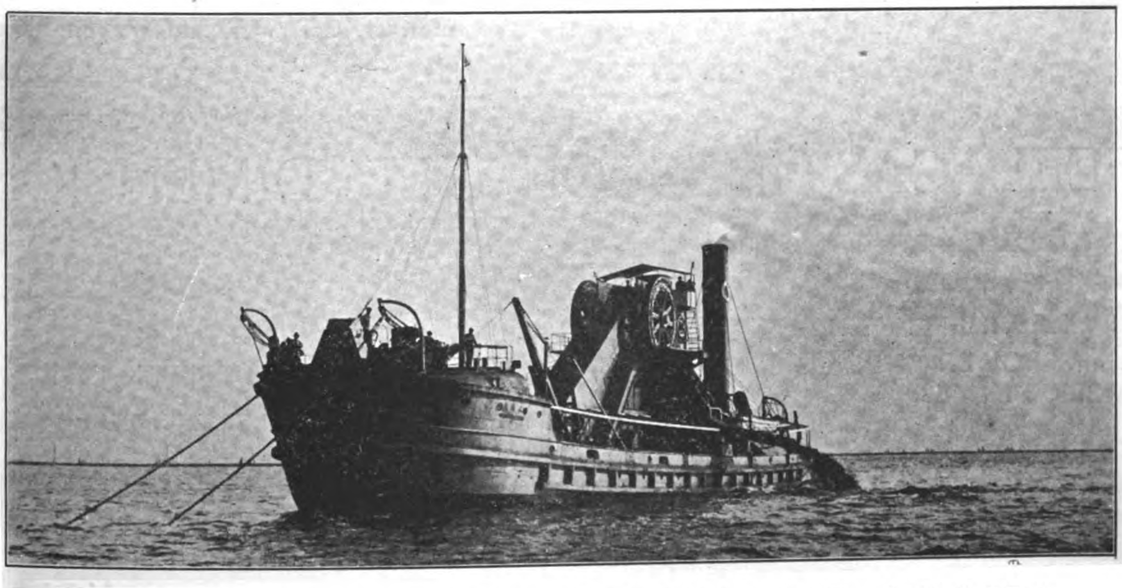

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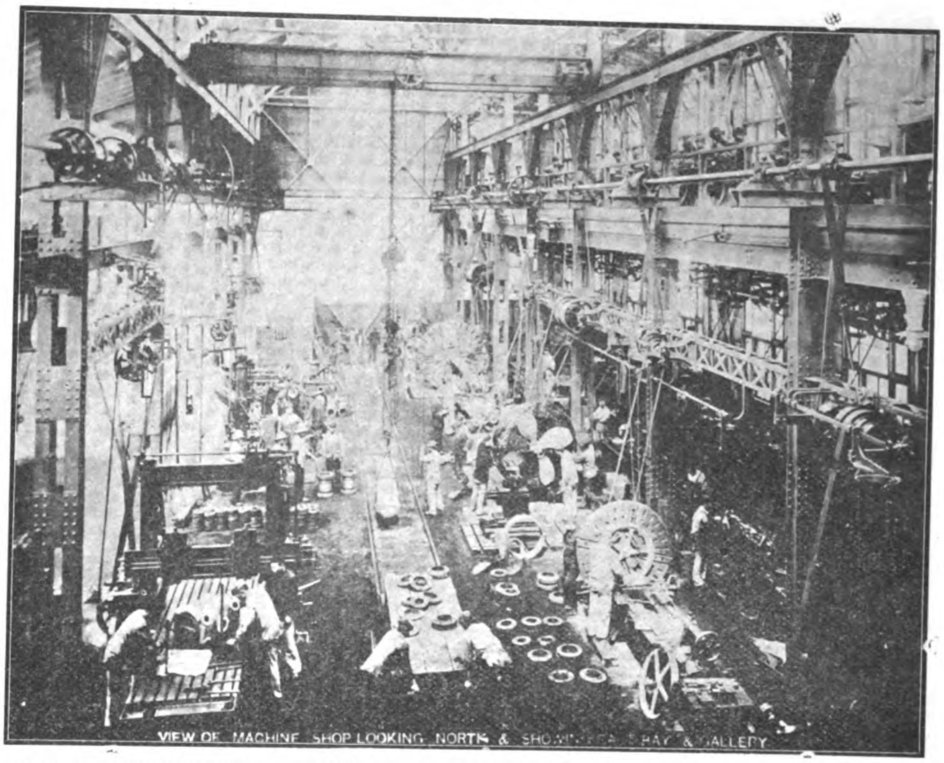

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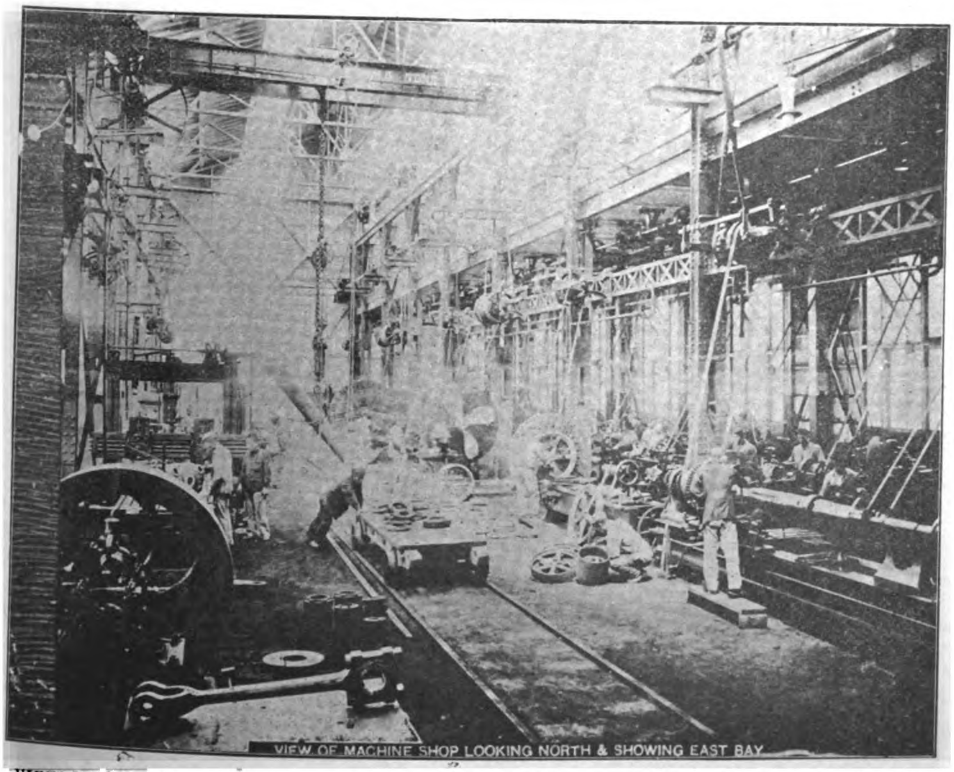

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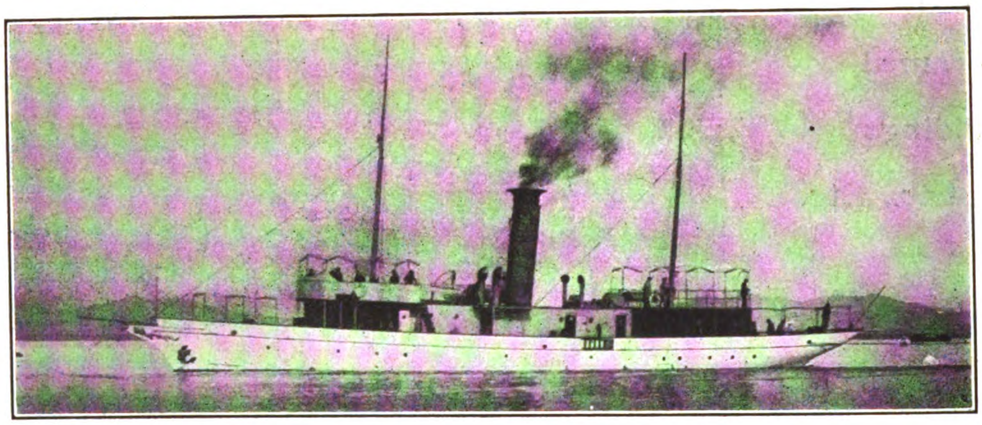

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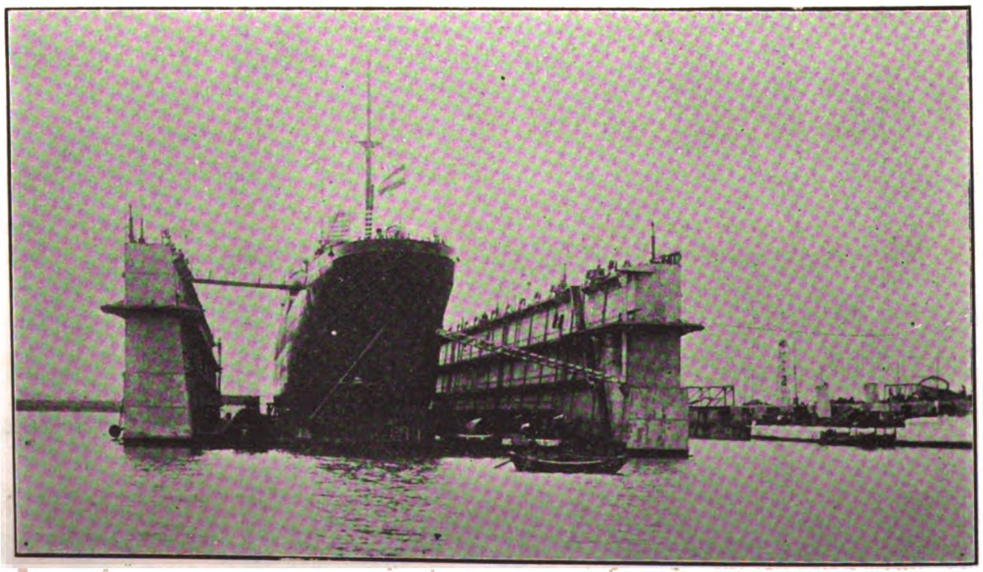

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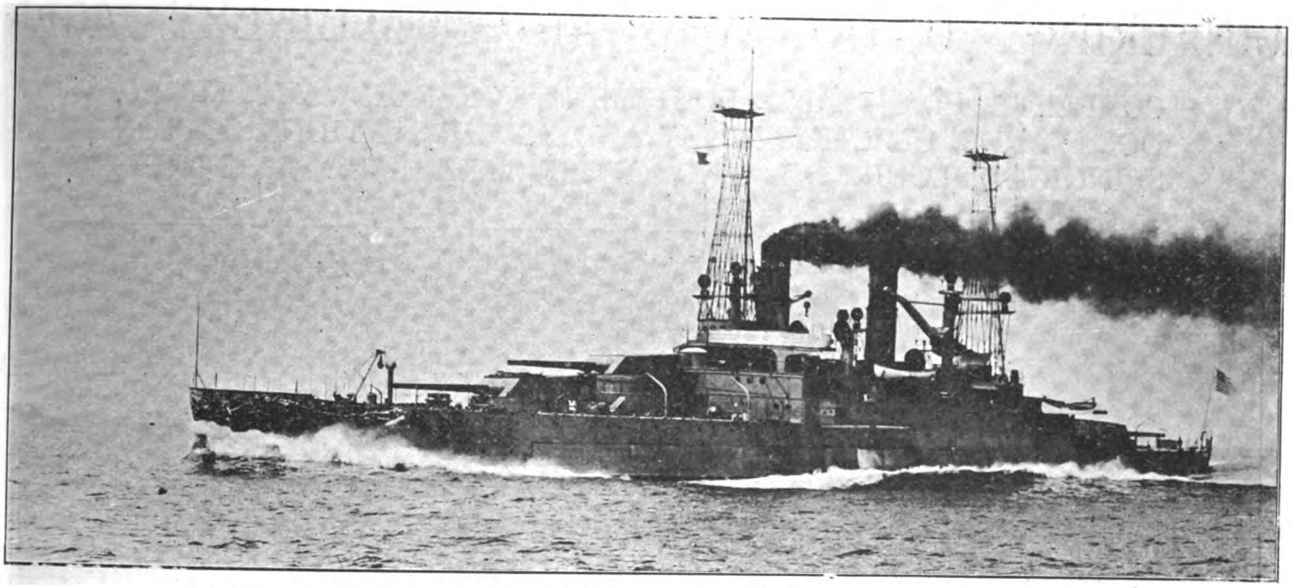

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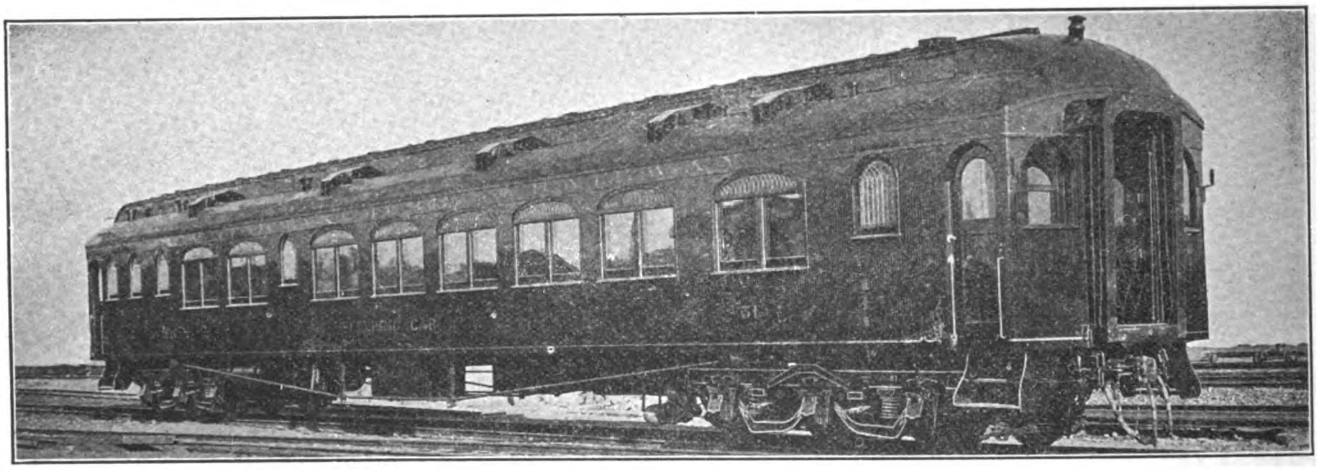

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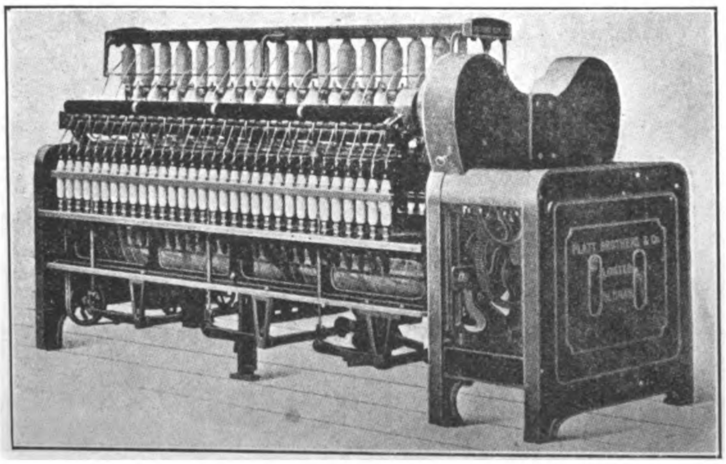

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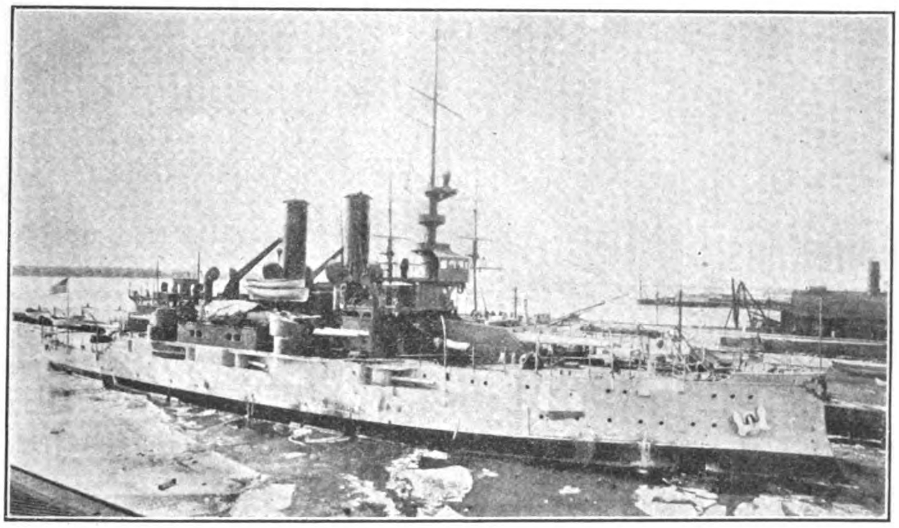

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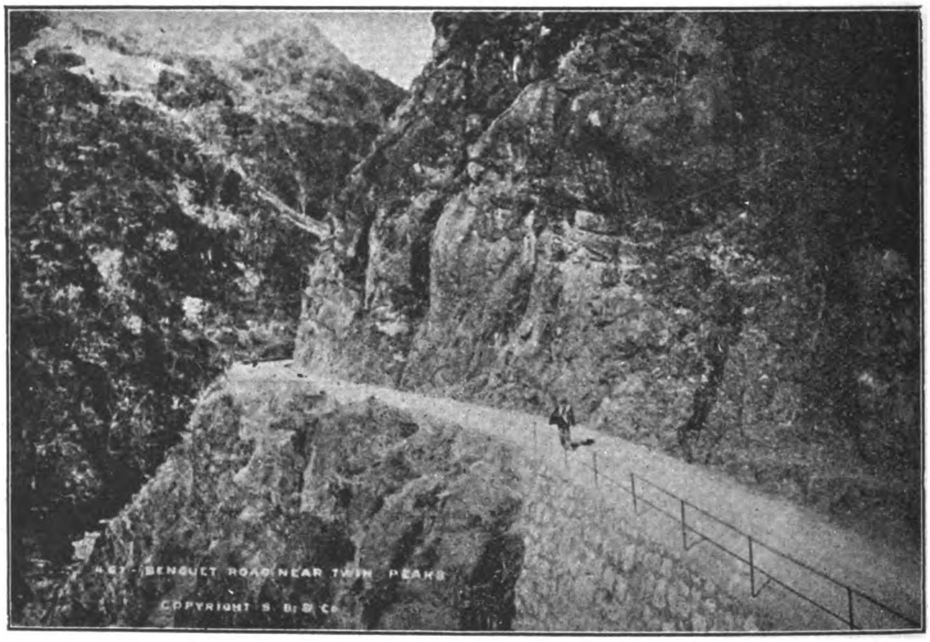

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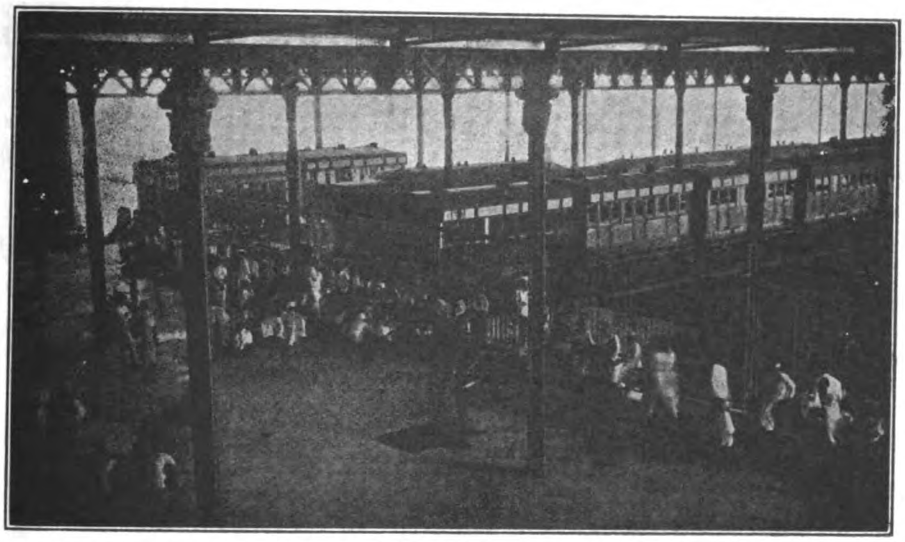

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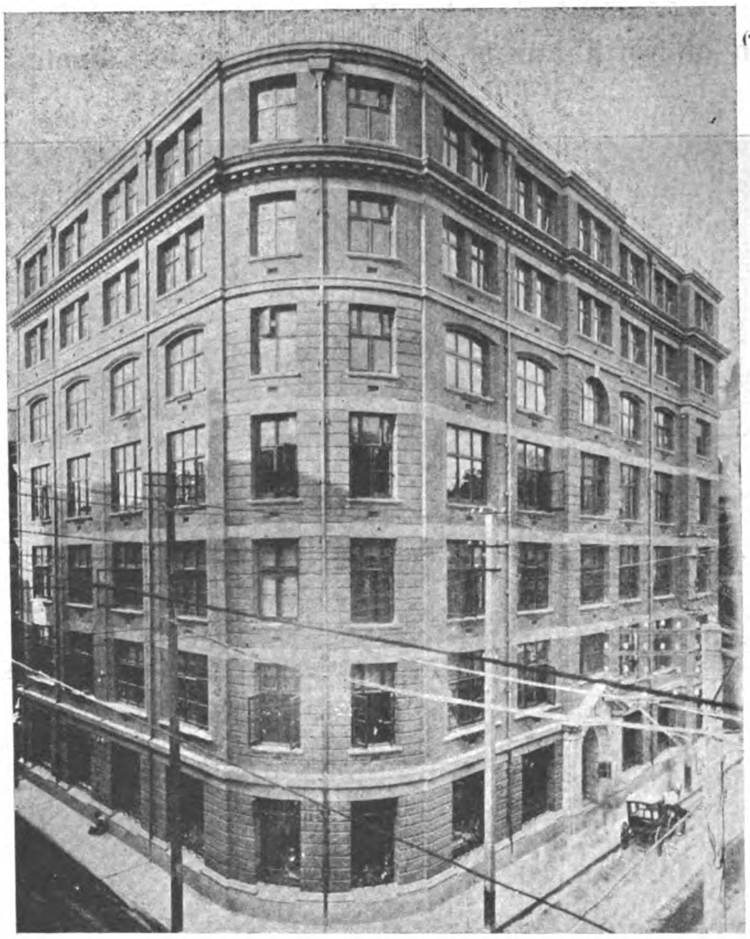

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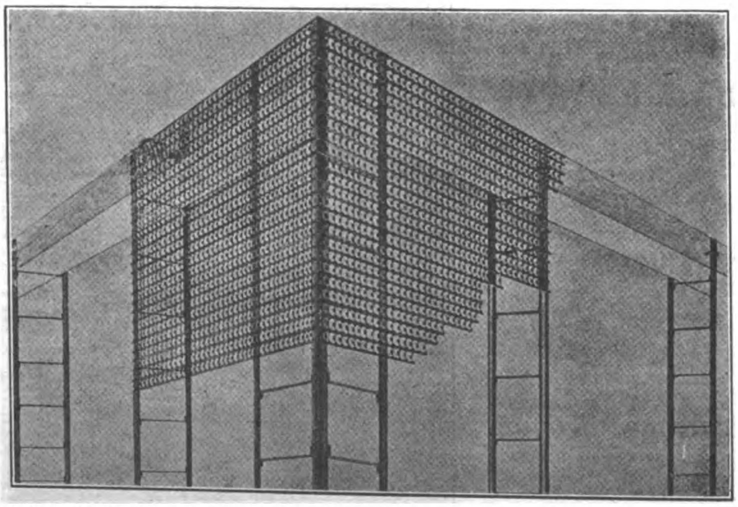

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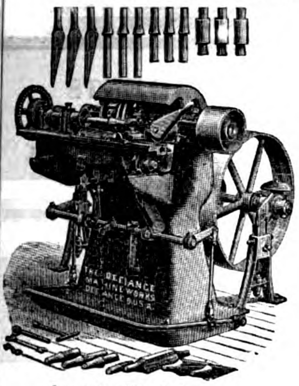

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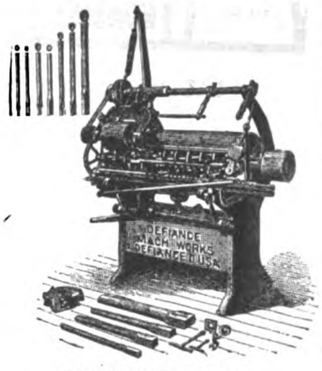

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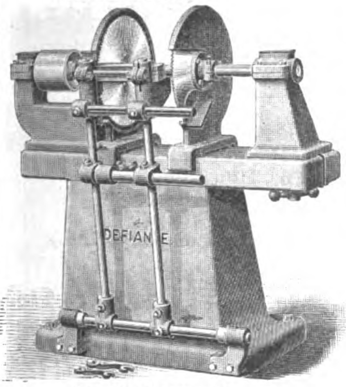

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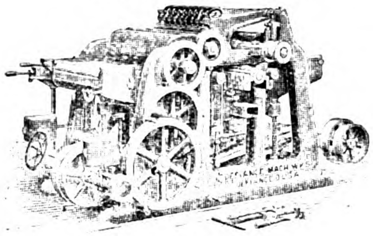

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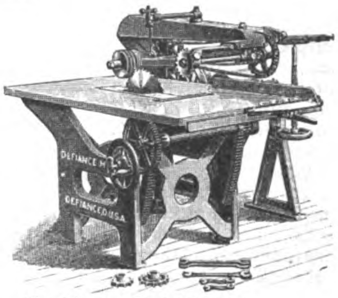

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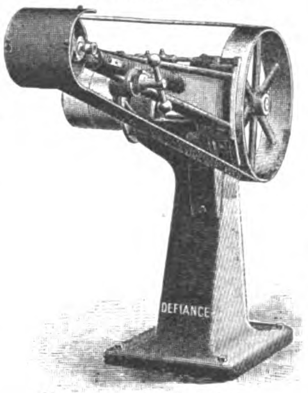

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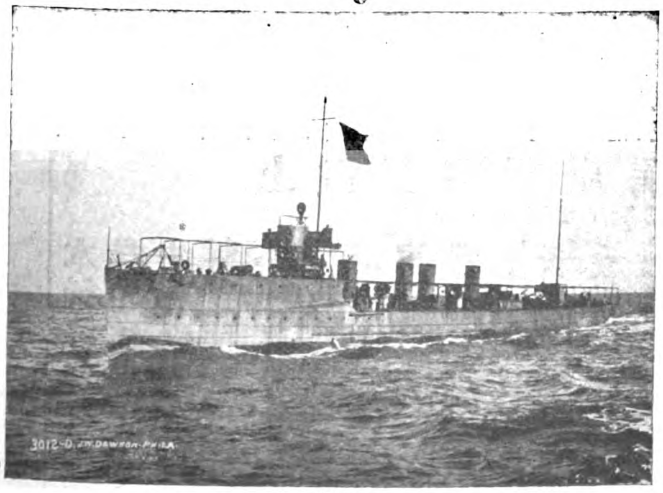

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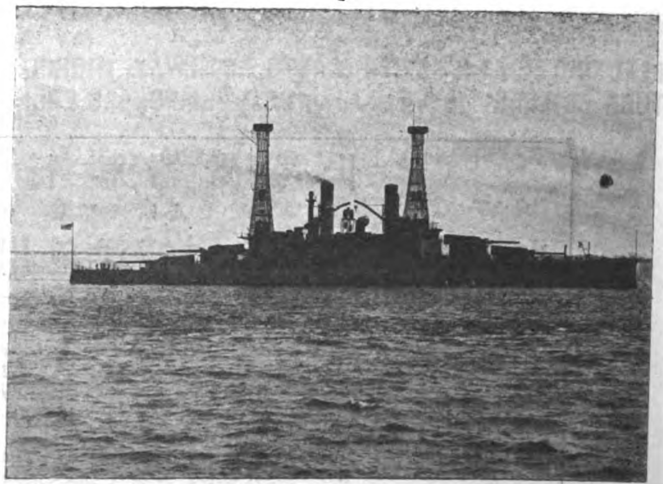

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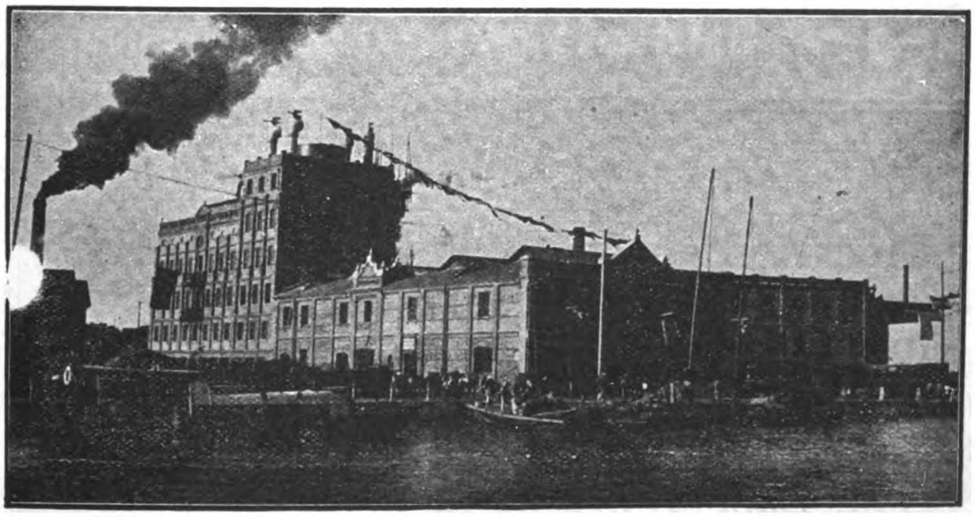

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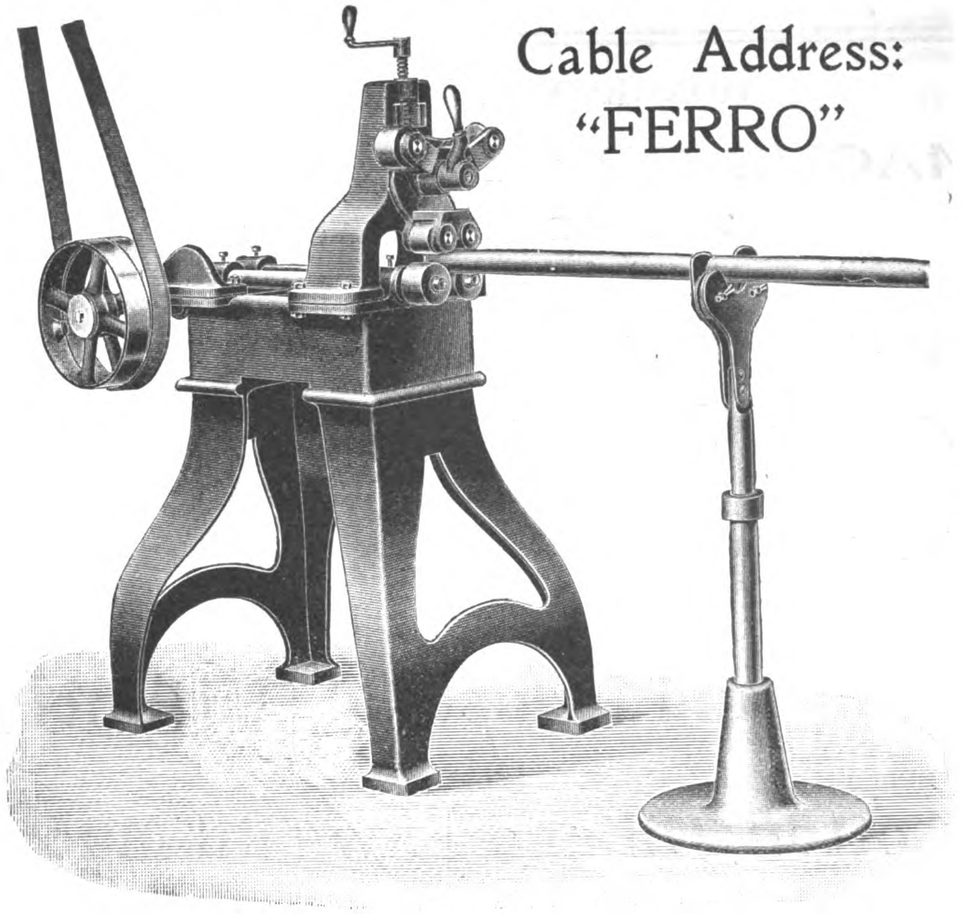

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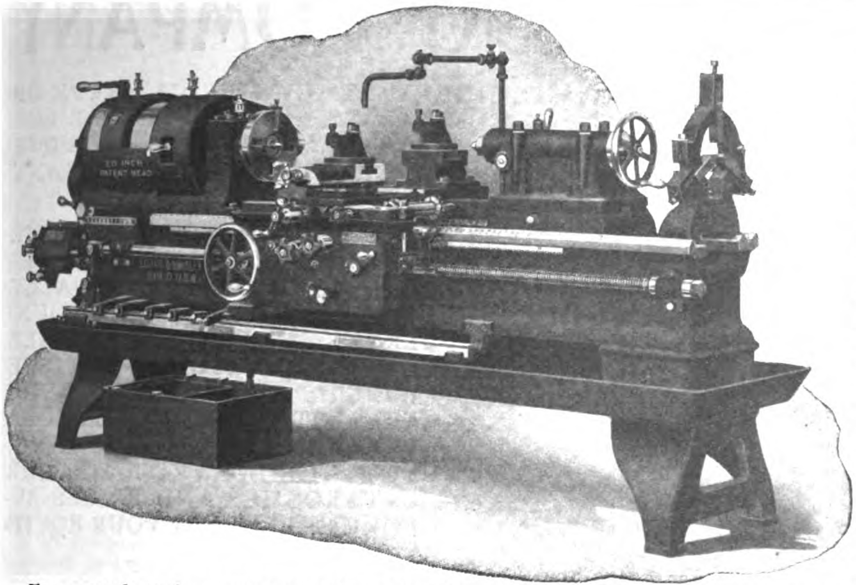

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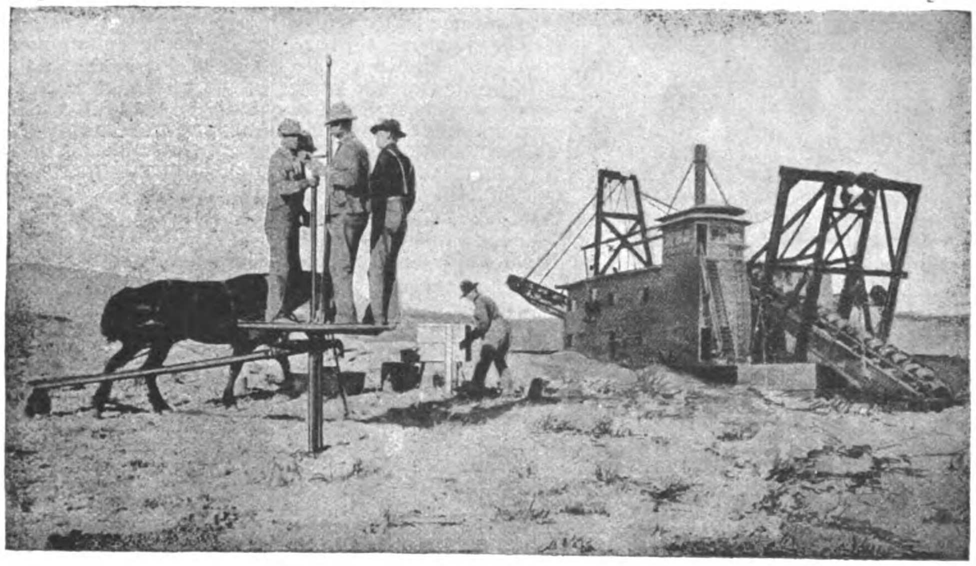

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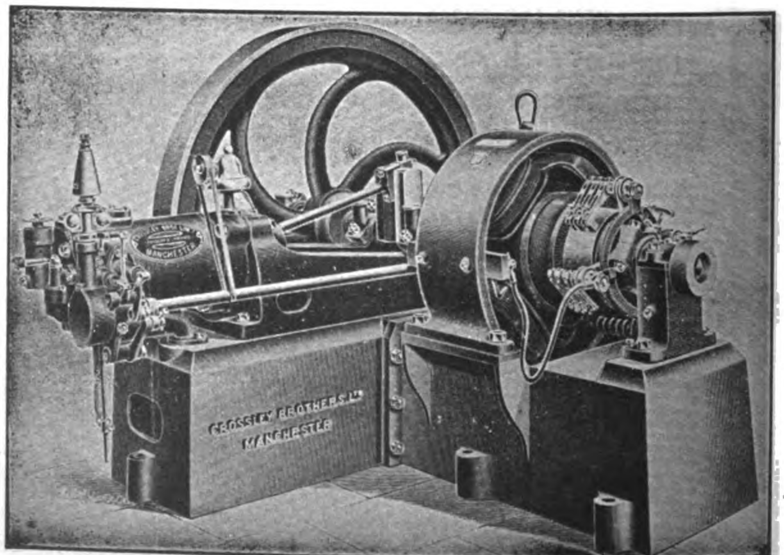

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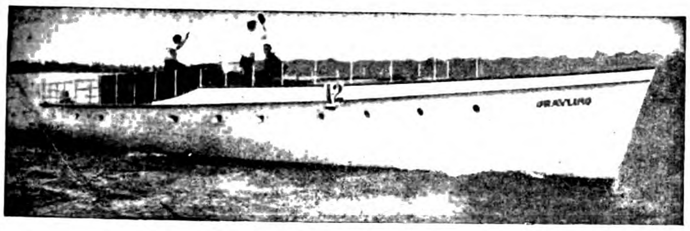

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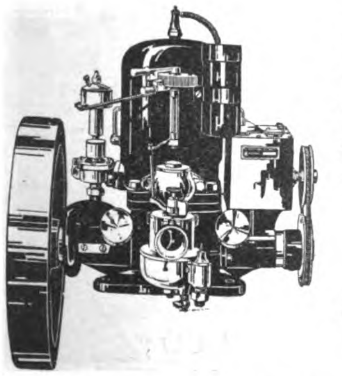

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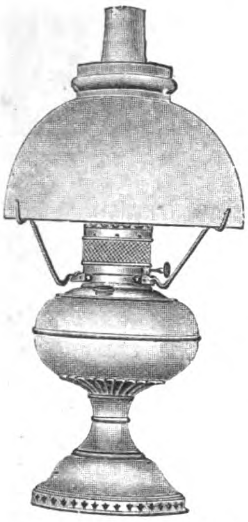

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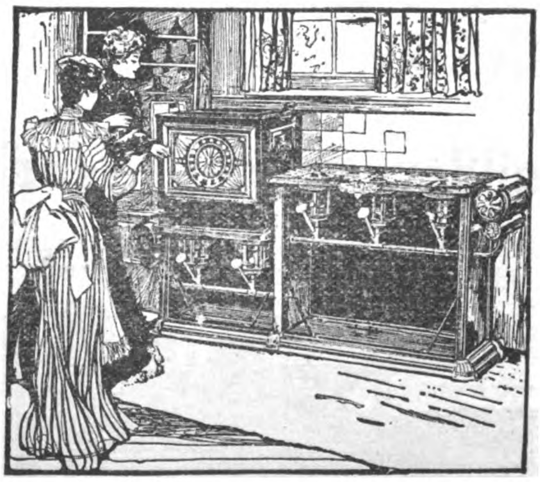

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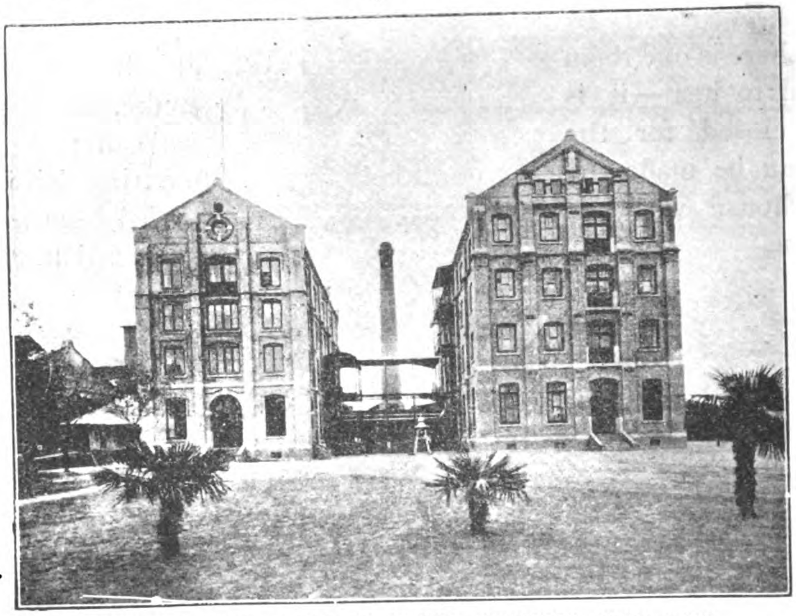

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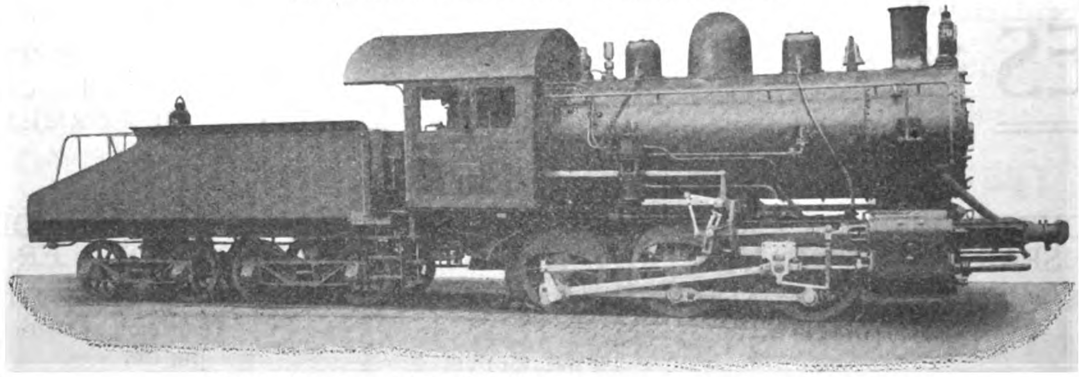

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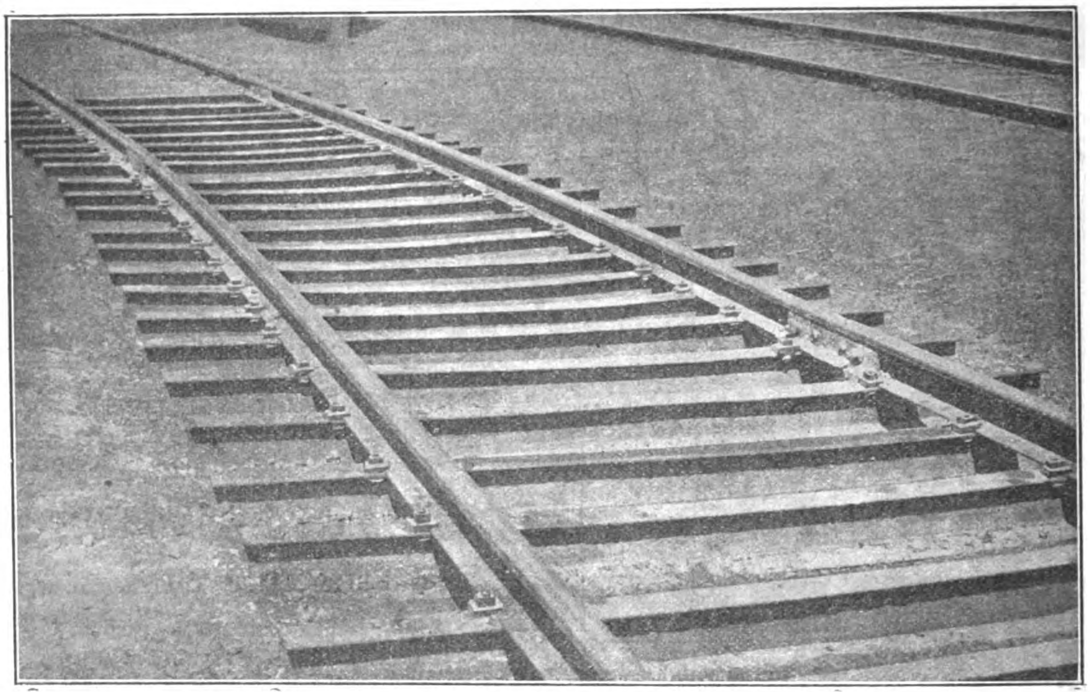

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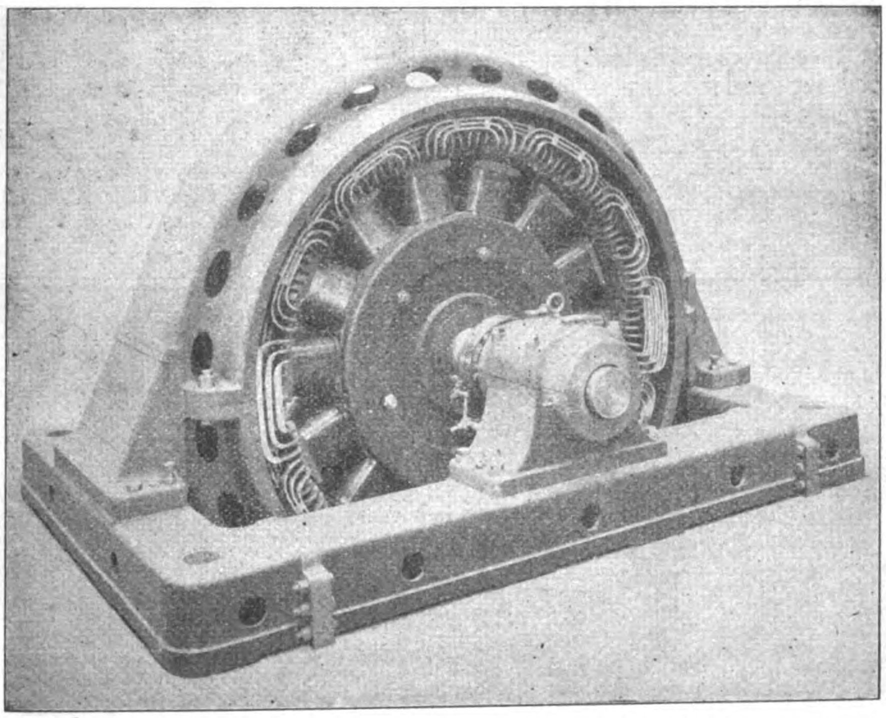

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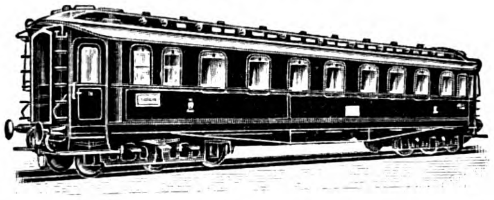

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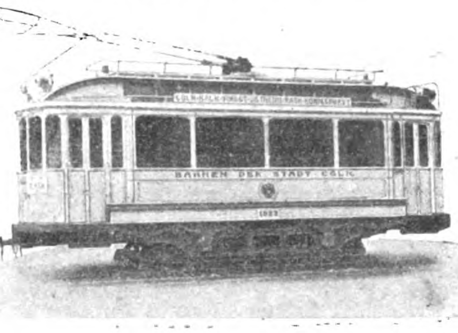

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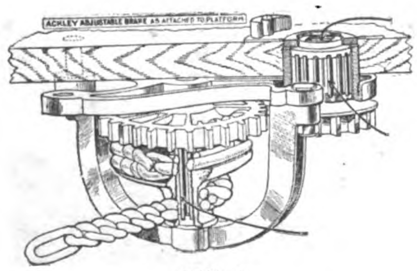

FIG. I

FIG. 3

The ACKLEY ADJUSTABLE is the only gear brake that can be attached to the platform at any angle, owing to the adjustable yoke.

It requires no machine fitted bearings on the staff—(Fig. 2) simply square the staff in blacksmith shop for loose fit—reducing cost of labor to less than one-fourth required to fit any other geared brake staff.

All movable parts revolve on roller bearings (B, C, Figs. 1 and 3), eliminating friction, thereby giving ease of action in applying brake shoes and releasing.

Three different gear ratios, 12×36, 14×34 and 18×30, all interchangeable in same frame, can be obtained with different sized winding drums, as desired, to take up required amount of slack chain, according to type or weight of car.

It is the only gear brake which has no staff bearing in the frame. The journaling of the pinion (Fig. 4), in the frame (Fig. 3 at D), independently of the staff (Fig. 2), places the gears at a fixed position, preventing **BINDING**, which occurs to gear brakes having staff bearings in frame. (See THE OLD—Figs. 5 and 6, G and I.)

Here is the conclusion: It is EASY AND INEXPENSIVE TO INSTALL; POWERFUL, YET EASILY APPLIED; RELEASES QUICKLY; NO BINDING OF STAFF OR GEARS; ADAPTED TO ANY AND SUITABLE FOR ALL KINDS OF CARS.

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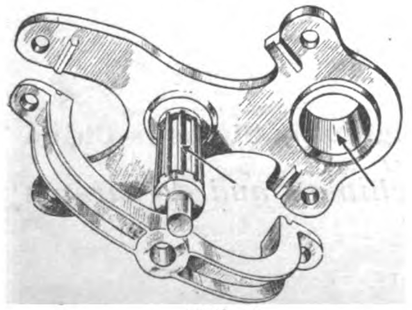

FIG. 2

FIG. 4

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Special Supplement to
THE FAR EASTERN REVIEW
May, 1911

CHINA'S NEW CABINET

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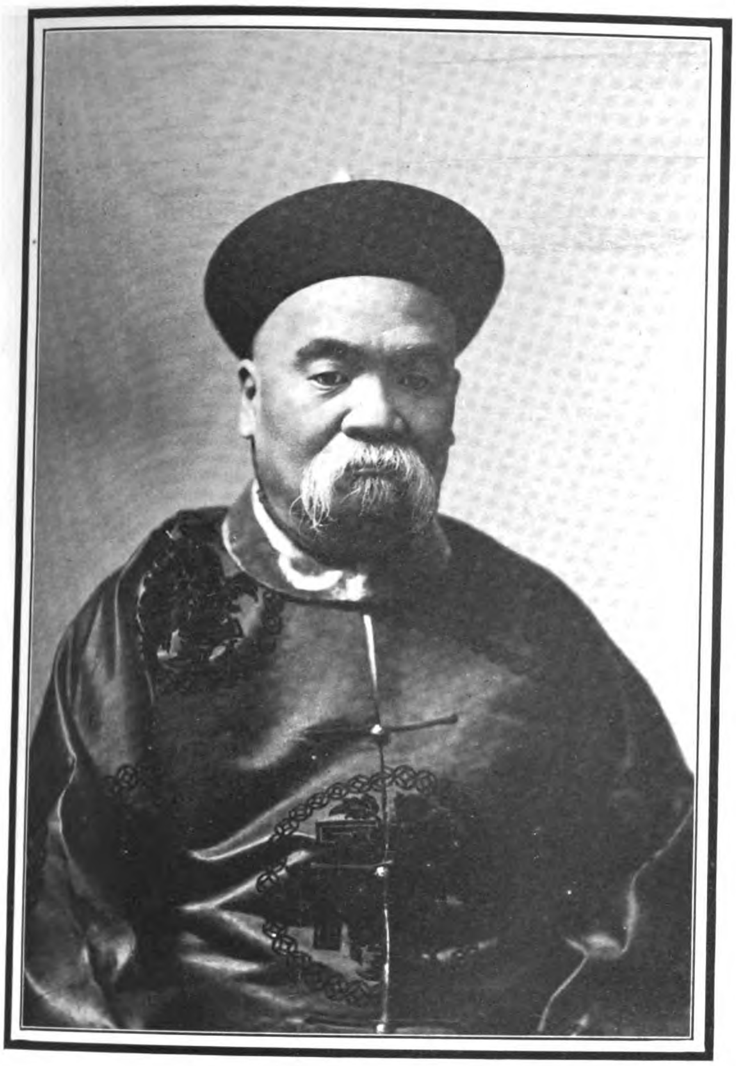
FIRST VICE-PRESIDENT OF THE CABINET

His Excellency, LIANG TUNG-YEN

Minister of Foreign Affairs



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Joint Minister of the Military Council

His Imperial Highness, Prince YU-LANG
Joint Minister of the Military Council

His Highness, SHANG-CH'I; Prince SU

Minister of the Interior

His Excellency General YIN-CHANG

Minister of War

His Imperial Highness, Prince TSAI HSUN

Minister of the Navy, Brother of the Late Emperor KUANG HSU and of Prince C'HUN, The Regent

From a recent Photograph for exclusive publication in *The Far Eastern Review*

THE FAR EASTERN REVIEW

COMMERCE ⊛ ENGINEERING ⊛ FINANCE

VOL. IX. MANILA, P. I., SHANGHAI, AND YOKOHAMA, MAY, 1911 No. 12.

CHINA'S CABINET

THE IMPERIAL FAMILY

The Emperor of China, and his father, the Regent.

From Chinese Paintings

The Emperor and his Father and Mother, the Prince and Princess of C'hun.

News from Peking states that the organization of the new Cabinet and Advisory Board was formally passed by the Government Council on April 27th, and later made public officially on May 8th. Many schemes had been proposed and rejected, but the old situation apparently remains unchanged, for notwithstanding all the shuffles and revisions, the Grand Council idea is still preserved, and instead of a real Cabinet responsible to the National Assembly, the new body will for all purposes be the same as the old Council, responsible to the Throne for its actions, and presided over by the same old office holder and leader, Prince Ching. Until such time as the Empire has an established Parliament with full powers over legislation, it is natural some one leader must dominate the affairs of the country, and so long as the prime occupation of the Grand Council or Cabinet consists in shuffling officials around from one post to the other, and collecting the proceeds of the sales of office, some one strong member of the Impe-ial Clan must hold the reins to insure the full share of the spoils for the Imperial Coffers. As there are only two or three members of the Imperial Family whose age and experience in public affairs qualifies them for this most important post, it is again natural that one of them should continue to direct the politics and government of the Empire. So the list of eligible princes, qualified to head a responsible Cabinet, narrowed down to Prince Ching, Duke Tsai-Tse and Prince Yu Lang.

There are other princes of the Pu generation, such as Prince Kung and Pu-lun who, while capable and intelligent, lack the age and experience to cope with the astute old officials who have climbed step by step the ladder of Chinese official life. Duke Tsai Tse, the Minister of France, loomed large on the horizon as a candidate for the mantle of Prince Ching, and the post of Premier. A strong party had gathered around this capable and efficient official, and his chances of being called to preside over the cabinet seemed favorable. Prince Yu Lang, one of the eligibles, was finally offered the post of Vice President of the Cabinet, which he refused, preferring to devote his whole attention to the Army, and the selection narrowed down to Prince Ching, and Duke Tsai Tse. The former, fearing that the responsibility would be too great, followed the customary tactics of all Chinese officials when they feel certain of a high appointment, and begged to be excused and permitted to retire. After a decent interval of time, certain of his declining, the formality of tendering the honor to Duke Tsai Tse was duly performed. The Regent then sent the colleagues of Prince Ching to call at his residence and announce the Throne's decision that if he again refused to accept this office the Cabinet system would never be promulgated. And to save the country, the Prince of Ching consented to reconsider the matter and finally accepted the post of Premier of the new Cabinet.

The main idea prevailing throughout the entire scheme seems to have been guided by the desires of the Grand Council to retain its power and prerogatives. The former Grand Council consisted of Prince Ching, Prince Yu Lang, Hsu Shih Chang and Natung, and the new cabinet scheme provides for a President and two Vice Presidents, and the Ministers of the eleven Boards. Prince

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MANILA, SHANGHAI, AND YOKOHAMA, MAY, 1911

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Ching has been made President, and Na Tung and Hsu Shih Chang the Vice Presidents, while Prince Yu Lang has been appointed minister of the Military Advisory Board with Prince Tsai Tao.

The Cabinet scheme as accepted is as follows, though some modifications were made: A president—only Princes of the three classes, or Dukes, or those with other high hereditary ranks, were eligible for the position.

Two Vice-Presidents.—Only Grand Secretaries of the Six Halls and Palaces to be appointed.

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Four Secretaries and Councillors, (two each) only Sub-Chancellors and Readers or Compilers of the Grand Secretariat and the Hanlin College are eligible to occupy such posts. The rest consists of five Departmental Directors, ten managers and ten compilers.

When there are important affairs, officials specially appointed by the Throne may attend or assist the Cabinet.

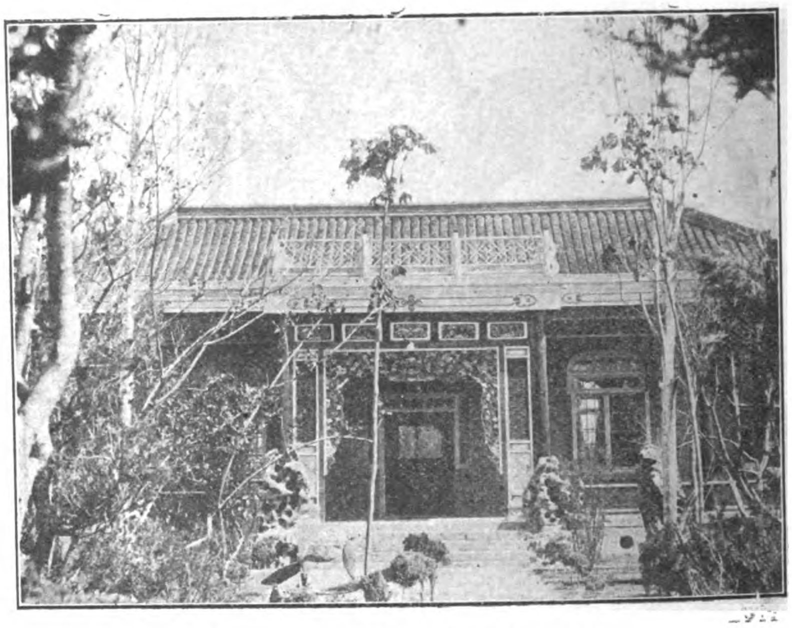
—(1) The Cabinet Ministers shall assist their Sovereign and assume responsibility for him in the Government of the Empire. (2) The President shall ascertain Imperial wishes and perform duties of the State. (3) The Vice-Presidents shall render assistance to the President in the Administration of the Government. (4) The Eleven Ministers shall each attend to the affairs of their respective Ministries. (5) When the Cabinet Ministers are confronted with too much business, officials may be appointed by Imperial Edicts to the Cabinet for assistance and consultation, and their number is not limited. (6) Cabinet Ministers shall not be allowed to hold other appointments or offices of importance concurrently. (7) The President and the Vice-Presidents shall attend the daily Audience; the Ministers of the Ministries shall meet in conference once in every five days.

(8) Cabinet Ministers shall sign their names on all the Edicts or Decrees and assume responsibility for same. To Decrees on affairs of secrecy, only the President and the Vice-Presidents shall sign their names.

(9) When Cabinet Ministers submit any memorial affecting the Empire's administration as a whole, the President and Vice-Presidents shall sign their names in conjunction with those of Ministers of the Ministries.

(10) On occasions of deliberation on matters of weight and importance, the President shall be the Chairman.

(11) Regarding affairs within the office of their duties, the Presidents and Vice-Presidents may issue Cabinet Orders (Council Orders.)



THE HOME OF H. E. YUAN SHIH-KAI.

PAVILION IN THE GARDENS OF H. E. YUAN'S HOME.

HIS HIGHNESS PRINCE CHING AND OTHER PROMINENT OFFICIALS OF THE WAIWUPU, CHINA'S FOREIGN OFFICE

Reading from Left to Right:—

TSAO YU-LIN, vice-president; W. W. YEN, councillor; CHEN NIAO TING, councillor; TSOU CHIA-LAI, junior president; LIU CHING-SUNG, councillor; TSENG TSI-TSING, senior councillor; WEN PU, councillor; H. R. H. PRINCE CHING, imperial president; S. K. ALFRED SZE, deputy vice-president; CHOW TSZ-HI, councillor; NA TUNG, senior president; LIU CHING-SUNG, councillor; HO WEI-TEH, senior vice-president; LIAO NGAN-TOW, councillor; B. C. WAN, councillor; CHENG TSENG-YAO, councillor.

JUST FISHING

HIS EXCELLENCY YUAN SHIH-KAI AND HIS BROTHER ENJOYING LIFE. YUAN IS POLING WHILE HIS BROTHER FISHES.

(12) The two Secretaries, Senior and Junior, shall frame the draft of Edicts, publish or read the memorials and telegrams, control the daily routine of business, and appoint and dismiss all officials, in pursuance to the Orders of the Presidents and Vice-Presidents.

It is also said that six departments will be created, viz:—Edicts or Decrees; Merits and Services; Law Enactments; Casting of Seals; Audit; and Compilation.

The Grand Council is still the Grand Council, and reserves to itself its old functions of daily audiences with the Throne, and the power to sign edicts of importance, while all the m m-bers must sign the routine edicts and assume their share of responsibility.

Following the appointment of Prince Ching as President of the Cabinet and Na Tung and Hsu Shihchang as Vice Presidents, the Edict proceeds to name the heads of the different State Departments.

Foreign Minister—Liang Tun Yen was appointed Minister of Foreign Affairs. The selection of his eminent statesman will surely meet with general approval. He typifies the trend of China's modern policy to regulate her foreign loans so as to avoid encouraging the "spheres of influence" menace. Liang Tun Yen was among the students who returned from America twenty-five years ago. He was right hand man of the late Chang Chih-tung for many years and by training is eminently fitted for the position. Chou Chai-lai will be acting Minister until the return of Liang Tun Yen from America.

Minister of the Interior—Shan Ch'i (Prince Su), who has been appointed Minister of Internal Affairs, was appointed president of the Board of Interior in 1907 and Commissioner of Naval Reorganization in 1909.

Minister of Finance.—Tsai Tse, new Minister of Financial Affairs, is recognized as an official of promise. In 1905 he was chief of the Imperial Mission to foreign countries, served on the Reform Commission in 1906, appointed president of the Board of Finance, 1907 and as member of the Commission of Naval Reorganization in 1909.

Minister of Education.—Tang-Ching-Chung, Minister of Education, has served in a number of official capacities among which was his appointment as vice-president of the Board of Works in 1902, Literary-Chancellor, Kiangsu, 1904, Board of Civil Applicants, 1906, senior Vice-President, Board of Civil Office, 1907, and President, Board of Education, 1910.

Minister of War.—General Yin Chang, the Minister of War, is an official eminently fitted for this important portfolio at a time when the important program for the reorganization of the Chinese Military forces requires unusual force of character and experience in modern military methods. It will be remembered that he returned from Berlin to accept the presidency of the Board of War last year and has been very active in furthering plans for carrying out a comprehensive military scheme. He served as minister to Germany from 1901 to 1905 when appointed director of the Nobles College. The following year he became provincial commander-in-chief of the Kiangpei forces and was appointed Vice-President of the Army Board in the same year. In 1908 he was reappointed minister to Germany and the same year acted as inspector of the Autumn Maneuvers at Anhui before proceeding to his post. His latest appointment was that of Inspector General of Division in the vicinity of Peking.

Minister of Naval Affairs:—Prince Tsai Hsun, the Minister of Naval Affairs, brother of the late Emperor Kuang-Hsu, has been one of the most active of the Imperial Princes in furthering the Naval program. In 1909 he was appointed High Commissioner of Naval Reorganization and proceeded on a Naval Mission to Europe in October of that year. In July, 1910, he was appointed consulting member of the Government Council and in August of the same year proceeded on a Naval Mission to Japan and America.

Minister of Justice.—Shao-Chang, Minister of Justice, was appointed Secretary Board of Foreign Affairs in 1901; Sub-Chancellor of the Grand Secretariat with rank of Vice-President, Board of Ceremonies in 1905; Senior Vice-President of the Board of Punishments in 1906, and Vice-President Board of Laws, 1906.

Minister of Agriculture:—Pu Lun, Minister of Agriculture, Industry and Commerce, is a prince of the 4th Order, and among his many appointments he served as Imperial Commissioner to the St. Louis Exposition, president of the Tz'u Cheng Yuan, or Senate, 1907, special service in selecting site for the late Emperor's tomb, and was appointed Lieut. General of the Plain White Banner in 1910.

Minister of Posts and Communications.—Sheng Hsuan-Huai, Minister of Posts and Communications, has been identified since 1886 with the development of lines of communication throughout the Empire, as director of the Chinese Telegraph administration. He was appointed customs taotai of Chefoo (1886), and of Tientsin (1892). In 1896 he was made administrator of the Lu-Han and Southern Railways; in 1901, guardian of the heir-apparent; in 1902, Senior Vice-President of Works and Commissioner for Treaty Revision; Junior Vice-President of the Board of Communications, 1908; President of the Red Cross, 1910; and especially appointed to assist the Board of Finance in currency matters in August, 1910.

Minister of Dependencies. — Shou Chi, Minister of Dependencies, has had an active official career of which the first appointment leading to his recognition in this deparment was that of the Mongolian Superintendency in 1900.

In 1907 he was advanced to the position of President of the Board of Dependencies and in the same year became a member of the Government Council. In 1909 he was named as Assistant Superintendent of the Hatamen Octari.

Minister Military Advisory Council—Prince Tsai Tao, brother of the late Emperor, and Prince Yu Lang, as previously mentioned, were appointed Joint Ministers of the Military Advisory Council. Prince Tsai Tao has been active in Military Affairs since 1908 when he was charged with the formation of the New Imperial Guard. In 1909 he was appointed Chief of the General Staff and proceeded on a mission to Japan, America and Europe to study military matters in 1910.

Prince Yu Lang has been active in police and military matters since 1905 when he was appointed President of the Board of Police. He assisted Prince Tsai Tao in the formation of the Imperial Body Guard in 1908 and was appointed General Commander of the Peking Gendarmerie in 1909. He became a Grand Councillor in August, 1910.

President of the Privy Council—By the same decree Lu Jun hsiang, former Grand Secretary and now High Commissioner for Opium Suppression was named as President of the Privy Council with Jung Ching, President of the Board of Ceremonies, as Vice-President.

Besides announcing the appointments the Imperial Edict reviews the imperial progress towards the establishment of the Cabinet Council. The original decree of last year, followed by the memorial of the Commission of Constitutional Reform presenting a preparatory program to that end; then in due course followed the joint memorial of the Commission of Constitutional Reform and the Council of State Affairs setting forth in detail the new Cabinet-Council system and as the Edict reads:

"We have perused it carefully and found that its provisions based on the constitutions of the foreign constitutional monarchies and revised to conform to the conditions at present prevailing in China, and that they have been very carefully compiled and are fairly satisfactory. They have also submitted that as the Cabinet system is a new thing introduced into the Chinese system of government for the first time it should be enforced cautiously and considered as an experiment, and have with that object in view drawn up fourteen provisional regulations for the management of public affairs by the Cabinet. The said regulations in some respects increase and in others curtail the power of the Cabinet and are acceptable. We have received the princes and ministers of the Council of State Affairs in audience and personally asked them to express their opinions, which are practically all the same. We hereby order that the Cabinet official system be promulgated and carried into effect and that the same be enforced and a Cabinet Council be established in accordance with the aforesaid provisional regulations as an experiment. With the exception of the Privy Council system, which is promulgated at the same time as the Cabinet official system, the official systems of the offices subsidiary to the Cabinet and the Metropolitan and Provincial official systems and regulations are hereby ordered to be speedily drawn up in accordance with the program of Constitutional Reform and submitted to Our approval for promulgation and enforcement, so that Our intention for carrying out constitutional reforms and making the country strong and powerful may be realized."

LU-CHING
COMMISSIONER OF EDUCATION, MUKDEN

TAOTAI HAN KAO CHIEN
COMMISSIONER OF FOREIGN AFFAIRS FOR THE MANCHURIAN VICEROYALTY

THE "FOUR NATIONS" LOAN

The conclusion of the currency loan negotiations brings to an end the first skirmish of one of the most stubbornly contested diplomatic struggles of the last decade, with the honors of victory to the American Secretary of State and his lieutenants in the field, Minister Calhoun and Willard D. Straight. The stake at issue has been the integrity of China, menaced by the aggressive policies of Russia and Japan, involving another clash between these two powers in which the neutrality of China would again be violated, and Manchuria subjected to the horrors and ravages of another war for its possession. We pointed out, over a year ago, that there was no good or legitimate reason why a war between Russia and japan should be fought on Manchurian soil unless the possession of that territory was the objective prize. Russia has been making strenuous endeavors to strengthen her forces east of Baikal and regain her lost position, compelling Japan in self defense to adopt aggressive measures in Manchuria to safeguard her hard won fruits of victory. There can be no doubt if events had been allowed to take their course, another year would have witnessed a renewal of hostilities between the two powers, with Russia in a more favorable position to win the victory on land. In this event, Japan would be compelled to vacate Manchuria, relinquish Korea, and revert to her old position with Russia threatening the very existence of the Island Empire, and Manchuria irretrievably lost to China.

It was this condition of affairs which influenced Mr. Knox, the American Secretary of State, to propose the neutralization of the Manchurian railways, as the most effective means of preserving the peace of the East, and the integrity of China's Three Eastern Provinces. The firm refusal of Russia and Japan to consider a proposal emanating from the highest motives on the part of America, served to create the feeling throughout the world that despite their oft repeated assurances to the contrary both powers had ulterior designs on China's territory.

This doubt became a firm conviction, when the same powers supported by their allies, Great Britain and France, opposed the construction of the Chinchow-Aigun Railway, a line which would have enabled China to defend the neutrality of Manchuria in the event of hostilities between Japan and Russia. China was bulldozed into temporarily relinquishing her undisputed rights to construct railways within her own territory without first consulting the wishes of her neighbours, thus creating a dangerous and iniquitous precedent, boding ill for the progress and peace of the Empire, and reasserting in no uncertain manner a reversal to the old sphere of influence policy and the utter collapse of the Open Door doctrine.

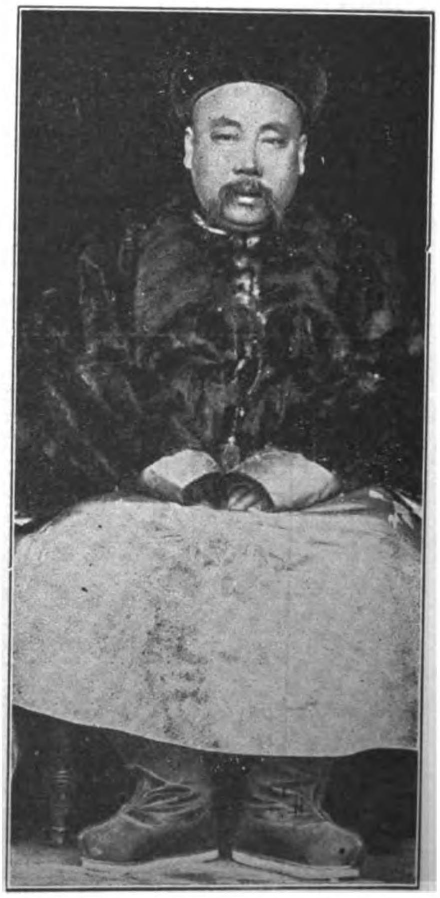
This railway line was to have been financed by America, and constructed under contract by a British firm. The attitude of the British Government, in refusing to support their own nationals on the grounds that the contract conflicted with the Scott-Muravieff sphere of influence agreement of 1898, which had not been abrogated, only intensified the situation, and isolated America at the outset of her re-entrance into the world of Far Eastern politics. The situation revealed America standing apparently alone for the maintenance of the Open Door principle and its application to Manchuria, incurring the deep resentment of Russia and Japan, who professed to see selfish motives in her attitude.

It is perhaps unfair to Russia and Japan to impugn their good intentions towards China, and concentrate the fierce light of publicity on their policy in Manchuria, and ignore similar conditions in other parts of China where European powers have the same rights and spheres of influence. The only answer to this lies in the fact that the press of other countries refrain from commenting on the shortcomings of their own national policies and magnify the situation in Manchuria to divert attention from their own spheres. Germany in Shantung, France in Yunnan and Great Britain in Hongkong hold the same relative position to China, as Russia and Japan do in Manchuria. The efforts of the Chinese to build the Chefoo-Weihsien Railway and develop the port of

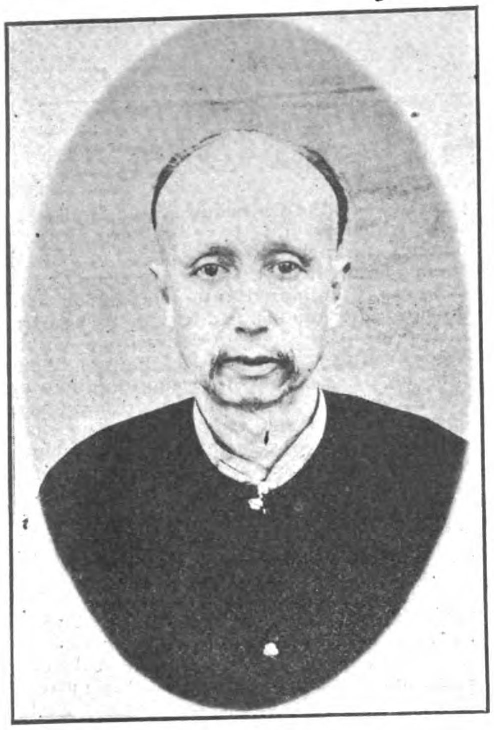
H. E. HSI-LIANG,
WHO RETIRES FROM THE VICEROYALTY OF MANCHURIA, TO GIVE PLACE TO H. E. CHAO EHR-HSUN.

H. E. CH'EN CHAO-CHANG,
GOVERNOR OF KIRIN PROVINCE.

CHANG YUAN-CHI,
COMMISSIONER OF CIVIL OR INTERNAL AFFAIRS TO THE FENGTIEN GOVERNMENT.



HIS EXCELLENCY CHOU SHU-MU,
GOVERNOR OF HEILUNGKIANG PROVINCE (TSITSIHAR)



H. E. SA-LIEN

VICE PRESIDENT OF THE BOARD OF CEREMONIES

H. E. TSEN CH'UN-HSUAN,

ONE OF CHINA'S GREAT EXECUTIVES NOW IN RETIREMENT. HIS REAPPOINTMENT TO OFFICE HAS BEEN STRONGLY URGED.

H. E. SHEN CHIA-PEN

UNTIL RECENTLY, VICE PRESIDENT OF CHINA'S FIRST CONSTITUTIONAL ASSEMBLY

Chefoo, as an offset to Tsingtau, has, according to Chinese official reports, met with the decided opposition of German interests, though the incident has never been permitted to reach the acute diplomatic stage. China is barred from connecting her central provinces with the sea by a direct railway outlet through Shantung, without strengthening Germany's hold on the province, and she is now seeking to offset this advantage by the construction of the Kaifeng-Haichow line, and a deep water port at the latter place. In principle the situation is identical with the one in Manchuria. Deprived of Port Arthur and Dairen, her best harbors in the North, China intends to create a new ice free port at Halutao, and construct the Chinchow-Aigun Railway for strategic and commercial reasons, but Japan and Russia have temporarily blocked these measures to preserve their hold on the territory and insure a profitable return on their railways. The attention of the world is skillfully focussed on Manchuria, while the identical situation in Shantung is never discussed.

In the Peking Agreement of 1905 China bound herself not to construct railways in Manchuria, parallel to or competing with the Japanese South Manchuria line, and when the Fakumen line was proposed Japan insisted on her interpretation of a very indefinite clause to prevent its construction.

But a similar clause exists in the Shanghai-Nanking and Canton-Kowloon Loan Agreements entered into with Great Britain, prohibiting the construction by China of competing lines between these points.

France in Yunnan holds the same relative position. Her Yunnan railway makes Haiphong in Indo-China the port of the Upper Yangtsze region, and she has also opposed the construction of any lines in South China which might weaken her influence over this sphere. Here also China is at present engaged in surveying a line from Yunnan to the Sea by the way of the West River valley, as an offset to the French line and to divert trade into her own port at Canton, or some other outlet at the delta.

H. E. SHIH SAO CHI (SAO KE ALFRED SZE)

JUNIOR COUNCILLOR OF THE BOARD OF FOREIGN AFFAIRS. IMPERIAL REPRESENTATIVE AT THE INTERNATIONAL PLAGUE CONFERENCE AT MUKDEN, (GRADUATE OF CORNELL.)

H. E. LIU JO-TSENG

VICE DIRECTOR OF THE HIGH COURT OF JUSTICE, THE SUPREME COURT OF CHINA.

H. E. TSAO JU LIN
SENIOR VICE PRESIDENT OF THE BOARD OF FOREIGN AFFAIRS

H. E. LI CHIA-CHU
VICE PRESIDENT OF THE BOARD OF EDUCATION

H. E. NA CHIN
SECRETARY OF THE INNER COUNCIL, BROTHER OF NA TUNG

As Russian influence predominates in Northern Manchuria and Japanese in the South so does Germany exert her influence in Shantung and France in Yunnan. While no direct charges of violations of the Open Door principle in these other spheres have been advanced, the trade is firmly in the hands of the countries holding the advantage, and the German merchants in Shantung and French in Yunnan outnumber those of all other nationalities, the same as the Russians and Japanese do in Manchuria. With the same intense international competition for the control of the Yunnan or Shantung markets as exists in Manchuria, the same conflict of national interests and charges of preferential treatment must inevitably develop.

The principle underlying the opposition of Russia, Japan, France and Great Britain to the construction of the Chinchow-Aigun line if admitted as a precedent meant a complete breakdown of the Open Door policy, a reversal to the spheres of influence, denial of China's sovereign rights to build lines within her own territory, effectively blocking her progress, with partition as the inevitable sequel. The establishment of the principle gave to Germany the right to block the construction of the Kaifong-Haichow Line, to France, the proposed Yunnan-Kwangsi project, and Great Britain the westward trend of the Yunnan or Szechuan-Tibet roads, while Russia could check any move on the part of the victim to develop or defend Mongolia or Sinkiang by the extension of railways.

Japan had consented to the construction of the Chin-Ai line with certain concessions, but Russia stubbornly rejected every modification of the scheme as threatening her strategical position on the Amur. The principle seemed in a fair way to be established and the work of years of constructive diplomacy set at naught. Knox's statesmanship was ridiculed as having brought no prestige to America, and the American group of financiers, who had patriotically entered the field at the earnest solicitation of the Government, were charged with endangering the peace of the country through desire for private profit by the exploitation of China. There seemed little hope of altering the situation, except through friendly diplomatic negotiations with Russia, with no certainty of overcoming her opposition.

It was at this juncture that the present currency loan was broached, and a preliminary agreement drawn up by the Chinese authorities

H. I. H. PRINCE TSAI JUN
PRESIDENT OF THE NOBLES' COLLEGE AT PEKING

H. I. H. PRINCE PU LUN

HIS EXCELLENCY HSU SHIH CHANG,
GRAND COUNCILLOR.

H. E. JUI CHENG
VICEROY OF THE HU KWANG

LIEUTENANT GENERAL TSENG-CHI, OF THE MONGOL PLAIN YELLOW BANNER CORPS; TARTAR GENERAL AT CANTON; AN ASPIRANT FOR THE POST OF VICEROY OF MANCHURIA

and the American Minister at Peking, which was duly signed and accepted by the temporary representative of the American Group. This agreement stipulated that the loan was to be purely American in character and employed for the reform of the currency and certain industrial developments in Manchuria. The American Group in signing this preliminary agreement were fully aware of the difficulty of successfully floating the bonds on the American market, and were prepared to take up the entire issue out of their own resources if necessary to support their own Government and preserve the confidence of China.

The fact that a New York City Loan of a few millions was difficult to float in the American market has been used by the opponents of the Administration and rivals of the Group to indicate their inability to handle this loan successfully. And as usual this story has circulated around the world, and nearly every paper in the East enlarged

H. E. CHANG JEN-CHUN
VICEROY OF THE LIANG KIANG

on it without any knowledge of the peculiar conditions surrounding the floating of a 4% Municipal loan in America, when other more profitable railway and industrial issues are on the market. It is self evident that when a combination of Morgan, Rockefeller, and Kuhn Loeb & Co. affix their name to an agreement of $50,000,000, their immense resources fully enable them to carry it through, even though the entire issue be locked up in their own vaults as their own investment.

The purely American character of the loan isolated still further that country, and, with the application of $15,000,000 to Manchurian industries, placed the sole responsibility of maintaining the neutrality of the province on America, and placing her in direct conflict with the terms of the recent Russo-Japanese Agreement. Followed to its logical end, it meant that America must assume, unaided, the task of preserving the neutrality of China against the alleged designs of Russia and Japan.

There were many good and sufficient reasons why the other powers through their financial groups should be invited to participate in this loan. As they would be the greatest losers by the establishment of a stable currency in China, common equity demanded they be allowed a share in the profits of the loan. But higher political reasons made it almost imperative that the European Groups should participate on equal terms, so as to effectively bring about the partial neutralization of Manchuria.

Had the American Government been actuated by the mercenary spirit charged by its critics and William J. Bryan, and if the so-called Dollar Diplomacy was only a disguise for advancing the special interests of Wall Street, regardless of future national entanglements, the $50,000,000 loan would have remained purely American, and the profits kept at home.

The agreement, signed in London last October between the four groups to participate equally in all future loans to China, included in its provisions the purely American currency loan for $50,000,000 and also the American-Chinchow-Aigun loan for $30,000,000. And here at the outset the Americans demonstrated to the world that they were faithfully adhering to their traditional policy of equal opportunity in China. For a while it looked as though the Chinese Government would decline to admit the participation of the other groups, and would hold to the letter of the preliminary agreement, providing for a purely American loan. This temporary opposition, however, disappeared when the full signifi-

H. E. LI CHING-HSI
VICEROY OF THE YUN-KUEI

CHINA'S RAILWAY TANGLE

Now that the currency loan negotiations have been brought to a successful termination, China has time to turn her attention to the perplexing railway problem which confronts the country through the opposition of the provinces to the application of such foreign loans as are manipulated through the central authorities at Peking. Until this question of authority is definitely settled, railway development will continue at a stand still, and progress be delayed. The crux of the situation lies in the provinces of Hunan and Hupeh where the gentry have openly threatened to revolt if the foreign Hukwang loan is applied to the construction of the Canton-Hankow-Szechuen lines.

Public opinion, in Hunan especially, is unanimous on the point of building their portion of the southern trunk line with their own funds, and heroic measures are apparently being taken to raise the necessary annual allotment on the shares to carry on the construction. But the funds are slow in materializing, and with the waste and extravagance and judging from the progress made to date, only a small portion seems to be expended in actual construction work. However, the Hunanese are supremely satisfied and elated over their success in thwarting the use of foreign funds, and hold their heads high as great patriots whose example should be followed by all other provinces. And in the face of such opposition the Central Government at Peking seems powerless to impose its will. Events are moving rapidly in China, and the signs of the times point to troublous days for the Empire in the near future, and further humiliation seems inevitable unless the government is prepared to preserve its prestige by a show of force at the critical moment. The Throne has compelled the Viceroys and Governors to recognize the Central authority over the new army, the command of which is now firmly under the Minister of War. Millions are annually expended in the feverish haste to organize and perfect the 36 new army divisions, and the provinces have recognized the urgency of this step, and are readily contributing every support to the new military program. On all sides China is having troubles with her neighbors: Russia on the North, Japan on the Yalu, France and Great Britain in Yunnan have all raised issues with China over the boundaries, and China in her defenseless state must always yield the point. Revolutionary societies in the South are a constant menace to the peace of the Empire, and a resolute leader could readily set up the standard of revolt, secure in the knowledge that lack of transportation with the North would facilitate his campaign and chances of success. When the hour strikes for China to mobilize her new army at any given point, the lack of transportation will impossibilitate the movement, and humiliation again will be her lot. The high spirited, proud and patriotic Hunanese whose stiff necked prejudice prevents the linking together of North and South, will then go down in Chinese history and be execrated by their countrymen as the real cause of defeat. The safety of the Empire demands the construction of this line without delay, and it would be far better for the Imperial authorities to brave the threatened revolt at once, than continue to jeopardize the integrity of the country by further parleying with the misguided patriots of H nan.

If the Throne had the power to centralize the command of the new army under the Ministry of War, for the best interests of the Empire, identical urgent reasons of State demand that the same policy be adopted with regard to the railways, as without the latter the army is helpless, and the huge sums expended in its creation and organization will be wasted. Either the Hunanese should immediately give sufficient guaranties of their ability to construct this line without further delay, or the Imperial Government should assert its prerogatives and proceed to build it, by force if necessary.

And the same argument holds good with other provincial lines, whose promoters are obstructing the progress and safety of the Empire through mistaken ideas of provincial rights.

H. E. WU TING-FANG,

RECENT MINISTER TO AMERICA. IT IS RUMORED THAT HE WILL BE CALLED TO TAKE THE POST OF JUNIOR PRESIDENT OF THE BOARD OF FOREIGN AFFAIRS.

H. E. LIANG SHIH-YI

DIRECTOR GENERAL OF RAILWAYS, REMOVED FROM OFFICE AND THE POST ABOLISHED BY THE NEW PRESIDENT OF THE BOARD

TAOTAI K. Y. KWONG

FORMER CHIEF ENGINEER OF THE CANTON-HANKOW LINE, TRANSFERRED TO DIRECT THE CONSTRUCTION OF THE KAIFENG-HAICHOW RAILWAY. EDUCATED IN AMERICA

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cance of the move was made apparent to the high Chinese authorities, and the negotiations then settled down to a discussion of minor points for the guarantee and supervision of the loan.

The final agreement stipulates that the revenues on tobacco, spirits, produce and the consumption tax in Manchuria, amounting to Tls. 2,500,000 and the salt surtax of all the provinces of China, amounting to Tls. 2,500,000 are pledged as security for the loan. And the neutralization scheme of the American Secretary of State, which was rejected by Russia and Japan and ridiculed and condemned by Europe, has been recognized and accepted in a modified form. Instead of America alone assuming the responsibility for the neutrality of Manchuria, Great Britain, France and Germany are now equally interested with her in this province, and the sphere of influence tendency has received another setback by the hypothecation of revenue from all the provinces.

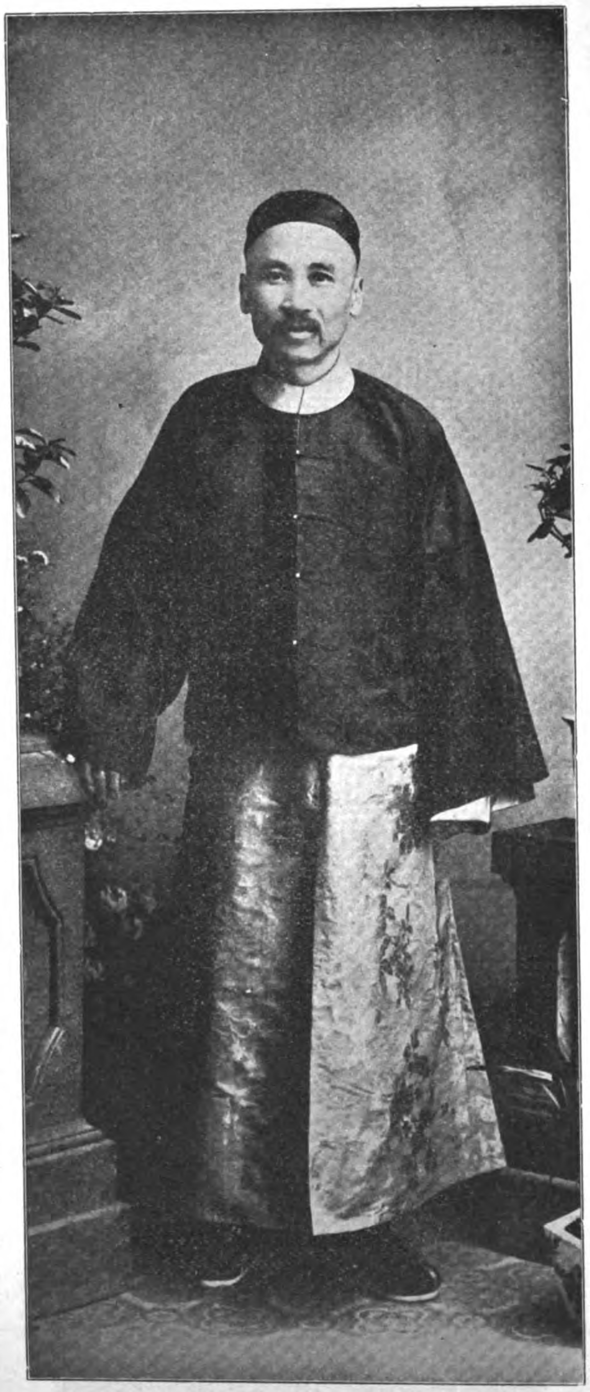
It is natural that the terms of the loan should call forth sharp criticisms from the jingoistic Japanese press, who profess to see in the hypothecation of the Manchurian revenues a menace to their trade and political expansion in their peculiar sphere of influence. There is, however, little danger of foreign interference in Manchuria, while the revenues of the province are sufficient to meet the interest. So long as Manchuria is permitted to peacefully develop its enormous natural resources, its wealth and revenues will increase by leaps and bounds, and the occasion will never arise to justify foreign control of the revenues as a safeguard for the bondholders. The real menace to the prosperity and progress of this rich territory lies in the possibility of a conflict arising out of the ambitions of Russia to retrieve her defeat. If Japan's oft repeated declarations of friendship for China are sincere, and she harbors no designs on China's territory or sovereign rights, the Island Empire has every reason to feel well satisfied with the creation of a situation which effectively ties Russia's hands, and creates a buffer state between the Amur and the Yalu. The neutrality of Manchuria, which seemed such an idle dream, is brought within the realms of reality, and with this as an accomplished fact, the peace of the East is assured.

—G. B. R.

FOREIGN ADVISERS IN CHINA

Mr. J. K. Ohl, the well known Peking correspondent of the New York Herald, explains, in an article to his paper, the Chinese side of the argument against the further employment of foreign advisers for the various branches of the Chinese Government. This question assumed considerable prominence during the negotiations leading up to the final signing of the Currency Loan, through the persistent and erroneous reports spread broadcast that America had demanded the appointment of an American Financial Adviser to supervise the finances of the Empire and the application of the new loan, as a condition to advancing the funds. This report had its foundation in the fact that the American Group had insisted that a foreigner be appointed as a special auditor or inspector whose functions would be limited to certifying that the loan funds were expended according to the provisions of the new currency scheme, and not divested into other Channels. The

C. Y. YUN
ASSISTANT TO THE DIRECTOR GENERAL OF RAILWAYS. EDUCATED IN TROY POLYTECHNIC INSTITUTE 1884



TAOTAI K. S. LOW,
FORMER MANAGING DIRECTOR OF THE TIENTSIN-PUKOW RY., SOUTHERN SECTION. GRADUATE OF TROY POLYTECHNIC INSTITUTE. AT PRESENT HE HEADS THE SURVEY PARTY FOR THE PROPOSED LINE FROM YUNNANFU TO THE WEST RIVER VALLEY AT CANTON

YEN TE-CHING, C. E. DR. ENG., A. M. AM. S. C. E., ETC.
ASSISTANT CHIEF ENGINEER OF THE SZECHUAN RAILWAY. GRADUATE OF LEHIGH UNIVERSITY

TAOTAI CHOU HSUEH-HSI
PRESIDENT OF THE ANHUI RAILWAY, A SON OF VICEROY CHOU-FU

The Anhui, Kiangsi, Kiangsu, Chekiang, Lotung, Fukien and the Canton-Hankow lines are all in a state of financial collapse and unable to proceed with construction. Owing to the high rate of interest prevailing in China native capital is almost impossible to secure for railway development, and the outlook seems hopeless for any great construction progress emanating from this source. The Central Government refuses to guarantee the bonds of provincial companies, and foreign financiers decline to advance the funds unless this guarantee is forthcoming. The provincial promoters, however, persevere, and hawk their projects around the money market seeking some unsophisticated agent who will advance funds on local guarantees. Progress is checked, and construction work almost at a standstill awaiting the solution of the situation. The Imperial Government should assert its authority, take over the provincial lines and concessions, and proceed with their construction for the best interests of the Empire, or demand sufficient guarantees from provincial shareholders that a certain schedule of construction be maintained under penalty of forfeiting the concession.

—G. B. R.

TAOTAI JEME TIEN-YU

DR. ENG. A. M. I. C. E., ETC. CONSULTING ENGINEER TO THE YUCHUANPU. CHIEF ENGINEER OF THE SZECHUAN AND CANTON-HANKOW RAILWAYS. GRADUATE OF YALE.

importance of this loan to China is so great and far reaching that every precaution was necessary not only to guarantee the bondholders but to protect China itself against the possible dishonesty of her own officials. The discussions concerning the appointment of the inspector revealed a deep rooted opposition on the part of China to the employment of any foreigner in any capacity which made him independent of the Chinese Government. Mr. Ohl explains the real Chinese attitude towards Sir Robert Hart, around whose distinguished name a glamour of romance has been built.

"It may surprise persons unfamiliar with China to be told that invariably the first illustration cited by Chinese in this connection is Sir Robert Hart.

"In the Chinese criticism of Sir R. Hart there is no suggestion of lack of fidelity. So far as I have been able to discover, no Chinese questions the honesty and integrity of Sir Robert or the administration of which he is still the titular head.

"Those who voice the broader criticism are the progressive men of China, the men most keenly alive to the necessity of a regeneration of the government and the proper development of the country and who, therefore, are advocates of the employment of foreign experts as necessary instruments. These men hold in their hearts bitter resentment toward Sir Robert Hart as the man more responsible than any other for building up among the Chinese a sentiment antagonistic to foreign employes, and, in consequence, retarding China's development.

"They assert that since 1868 Sir Robert, with his own and other governments at his back, has kept the customs a wholly foreign institution. In all that long period of time not a single Chinese has been permitted to hold a position of responsibility in it, and yet it is a branch of the Chinese government.

"It is not that the Chinese begrudge the money or that they look at the question from a mere office holding viewpoint. They contend that Sir Robert Hart's administration has caused the Chinese people to believe that the employment of foreigners in any of the institutions of the Chinese government means foreign control of those institutions.

"If he had built up the customs administration as a truly Chinese and not a distinctly foreign institution, he would, the Chinese assert, have performed a vast service to this country and every progressive would to day be singing his praise. As it is, they feel very bitterly toward him."

And while his fellow countrymen may fairly resent any criticism of Sir Robert Hart's life work, they must be prepared to face the inevitable verdict history will direct against the action of their government in

H. E. SHENG KUN PAO,

PRESIDENT BOARD OF COMMUNICATIONS.

converting a distinctly Chinese department into a purely British bureau. To Sir Robert Hart as the head and organizer of the Imperial Maritime Customs, the world has ceded the honor and praise for the efficient and honest operation of a service, which in its inception and for years afterwards was an international institution. Its success and efficiency was based entirely on the fact that the service was open to all nationalities, and good, honest, earnest men sought and obtained posts, with the natural ambition of some day reaching the top of the ladder. It is a fact that in the early days and up to within ten years, Sir Robert's best lieutenants and commissioners were other than British, and the successful and honest working out of the system was due largely to their hearty and loyal co-operation.

Then without any warning, to guarantee the British bondholders of Chinese securities, the British Government exact the promise from China that as long as British trade predominated in China, the Inspector General of Customs must be a British subject. Under existing conditions at that time, and in view of the many intrigues on the part of other European powers to secure the appointment for an official of their own nationality, the British Government acted wisely and well for its own interests.

But, in so doing, the door of equal opportunity, which had stood open for years and attracted the best men of all countries to the service, was slammed in their face, and they found instead of serving an international institution they were puppets in a British bureau, with no hope of ever reaching the top. Exigencies of politics amply justify British action, but they must be prepared to accept the inevitable results. No ambitious young man of American or other nationality selecting a career will enter in service whose highest positions are pre-empted by Great Britain. Already complaints are heard about the degeneracy of the service and the impossibility of securing good men to fill the vacancies. When Great Britain insisted that only a British subject could honestly administer the Chinese Customs to the satisfaction of British bondholders, it reflected on the honesty of other officials of the Customs. Now when the older men who made the service are retiring, and it needs strengthening with new blood, it is impossible to again enlist the sympathy and services of the best men of other nationalities.

As it is, Sir Robert Hart's policy, which built up the Customs as a purely foreign institution, and closed the door to those other than British, and his failure to grant some concessions to Chinese, has brought down on the service the distrust of the latter and indifference of other foreigners, and now if the service needs regeneration or new blood, Great Britain must either open the door to the higher positions or recruit the service from the best of her own.

Mr. Ohl continues and cites the case of Sir Robert Hillier as follows:

"The Chinese do not build their case on one experience alone. When, for instance, in talking with a high official of the Foreign Office, I repeated to him the general criticism of responsible officials for not availing themselves more freely of the services of Sir Walter Hillier, who for two years held the position of adviser to that department, his reply was:—'How could we? Whenever a case came up involving the British government he talked of 'we' and 'our Government,' meaning always the British government, not the government of China, which he was employed to serve."

These two examples are alone cited by Mr. Ohl as the reasons underlying the antagonism of China to foreign advisers. On the other hand there are instances where foreigners have subordinated their own national interests and given their best services to China's cause.

Sir Robert Bredon, the distinguished assistant to Sir Robert Hart, is a case in point. He paid the penalty however by forfeiting the support of his own government and other Britishers in China.

Dr. J. C. Fergusson for many years held the post of Foreign Secretary to H. E. Sheng Kung Pao when the latter was Director General for all the railways, and at the same time was Adviser to the Viceroys of the Liang Kiang and the Hukwang, and the Taotai of Shanghai. The highest tribute that can be accorded Dr. Fergusson is that he was intensely loyal to the country he served, and in faithfully and honorably discharging his duty' was invariably compelled to oppose the interests of his own countrymen. Sir Robert Bredon or Dr. Fergusson will never receive the appreciation of the interests they opposed, and their only hope of recognition must come from the Chinese Government.

There are other cases to the point, to fully vindicate China's intense antipathy to any further foreign interference through the appointment of advisers.

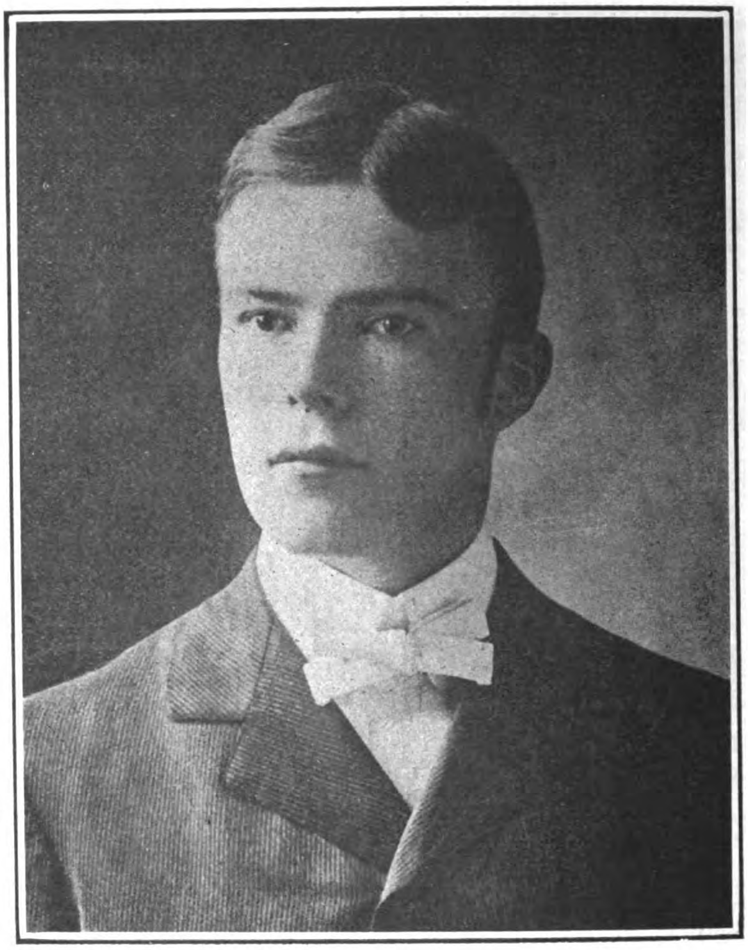
Mr. Claude Kinder, the Engineer-in-Chief of the Imperial Railways of North China, was in a fair way to be appointed Inspector General of China's Railways. Had he adopted a different policy, and admitted the right of the Chinese to a broad share in the management of the line, instead of standing on the hard and fast terms of a loan agreement, there is little doubt that this coveted post, out-rivalling in importance the Inspectorate General of Customs, would have been tendered him. Under his direction the railway standards of the Empire had been designed and adopted, and the way paved for the manufacture of cars and bridges for all Chinese roads, in the shops under his direction.

Mr. Kinder's services to British interests were on a par with, if they did not exceed those rendered by Sir Robert Hart.

AMERICAN FINANCIAL ADVISERS TO THE PERSIAN GOVERNMENT

The appointment of Mr. W. Morgan Shuster as Financial Adviser and Treasurer General to the Persian Government is the first time that an American official has been requested by a continental power to act in that capacity.

The badly tangled condition of Persian finances was the subject of much discussion by several interested European powers and it was practically decided that they would take them over under a joint European commission for the purpose of straightening them out. This of course would have involved more or less friction, but it was finally decided that a corps of officials, comprised of the citizens of a country having no financial claims, would best serve the purpose and at the suggestion of the Persian Government, approved by the European bondholders, a request was made to President Taft by Persia for the services of a staff of officials to take charge.



HON. W. MORGAN SHUSTER
FINANCIAL ADVISER AND TREASURER GENERAL TO THE PERSIAN GOVERNMENT

BRUCE L. DICKEY
INSPECTOR OF PERSIA'S PROVINCIAL REVENUE DEPARTMENT

The position was at once offered Mr. W. Morgan Shuster to head this staff in the capacity of Treasurer General. President Taft was no doubt influenced in his selection by his personal knowledge of the man who had served his administration most loyally in the Philippine Islands and whose direction of the important position of the Philippine Bureau of Customs won for him advancement to the portfolio of Secretary of Public Instruction.

Mr. Shuster's first public service was in connection with the Cuban customs service where he served three years and became special deputy collector. In 1901 he was appointed Collector of Customs, Philippine Islands, in which capacity he served for five years. In 1906 he was appointed Secretary of Public Instruction by President Roosevelt upon the recommendation of Secretary of War Taft. In 1909 he resigned from the government service to engage in the practice of law in Washington, D. C. During his official career, he was active in the revision and framing of

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The diplomat was knighted and honors heaped upon him, but the Engineer was retired to private life after a lifetime of service. British manufacturing interests owe a debt of gratitude to Claude Kinder, for his work in their behalf merits some substantial reward in honors.

Other manufacturing nations however have every cause to feel relieved over the failure of Mr. Kinder to secure the coveted post of Inspector General of Railways, for had this occurred it meant the complete standardization of all the lines in the Empire according to British specifications, and the gradual monopolization of the immense field by manufacturers of this nationality.

That this was the ultimate goal of British railway policy in China is revealed in an article from the pen of Mr. J. O. P. Bland, in *The Times* of London last year. Mr. Bland was defending the British Loan agreements in answer to the main editorial of THE FAR EASTERN REVIEW in its issue on Railways in China, and summed up the situation in the following words:—

"It is evident to-day, whatever doubts there may have been on the subject three years ago, that Chinese Government railways cannot be expected to strengthen and benefit the country unless, like the Customs, they are administered under honest and efficient (that is to say under foreign) financial supervision. Given this condition, and a certain inevitable amount of waste in construction need not be too closely regarded."

This statement emanating from one who represented British railway financial interests in China for several years discloses the desire to duplicate the conditions existing in the Customs. On analysis this statement says, in effect, that, like the Customs, as long as British railway loans predominate in China, the Inspector General of Railways must be a British subject.

The full significance and weight of this argument was not lost on the high Chinese officials and foreign diplomats, who immediately saw the danger to China and their respective commercial interests from this avowed trend of British policy.

It is to be regretted that foreign expert knowledge is spurned by China, when she stands so sadly in need of such disinterested advice, and it is to be hoped that she will yet find some way to avail herself of the services of broad minded competent foreigners who will subordinate their national interests to those of the Country they are called upon to serve.

FRANK S. CAIRNS,
DIRECTOR OF TAXATION FOR THE
PERSIAN GOVERNMENT

revenue and tariff laws and his experience in the direction of internal finance makes him a most desirable man for the place.

In proceeding to the selection of his staff, Mr. Shuster chose men from among those closely associated with him in his official career and who are familiar with the work to be undertaken.

Frank S. Cairns of Maine, who will be Director of Taxation, served with Mr. Shuster in Cuba and the Philippines, occupying the posts of special agent, surveyor of the port, deputy collector, and when he received this appointment was serving as collector of customs of Iloilo, the second largest port in the Philippines.

C. I. McCaskey, who has accepted the position of Inspector of Provincial Revenue, is a son of Major General W. S. McCaskey, U. S. A., retired. He entered the Customs Service in Manila in 1899 as inspector and was promoted to the position of deputy surveyor in 1907, but owing to illness of his wife retired from the Philippine service and accepted the position of inspector of customs at the port of New York. In 1909 he was promoted to the position of acting deputy surveyor of New York, which position he gave up to accept his present commission.

Bruce L. Dickey, who will serve the Persian Government as Inspector of Taxation, was appointed inspector of cus'oms at Manila in 1901. He was promoted through the various grades to the post of chief of the passenger and baggage division and later in 1906 was appointed cashier which position he held until 1909, when he resigned to return to the United States.

C. J. Hills, who goes to Persia in the capacity of Expert Accountant, is a native of Cleveland but has been resident in Washington since childhood. He is a graduate of the Columbian University, where he took a law course. He was employed by a bonding company of New York and later entered the office of the solicitor of the Department of Commerce and Labor to resign a year later to engage in private and departmental practice of law. He held the office of examiner of building and loan companies for the United States Treasury and his wide experience in the supervision of accounts makes him a most desirable addition to Mr. Shuster's Staff.

THE U. S. COMMERCIAL AGENT TO THE ORIENT

The recognition by Secretary Nagel of the U. S. Department of Commerce and Labor of the growing interest among American manufacturers in the development of Far Eastern trade, was emphasized recently by the appointment of Lovett M. Wood, editor of the *Seattle Trade Register*, to the position of Commercial Agent to the Orient, under the Bureau of Manufacturers. Mr. Wood has been a resident of Seattle for over 22 years and during that time has watched the growth of Seattle trade with the Orient and familiarized himself with conditions, so that he is sufficiently informed as to the attitude of Western manufacturers toward Oriental trade development, to make his active interest in his present position very valuable. Before leaving for the Far East in March Mr. Wood made it a point to meet the representative commercial bodies of the Pacific Coast interested in promoting better trade relations and was assured of their active interest and support in his work.

YELLOW JOURNALISM A MENACE

The glaring sensationalism of the yellow press that devotes its space to the magnification of crime by lurid details, so nauseating to the healthy section of any community, is receiving some attention from commercial quarters that may serve to check its evil influence. Mr. Edward A. Abbott in the Southern Furniture Journal calls attention to a recent pessimistic attitude on the part of the trade press in which they invariably charge that "Unreasoning fear and unwarranted apprehension is what ails business," but Mr. Abbott declares it is largely due to the distressing influence of the Yellow Press upon the minds of the people.

He relates in illustration of how the yellow terror is spreading mental depression by the story of an old negro woman whose efficiency was reduced by the distressed condition of mind following the reading of details of an unhappy crime.

He writes:

"The woman is several times a grandmother and has been in my employ fifteen years. She can read, write and count, and is faithful and efficient in her humble place. One day when she was counting some dishes for me, I noticed her usual accuracy was lacking. On being asked the cause, she said, 'Mr. Abbott, I'm all broken up.' Then, with tears wetting her wrinkled face, she told me she had read in the morning paper about a 'white man up in Illinois' who, whisky crazed, had stamped his little baby to death.

"If so humble a worker is, by this cruel publication, so distressed that she cannot count cups and saucers and plates, what must be its effect on her employer, higher up in the scale of intelligence and responsibility"

He continues:

"If we read our morning paper, we go to our stores and factories with minds shocked by the doings of criminals, soiled by the vulgarities of the divorce courts and filled with fear and apprehension by double-headed stories of defaulting cashiers, unfaithful employees and no end of other commercial iniquities. At night we are disturbed by the terrors of the day that we have read about in the evening paper, that follows us to our homes with stories even more yellow and more shocking than those that went out with us in the morning."

For a solution he offers:

"Without hope of help from those in high places, in church and society, I propose to take the case to the advertiser who, in buying space, is paying the press to hinder his business and delay the r turn of those good times we are all looking for.

"I shall ask the trade journals of the whole country to furnish the publicity and help to convince the storekeepers and manufacturers that murder and suicide, larceny and divorce, disease and death are not good companions for their advertisements Together we will show those who have things to sell the wisdom of cultivating a clientage that is optimistic, joyous and clean minded—not one that is fearful, saddened and vulgar.

"We shall ask the advertisers to put the knife in the Yellows' and Muck-rakers' most vulnerable spot—the cash register. We shall not ask in vain. This is my prescription for the 'unreasoning fear and unwarranted apprehension' that is hurting business."

Mr. Abbott might have gone further and directed attention to the crowning crime of this same yellow press that, not satisfied with filling the local mind with the horrors of which he writes, spreads it misinformation and sensational interpretation of international questions in a manner to inflame the lay mind, stir up race prejudice, and make trouble between neighboring nations. Of such we have had a surfeit. We not only endorse Mr. Abbott's campaign but would go further and urge a ban upon the literature that is jeopardizing foreign relations, and injuring foreign trade. The publication that would viciously inflame the citizens of one nation against those of another, is a serious menace to any country and patriotic advertisers everywhere should find it their duty to serve this class of Yellow Journal with the same rigorous discipline as they would mete out to the local member of the same lurid press. And the counting room is a very vulnerable objective.

IMPERIAL KIRIN-CHANGCHUN RAILWAY

The Kirin-Changchun Railway, which, when completed, will traverse one of the most prosperous sections of Manchuria, is approximately 85 miles in length according to survey and last month 35 miles were opened to construction train traffic connecting Changchun with Yingchengtsu, while construction is well along on the Kirin end.

In December last year the announcement was made that the line would be opened for passenger and freight traffic from Changchun to Coran by construction trains a distance of about 15 miles. The inauguration of the section was celebrated at Changchun on December 5, 1910, by a general reception. The local authorities, gentry, and Japanese and Russian officials, with a number of foreign prominent merchants in Southern Manchuria were invited to be present. Tea and refreshments were served by the staff of the Railway. Addresses were given by the Director-General and the Engineer-in-Chief.

The Director-General said:—"Gentlemen—I am very glad to express my pleasure in having you with us today to witness the opening ceremony of running trains of the Kirin Changchun Railway in spite of it being such an extremely cold day. I also wish to express my sincere gratitude to you for your favors often shown me since I was appointed by the Board of Communications in the 10th Moon (December 1909) of last year to take over the directorship of this administration.

"Now let me submit you a brief report on our work here. During the 11th Moon (January 1910) of last year, our Engineer-in-Chief and I made a careful survey for this line when there was tremendously heavy snow about several feet deep, which caused a great deal of trouble to our work. But in the following month we got our staff to continue the measurement in spite of the hindrance of snow and ice on our way. But the 4th Moon (May 1910) of this year as soon as the snow and ice were melting away we began to have the embankment built without delay. But owing to the continuous rains in the last three months (viz. the 6th, 7th, and 8th Moon of this year) the work was greatly interrupted. Fortunately through the efforts and diligence of every member of the whole staff, the section of the embankment from Changchun to Tumenling, about 140 li long (44 miles), has just been completed. As to the other section of the embankment about 120 li (40 miles) long ness in being present." The Engineer-in-Chief (a Japanese gentleman) said:—

"*I—The result of general work.*

"I have nothing to say except a short report on the work which has been trusted in my charge. The distance of the main line from here Kalunkah is 13 miles and from Toutaoleo, 15 miles. The highest part of the embankment is 26 feet and the deepest part of the trenches is 16 feet. As to the construction of the turn-outs, switches, etc., all is built satisfactorily. Now I wish to tell you that the importance of the construction is to have the road built as soon as possible for the convenience of conveying the materials for the building purpose, then the work will be easily carried on with more success. At the present time, the stations and other buildings have not yet been put up in good shape as you have already witnessed.

"*II—The diligence of the Director-General.*

"On the 2nd day of the 12th Moon of last year when the weather was much colder than it is now, the Director although he was then very ill, went with me to survey the line of this road in spite of the heavy snow on the way. Now I am sure the success of the contruction is insured by his hard work which I believe is appreciated by you all.

"*III—The faithfulness of the staff*

"As the Director-General has been so diligent all the time, the whole staff are also willing to work hard. Now I am very glad to say way as soon as possible and that you will continue to do us favours as you have ever done before."

from Kirin, the work has been also nearly done. As all the materials have already been o tained, we are hoping that by the first two months of next year the rails will be laid as far as to Tumenling through Yihmah-ho, but at present, only a short section of 50 li (16 miles) between here and Kalunkah has been completed. So that by the first day of next Moon (January 1911) the construction trains will begin to run and at the same time we hope we will be able to provide accommodation for the passengers and to carry cargoes in the same trains.

"I am sorry that you are greatly disappointed today by coming over here to see such incomplete work as the stations. Cars and other facilities have not yet been put into good working order.

"On behalf of the staff of the railway, I, as a Director-General wish to drink your health and thank you heartily for your kind-

that the result of having the whole line of embankment built up, and the construction trains begun to run as far as Kalunkah is due to both the diligence of the Director-General and the faithfulness of the whole staff.

"*IV—Chinese and foreign interests.*

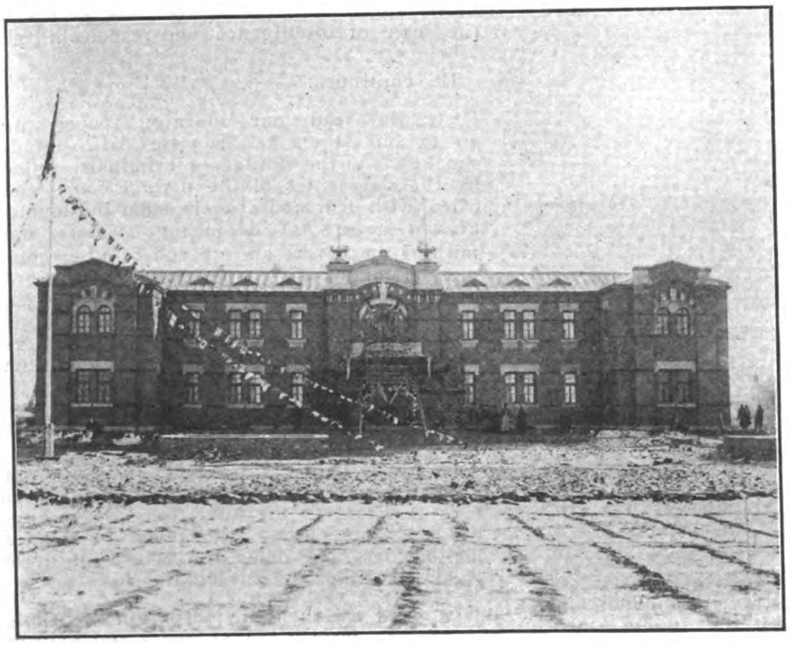
"I also wish to say that the success of this undertaking is not only dependent upon the hard work of the staff but also of the help of well-wishers of different foreign countries. With this in view I wish to thank you for your kindness before the large audience of our guests.

"*V—Good feeling from the Southern Manchurian Railway Society.*

"I also wish to thank the Southern Manchurian Railway Society for its sincere sympathy with our work.

"*VI—The future hope.*

"I hope that we will do our utmost in bringing about the completion of this rail-



IMPERIAL KIRIN-CHNGCHUN RAILWAY

ADMINISTRATION BUILDING AND STATION AT CHANGCHUN

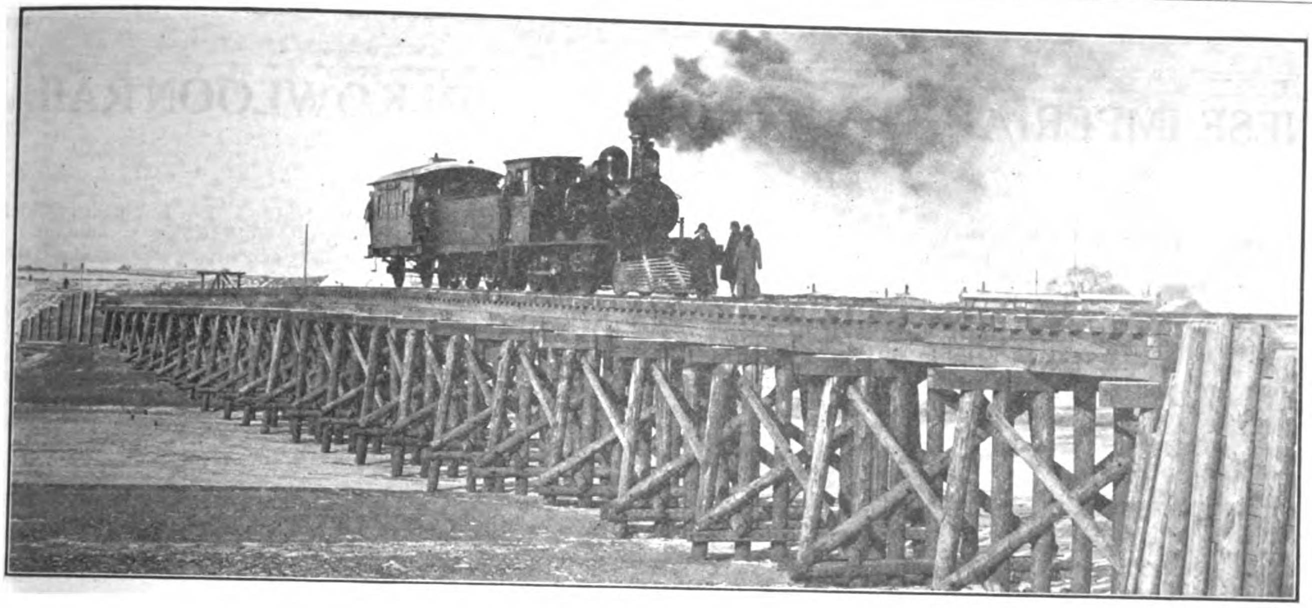
A FIRST CLASS STATION

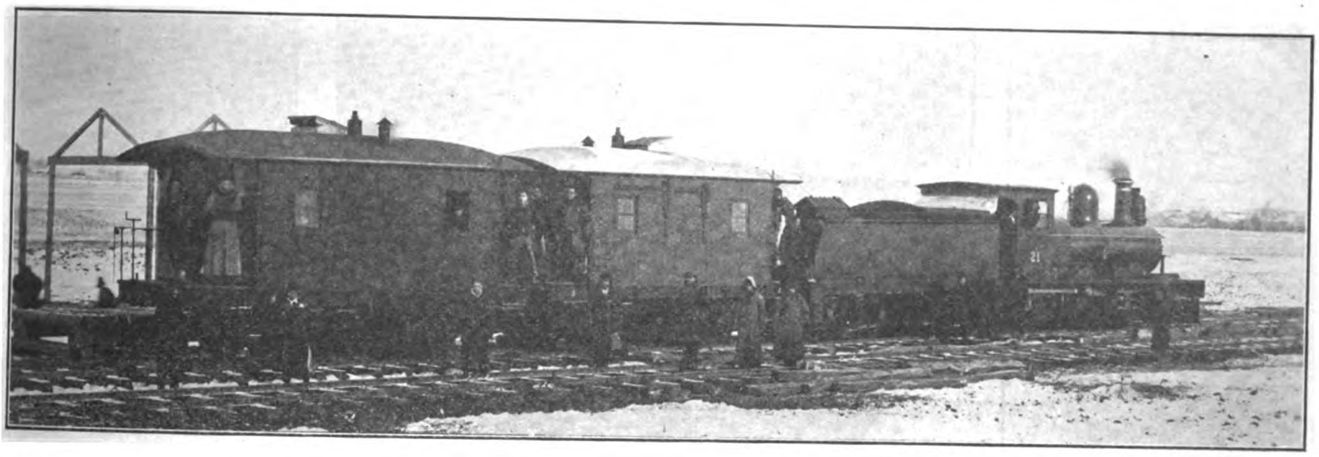
The first locomotive put in commission on this line was built in the shops of the Imperial Railways of North China. The Hanyang Iron Works have the contract for supplying all the rails. The most difficult engineering work on the line has reference to two large bridges and one tunnel, upon which work is progressing most favorably. Indeed, great activity has featured this railway construction throughout there being no suspension of work during the winter months. The bridges will all be of steel or reinforced concrete with the exception of temporary structures where large permanent bridges are being built so as to expedite the opening of general traffic.

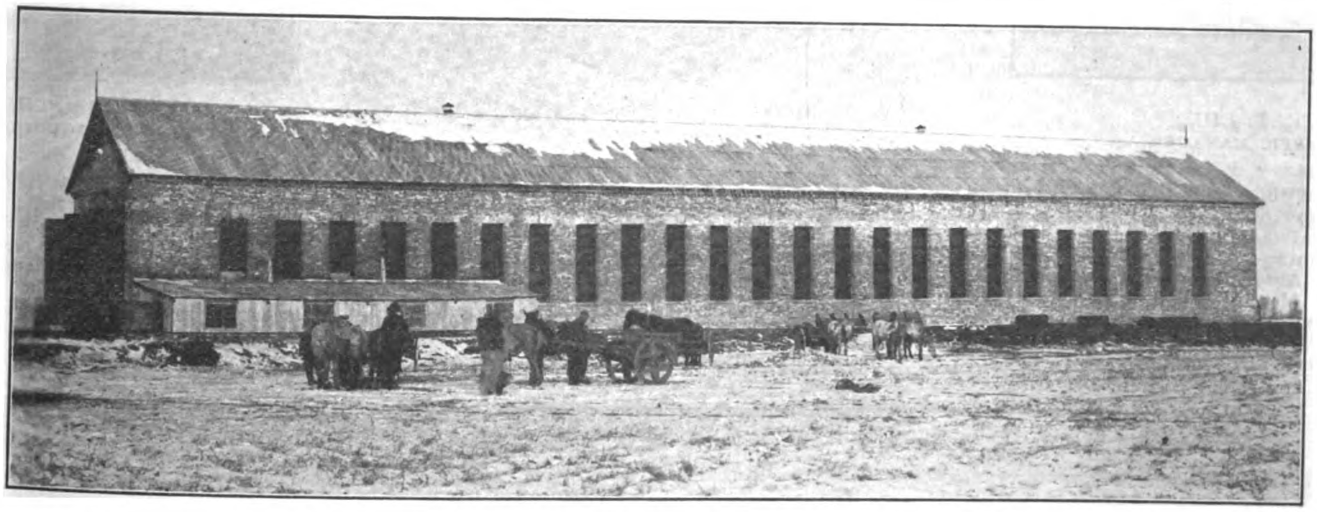
It is expected that the line will be completed by November this year.

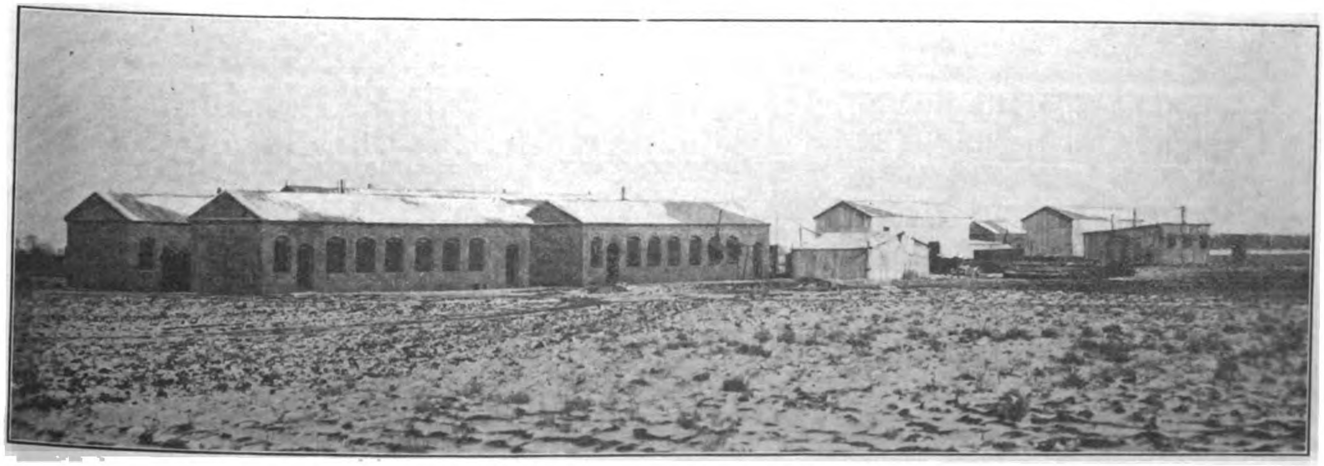
The Kirin Changchun Railway is financed by Japanese and Chinese capital. Under an agreement entered into between the South Manchuria Railway and the Chinese authorities the former agreed in August, 1909, to loan the latter half the capital necessary to construct the line. The total capital required was estimated at Tls 4,300,000 of which half was paid over to the Kirin-Changchun Company in September, 1909. The Yokohama Specie Bank was named repository for the funds of the railway. The loan bears interest at the rate of 5%.

The agreement provided that the Engineer-in-chief and the Chief Accountant should be Japanese, that the agreement should continue in force for 25 years and the railway be operated by Chinese and Japanese jointly.









VIEWS OF THE KIRIN-CHANGCHUN RAILWAY

TEMPORARY WOODEN TRESTLE AT CHANGCHUN. CONSTRUCTION TRAIN. LOCOMOTIVE SHED AT CHANGCHUN. STOREHOUSES AT CHANGCHUN

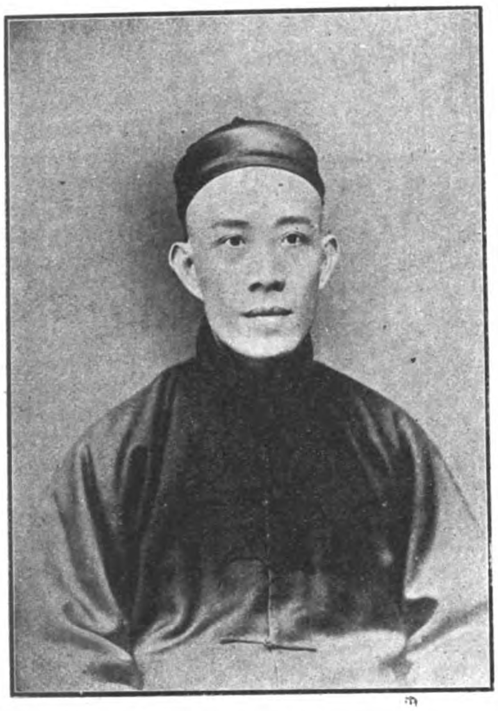
The locomotives and cars for this line were built at the Tangshan Shops of the Imperial Railways of North China

CHINESE IMPERIAL RAILWAYS.--CANTON-KOWLOON RAILWAY

THE CHINESE SECTION

We are now enabled, through the courtesy of the Administration of the above Railway, to present to our readers a detailed account with illustrations of this, one of the last railways, to join the revenue earning lines of China.

A section of 29 miles was opened to public traffic on December 6th, 1910, and the photographs show the ceremonial train and party of Chinese and foreigners which proceeded to Tong Mei (Mile 24) from Canton on December 5th, the occasion being the formal opening of this section by His Excellency The Viceroy of the Kwang Tung provinces.



C. T. LIU,
TRAFFIC MANAGER

FRANK GROVE, M. I. C. E.
ENGINEER-IN-CHIEF

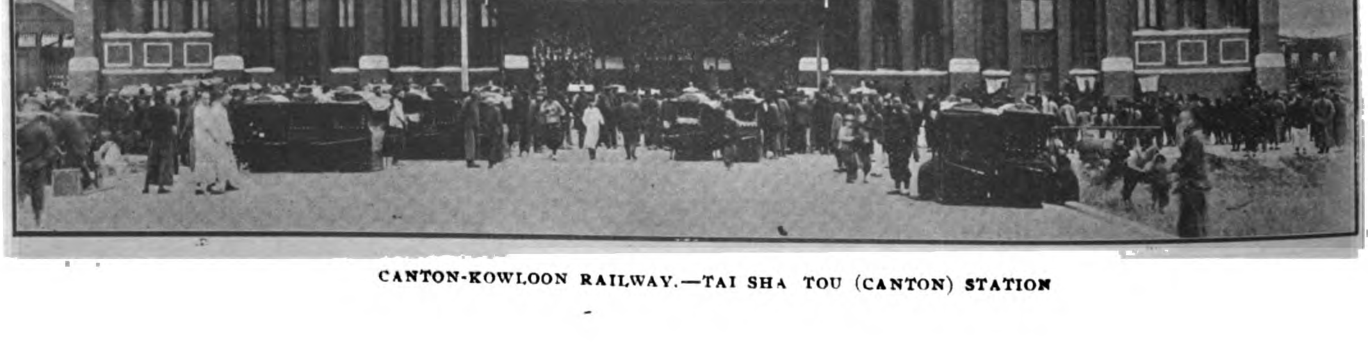
TAOTAI CHAO CHING-HUA
ACTING MANAGING DIRECTOR

The total length of the Chinese Section of the Canton-Kowloon Railway is 89¼ miles; the Loan Agreement for its construction was signed in March 1907 by the British & Chinese Corporation and the Imperial Chinese Authorities; the detailed survey was commenced in August of that year, while construction was commenced in certain sections where land had been purchased, in June of 1908.

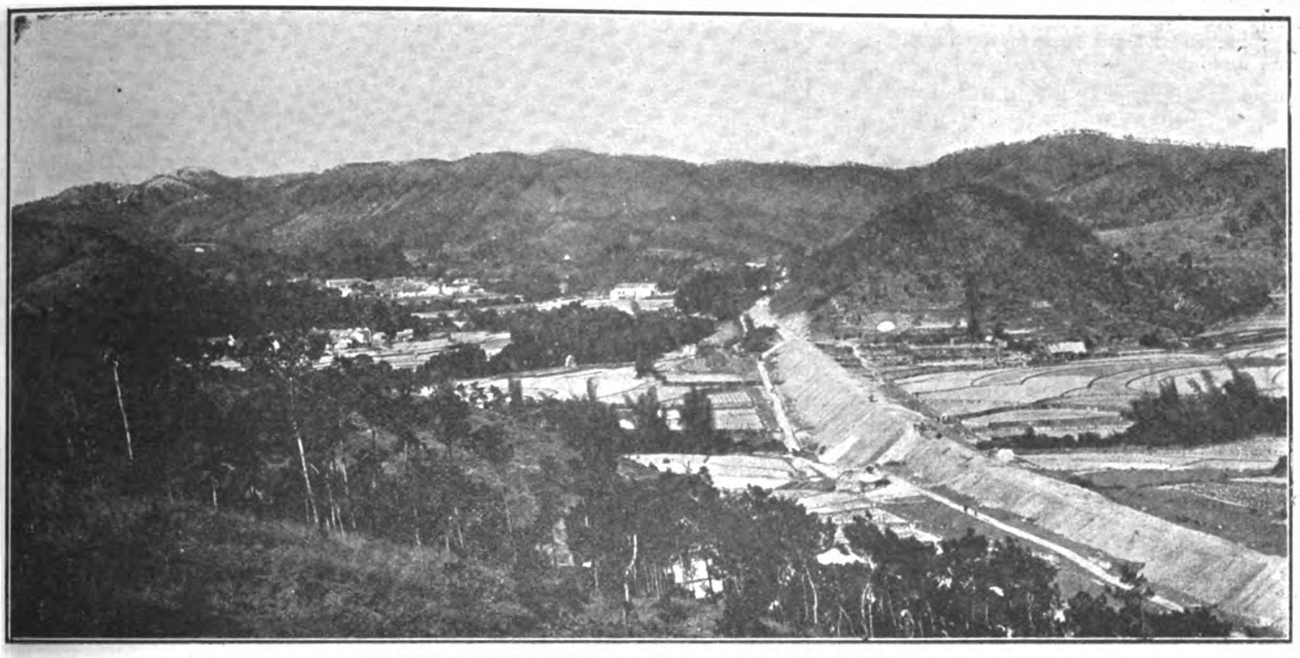
The local administration of the railway is placed by the Loan Agreement in the hands of a Chinese Managing Director associated with a British Engineer-in-Chief and a Chief Accountant, and these positions are at the present time filled by Mr. Chao Ching Hua, Acting Managing Director, Mr. Frank Grove, M. Inst. C. E., Engineer-in-Chief, and Mr. Ernest Hall, Chief Accountant.

The executive officers at present engaged on the line are as follows: Mr. B. T. B. Boothby, Assoc. M. Inst. C. E., District Engineer, No. 2 District; Mr. W. G. Moore, District Engineer, No. 3 District; Mr. W. M. Stratton, Maintenance Engineer, Tai Sha Tou; Mr. J. J. Thompson, Locomotive Superintendent, and Mr. C. T. Liu, Traffic Manager.

Construction work has proceeded steadily, though many troubles caused by native opposition in the country districts occurred in the early days of land purchase and of the commencement of actual works. Eventually, however, with more vigorous measures on the part of the Chinese authorities, and much patience and care on the part of the foreign engineers, a better time came and more rapid progress was attained, especially in the past year.



CANTON-KOWLOON RAILWAY.—TAI SHA TOU (CANTON) STATION



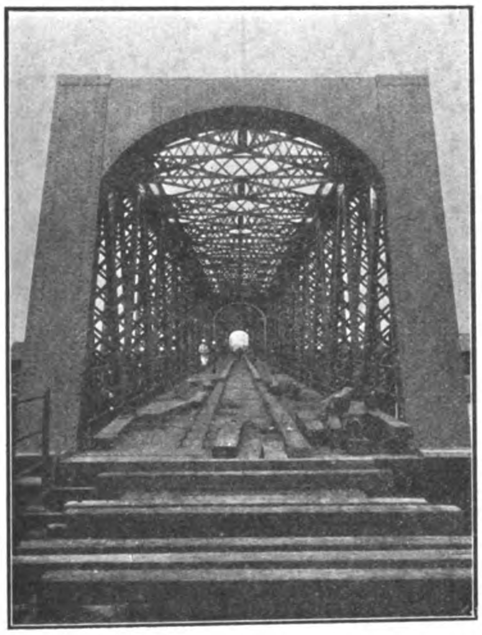
MILE 83, LOOKING NORTH, CANTON-KOWLOON RAILWAY.

While this Railway does not rank as China's most difficult engineering work up to the present, there are works of magnitude and some considerable engineering interest.

In the early days of promotion of the scheme, a length of 100 miles, more or less, was anticipated and that this could be reduced to 89½ miles is satisfactory. Tunnels have been avoided though there are heavy earthworks from Mile 58 to Mile 85 through hilly and mountainous country, and in the lowlying portions there are some 10 miles of high embankment necessitated by the very high flood levels.

Besides an interesting route through the hilly portions, already indicated, the feature of this railway which calls for special comment is a series of large bridges in the East River Valley which is crossed between Mile 32 and Mile 41. In these nine miles, the following bridges have already been, or will very shortly be, completed, and we are enabled to give photographs of some of these interesting works.

Sien Tsun River Bridge		5 spans 60 feet Skew.
Shek Ha	do.	3 spans 60 feet.
Shek Tan	do.	3 spans 100 feet, 2, 60 feet.
Pek Kong	do.	4 spans 60 feet.
Kan Sui	do.	3 spans 100 feet.
Sheklung, East	do.	3 spans 224 feet, 2, 60 feet.
Tung Kun	do.	4 spans 224 feet, 2, 60 feet.



VIEW THROUGH THE GIRDERS OF THE EAST RIVER BRIDGE ON THE CANTON-KOWLOON RY.

The method adopted for the erection of the 224 feet span girders is unusual in this part of the world and indeed has been elsewhere seldom attempted on so large a scale. Five spans have already been floated out at bed stone level on pontoons specially built with deck staging for the purpose. The weight of each span when floated out is 330 tons and the erection and riveting has taken place on shore near launching jetties. The final floating out and seating of each span only occupies a few hours. The piers of the larger bridges are founded upon caissons encased as to the lower portion in steel, sunk to a sufficient depth by open dredging and finally plugged with concrete.

The ruling grade of the line is 1 in 150 and this grade is almost entirely confined to the hill section, which remark also applies to the sharpest curvature, viz: 3 degrees.

Tangents are long throughout the more level portions of line and therefore a satisfactory through train speed should be maintained without difficulty.

Steel Rails 85 lbs per yard have been supplied by the Hanyang Iron & Steel Works, Hanyang, near Hankow, also fastenings with the exception of fish bolts, and the quality, as proved by analysis and physical tests, is up to a high standard.

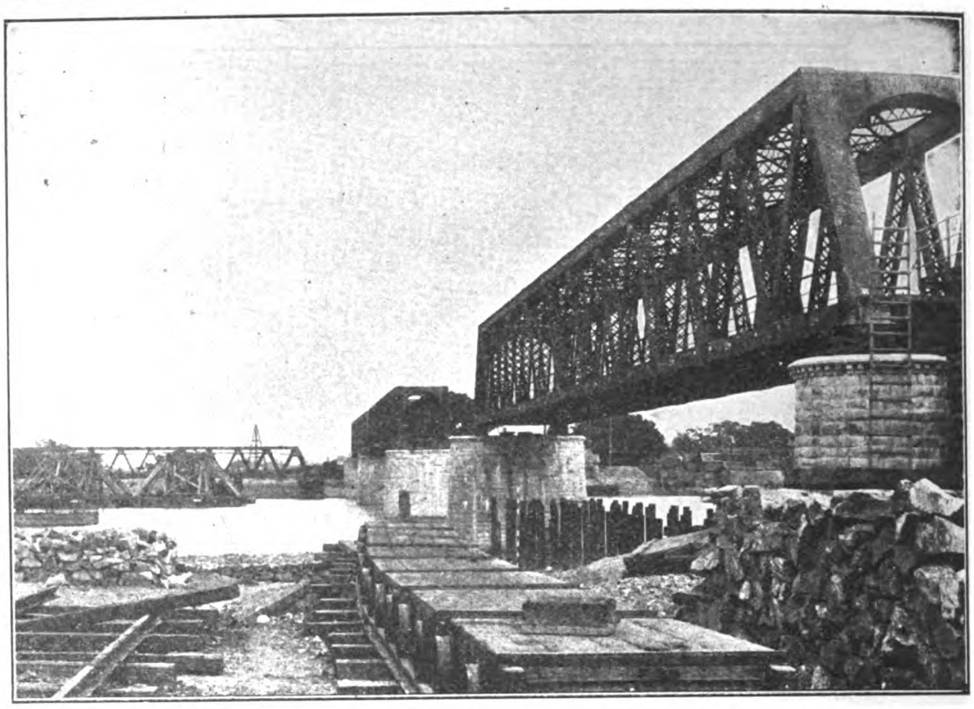
THE OPENING TRAIN AT TAI SHA TOU STATION (CANTON) ON THE CHINESE SECTION

Sleepers are of New South Wales hardwoods mostly Eucalyptus, hewn, 8 feet by 9 inches by 5 inches, and the superior lasting qualities are undoubted.

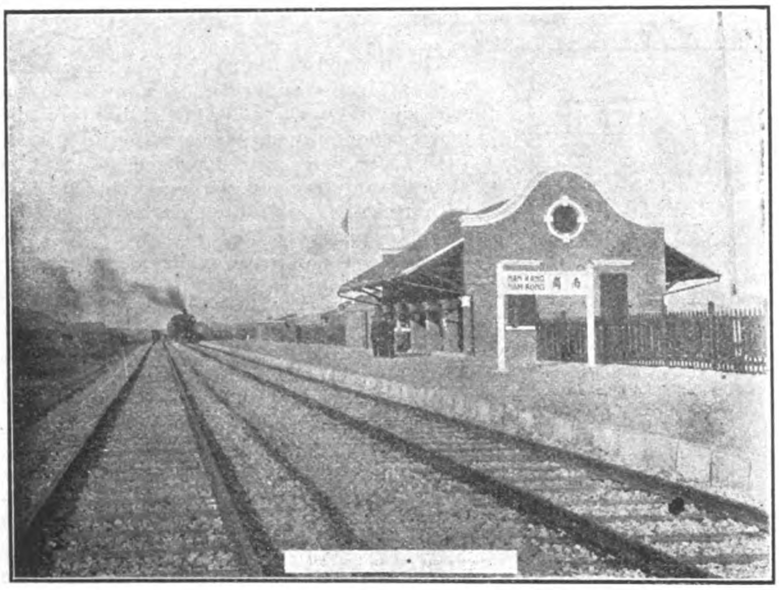
The equipment of the Railway, while not extravagant, is such as will ensure a fair degree of comfort to passengers, and the railway has already been complimented on the smooth running of its trains.

The type of locomotive at present adopted is 2-6-0, outside cylinders 19"×24" stroke, double bogie tender for 3500 gallons of water and 5½ tons of coal, weight of engine and tender loaded 101½ tons, maximum axle load 16½ tons, diameter of driving wheels 5 feet, manufacturers, the North British Locomotive Company Limited, Glasgow.

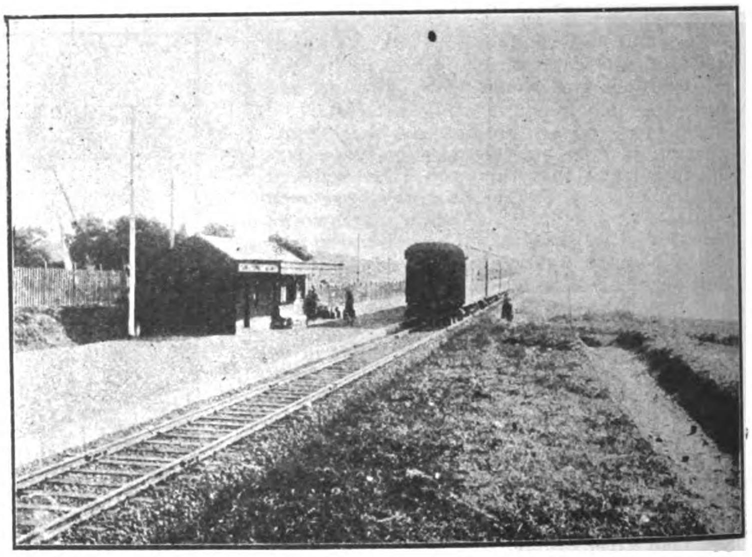
Eight carriages at present in use were supplied as to frames and bogies by the Metropolitan Carriage & Wagon Company, Birmingham, the bodies being manufactured and erected by the Hongkong & Whampoa Dock Co., Ltd., of Hongkong who sent up the carriages to Canton ready for running by lighter towed by a launch. Twenty-three similar carriages are under contract with the Tong Shan Works of the Imperial Railways of North China. The type of carriage adopted is as follows:—length over platforms 61 feet, 4 wheel bogies, body of teak with varnished teak lagging outside and light wood inside, high dome roof with torpedo ventilators. The trains are continuous with standard central couplers and Westinghouse Brake throughout. The first class carriages have a side corridor with coupés and a card saloon, rattan seats and cushions and electric light equipment. For sound design and workmanship combined with reasonable economy, the type of carriages adopted, which has also been introduced on the British Section of the railway, is considered eminently satisfactory.



THE TUNG KUN RIVER BRIDGE, CANTON-KOWLOON RAILWAY.



CANTON-KOWLOON RAILWAY.—NAM KONG, 3RD CLASS STATION

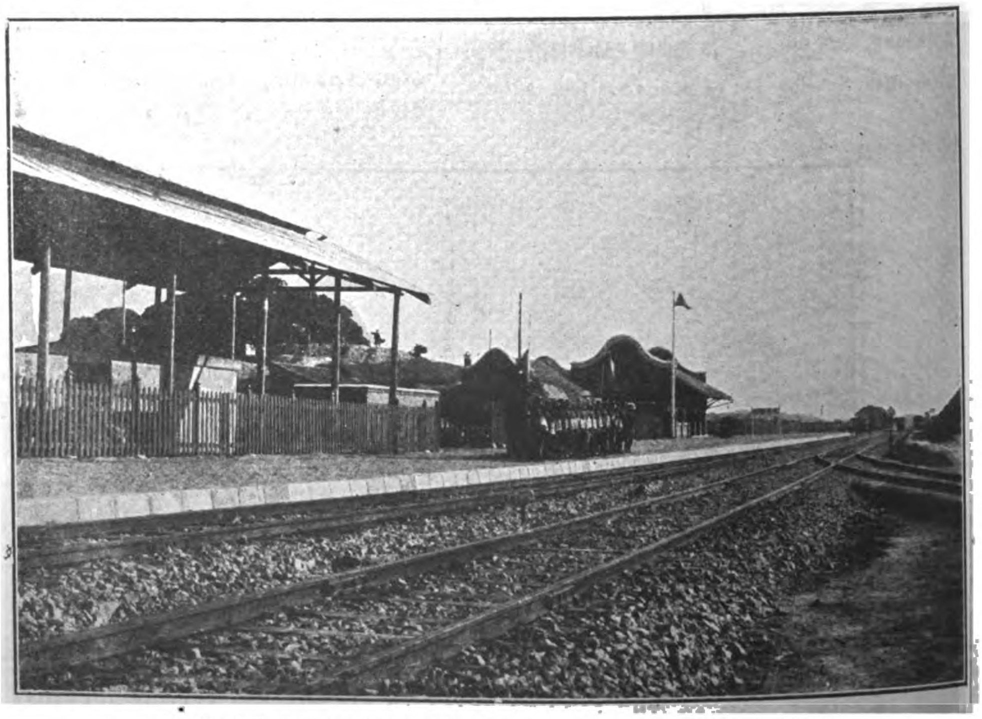


SUN TONG HALT ON THE CANTON-KOWLOON RAILWAY.

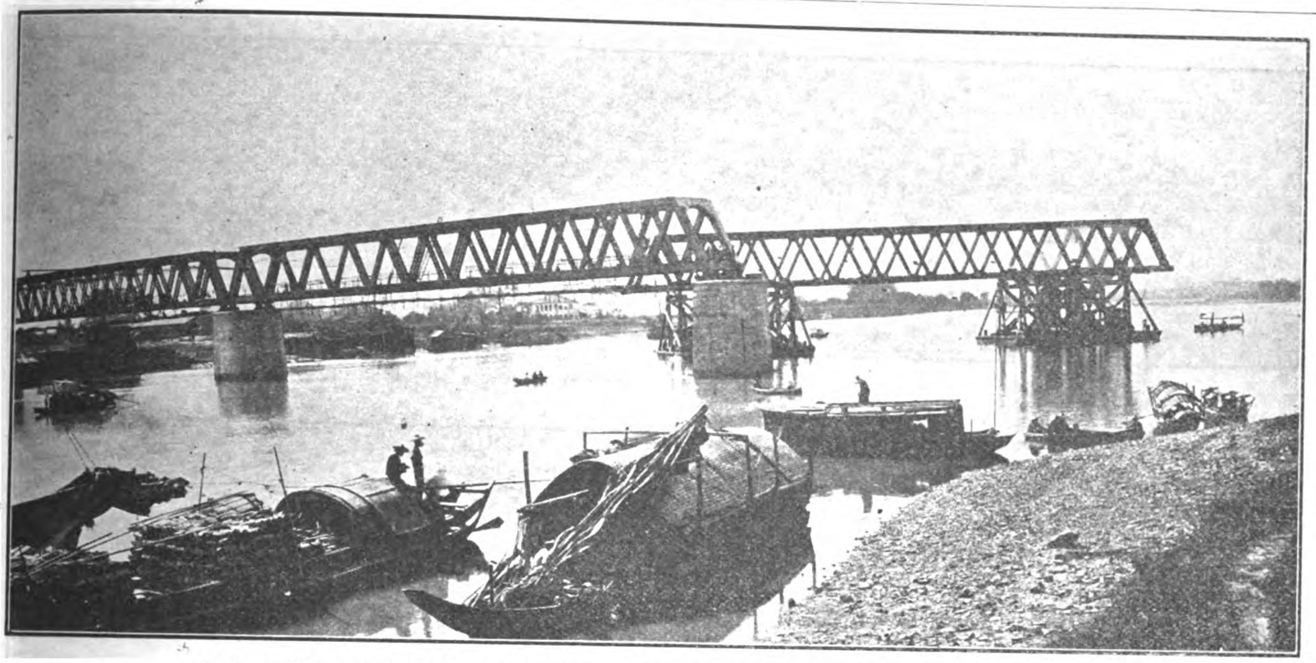
The terminal station at Tai Sha Tou, Canton, as the illustration indicates, is now completed and in use as a general head office, as well as providing station accommodation.

The smaller stations on the line are simple structures sufficient to serve local demands, while permitting extension and development with the growth of traffic.

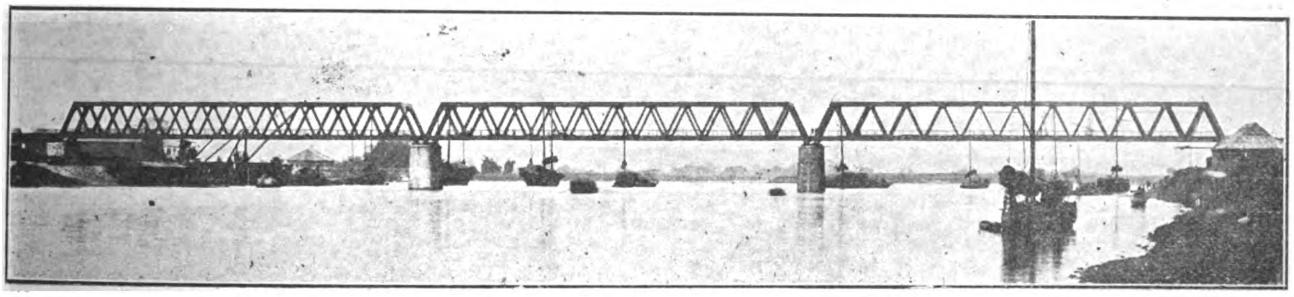
With the exception of Sheklung on the East River, which is a dstributing center of some considerable importance, though not a large city, there are no towns of importance contiguous to the railway. There are however many villages and a large population, and the rapid and cheap means of transport afforded by the open section of the line is already hailed with much gratification by the inhabitants.



CANTON-KOWLOON RAILWAY.—SIEN TSUN, 3RD CLASS STATION



THE EAST RIVER BRIDGE: LAUNCHING A 224-FOOT SPAN, CANTON-KOWLOON RAILWAY



THE EAST RIVER BRIDGE ON THE CANTON-KOWLOON RAILWAY

In order, therefore, to develop a maximum amount of local traffic, besides 3rd class stations, semi-permanent "halts" have been established at all likely places, which, with a small station staff, should materially assist in building up the traffic of the railway.

The date of opening to through traffic with Hongkong is given as probably some time in August of this year and unless some untoward incident occurs, there appears every indication that this estimate is not over optimistic, for little remains to be done but completion of track laying, ballasting and some station buildings and yards, also the delivery and erection of further rolling stock to meet the needs of traffic.

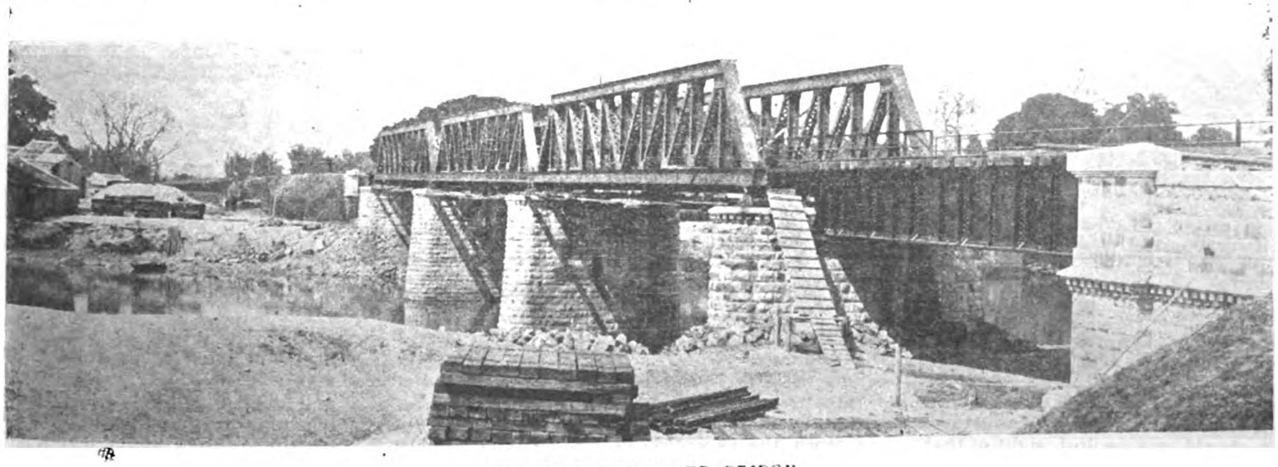
We are informed that the existing section of open line will be extended to Sheklung (Mile 40) during April or May.

Upon the completion of the railway the travelling public will find an interesting journey awaiting them, the British and Chinese Sections combined, affording unusual and very beautiful scenic attractions apart from any engineering interest.

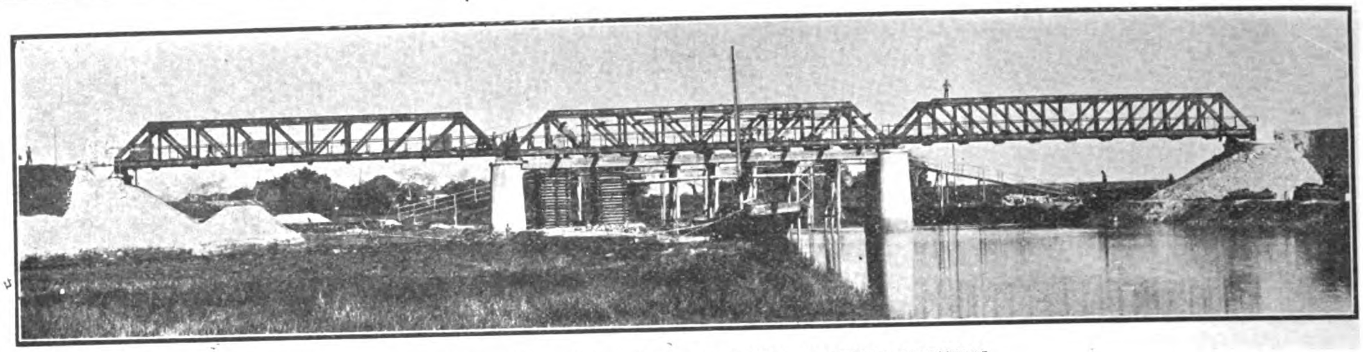
It is no exaggeration to state that the short railway journey from Hongkong to Canton will rank very high in point of interest, and the development of the line into one of the most important and financially successful railways is merely a question of time.

Mr. Frank Grove, M. Inst. C. E., Engineer-in-Chief of the Chinese section of the Canton-Kowloon Railway, deserves great credit for the progress made in the construction of this important line. Notwithstanding the many discouragements endured and prejudices to overcome, together with engineering difficulties encountered, Mr. Grove has upheld the prestige of British engineering construction standards in the enterprise now nearing completion. He was not discouraged by the many trying delays due to friction between the officials and the Chinese in their endeavor to fulfil their obligations to the railway, and the inhabitants along the right of way. By the exercise of great patience and tact, he carried on the work under these trying conditions and today it might be said that instead of the railway being unpopular, it appeals generally to the inhabitants who formerly lost no opportunity to obstruct the work.

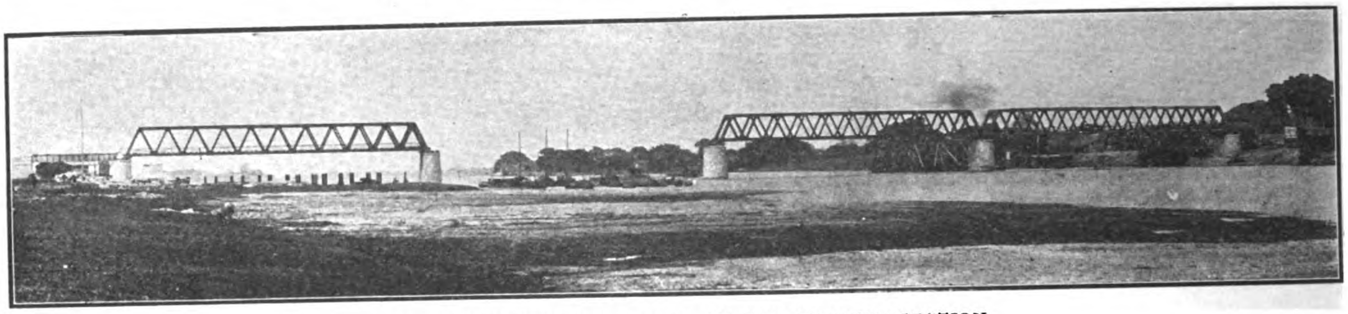
Mr. Grove was formerly connected with the Bengal-Assam Railway previous to undertaking the position he has for years occupied Indeed the Hongkong-Canton line is indebted to the Assam-Bengal for Mr. E. S. Lindsay, M. I. C. E., the Chief Resident Engineer, and Mr. H. H. Logan, assistant engineer of the



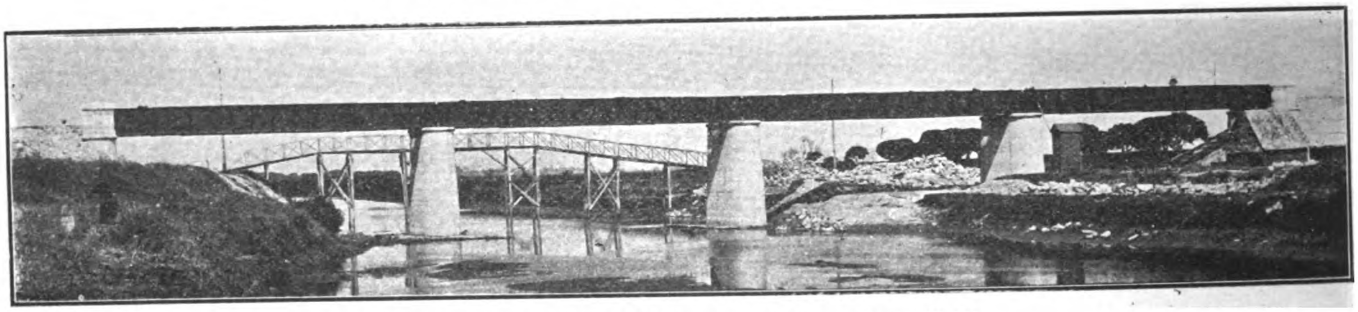
THE SHEK TAN RIVER BRIDGE



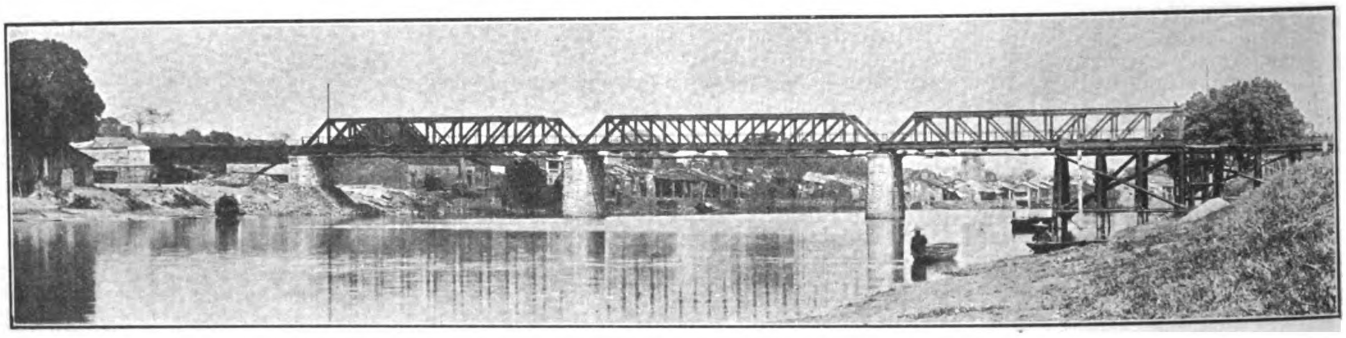
THE KAN SUI RIVER BRIDGE ON THE CHINESE SECTION



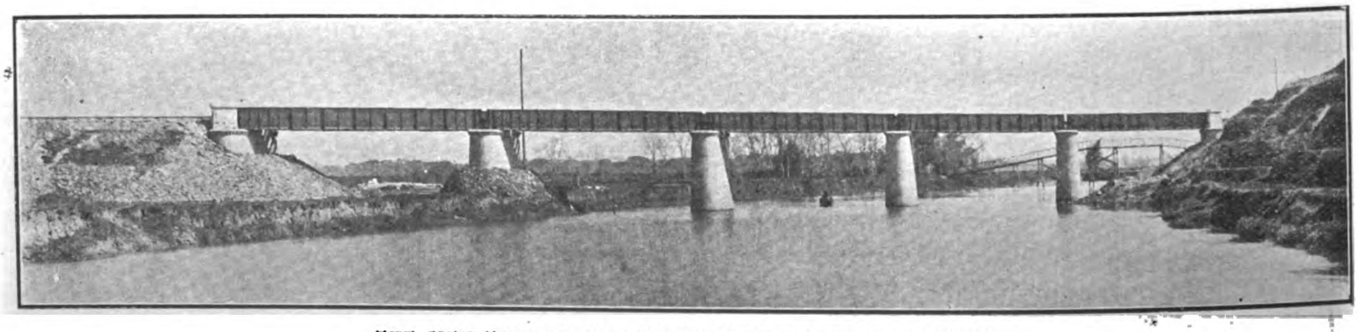
THE TUNG KUN RIVER BRIDGE ON THE CHINESE SECTION



THE PE KONG RIVER BRIDGE ON THE CHINESE SECTION



THE SHEK TAN RIVER BRIDGE ON THE CHINESE SECTION

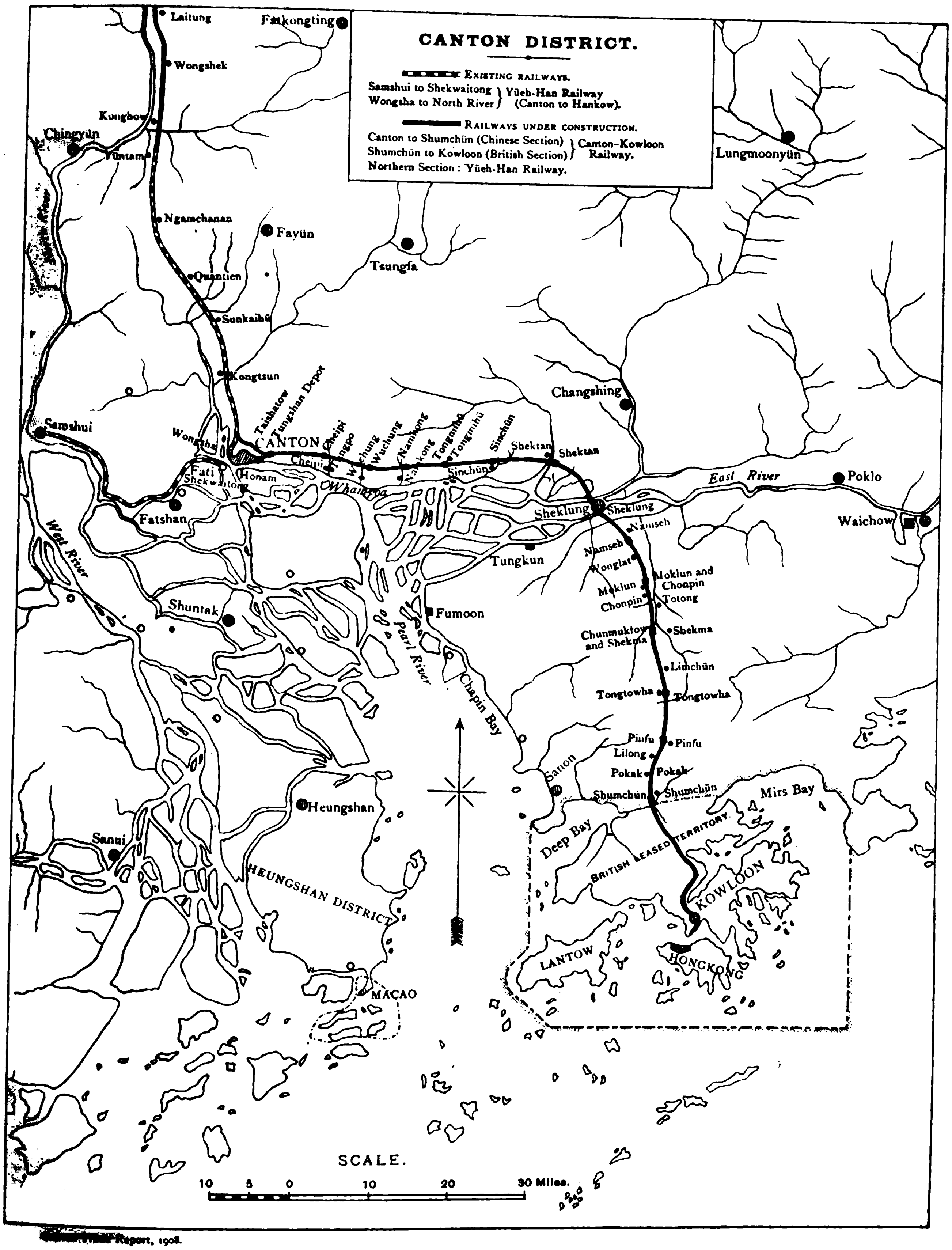


THE SIEN TSUN RIVER BRIDGE ON THE CHINESE SECTION

British section, who also served on this railway previous to their acceptance of these positions.

On the date of the opening of the first section Mr. Grove said:—"While delay is to be regretted, it should not be lost sight of that the rapid acquisition of large areas of land in the Kwangtung province presents a difficult task to Chinese officials which is not easily surmounted owing to the customs of China and the care necessary to avoid serious disturbances, especially in dealing with the removal of graves, tombs and temples.

With the exception of scme comparatively trivial affairs it is at least a matter for congratulation that land purchase has proceeded to the extent indicated without great friction between officials and inhabitants, known in many districts for exceptionally truculent and determined habits, and that the safety of foreign engineers who have endeavoured to do their duties under trying conditions, has not caused greater anxiety than that experienced."

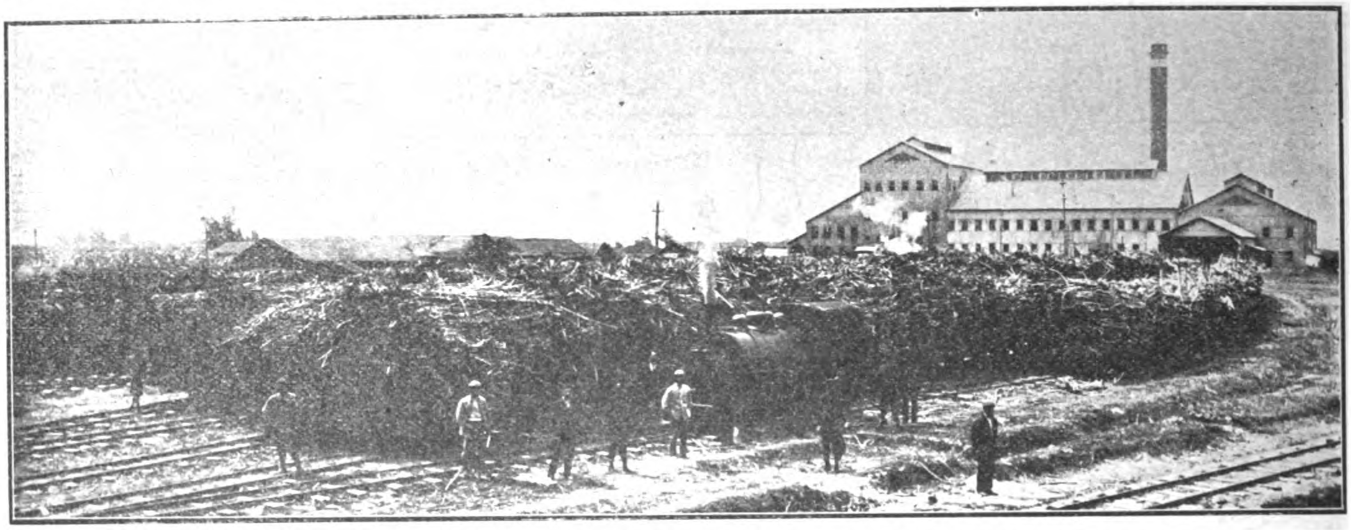


Report, 1908.

MAP OF THE CANTON DISTRICT SHOWING CANTON-KOWLOON RAILWAY LINE

THE FORMOSAN SUGAR INDUSTRY*

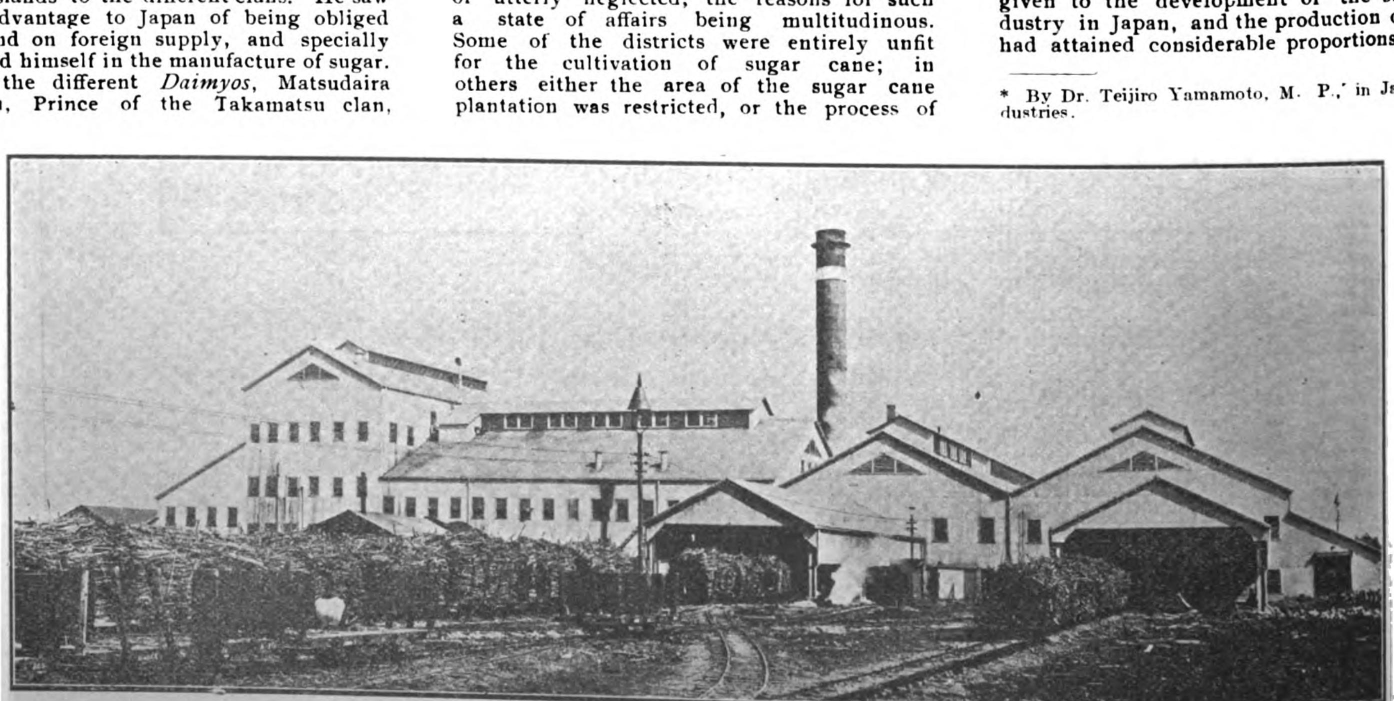
Sugar did not originally exist in Japan, but was brought over as tribute about 1,140 years ago from China. Since that time records regarding the commodity are lacking, and trace of it is lost for a number of years; but about 330 years ago, when trade relations were opened with the neighbouring countries, we find sugar figuring among the imported goods. It was also during this period that the sugar cane was first introduced into Japan, and it has been proved by history that the cane was first planted in the Luchu islands. It is recorded that at this time some inhabitants of the island of Oshima who were cast on to the coast of China managed to learn the method of manufacturing sugar and introduced it into Japan on their return. The process of manufacture appears to have been of the most rudimentary nature, sugar being only used for medical purposes and as a luxury by the nobility and wealthy people. Sugar was gradually imported in larger quantities as the demand for it increased. It was about 180 years ago that Yoshimune, eighth of the Tokugawa Shoguns, encouraged the plantation of sugar cane and the manufacture of sugar by distributing the sugar cane plants from the Luchu islands to the different clans. He saw the disadvantage to Japan of being obliged to depend on foreign supply, and specially interested himself in the manufacture of sugar. Among the different *Daimyos*, Matsudaira Yoriyasu, Prince of the Takamatsu clan, manifested the greatest interest in the subject. The province of Sanuki, of which he was the feudal lord, often suffered from famine on account of the lack of irrigation, so he encouraged the plantation of sugar cane in his dominion with the object of raising the revenue, in order to cover the deficit frequently caused by a bad harvest. He ordered his retainers Hiraga Gennai and Ikeda Genbun to study the process of sugar manufacture, and one of the followers of the latter—Mukoyama Shukei—was able to attain the object and succeeded in manufacturing sugar of a superior quality. This was about 120 years ago, and since then the manufacture of sugar has become the staple industry of Sanuki province, Kagawa Prefecture, the name of "Sanuki Sambon" or Sanuki pure white sugar having become quite famous throughout Japan. About 90 years ago, when the finances of the Takamatsu clan were in a very embarrassed condition, the revenue derived from the sugar industry saved the situation, and the industry was further developed in the district. With regard to the other clans, the result was far from satisfactory. The development of the industry was, in most cases, either retarded or utterly neglected, the reasons for such a state of affairs being multitudinous. Some of the districts were entirely unfit for the cultivation of sugar cane; in others either the area of the sugar cane plantation was restricted, or the process of manufacture kept a strict secret. Some of the clans went so far as to prohibit the cultivation of the plant, deeming sugar an injurious luxury. Even the Central Government of the Shogunate, which had been scared by several cases of famine, laid great importance upon cereals, and forbade the cultivation of anything but cereals on the farms. It was considered that the sugar cane extracted richness from the soil, and orders were issued restricting sugar cane plantations to the waste land bordering the river beds. Some of the authorities even held the opinion that the development of the sugar industry in Japan would prove detrimental to the foreign commerce with the Dutch. So great was the prejudice and opposition that the only localities where the sugar industry remained were in Luchu Islands, Oshima and Sanuki.



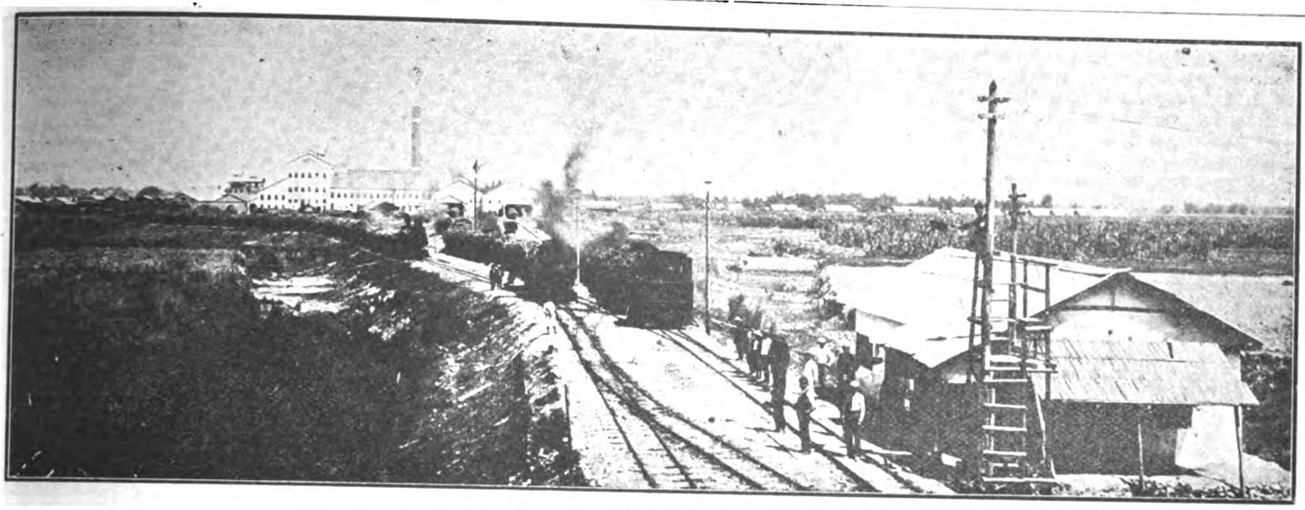
KOHEKIRO MILL OF THE TAIWAN SEITO COMPANY.—CAPACITY: 1000 TONS OF CANE IN 24 HOURS

Notwithstanding the unfortunate check that was placed on its early development, the subject of manufacturing sugar attracted the public attention, and we find that, as early as 110 years ago, a Mr. Kimura published a treatise on the manufacture of sugar, while there were many other eminent men who interested themselves in the subject. By these means a great impetus was indirectly given to the development of the sugar industry in Japan, and the production of sugar had attained considerable proportions during

* By Dr. Teijiro Yamamoto, M. P., in Japan's Industries.



AKO MILL OF THE TAIWAN SUGAR COMPANY.—CAPACITY: 3000 TONS OF CANE PER DAY



AKO MILL OF THE TAIWAN SUGAR COMPANY

the years preceding the Meiji Restoration. With the abolition of the clan system of Government after the inauguration of the new régime, protection accorded to the sugar industry by the different clans was withdrawn, and the domestic sugar industry suffered a serious set-back by reason of the competition of imported sugar. This state of affairs turned the attention of the authorities to the encouragement and revival of the sugar industry. The Japanese Government, taking into consideration the fact that beet sugar was extensively manufactured in Occidental countries, and also being satisfied that beet was superior to the cane as raw material (because while the growth of the latter was limited to tropical climates, the former was suitable for temperate as well as cold climates), ordered samples of beetroot from the United States in 1872 and experimented with them in the North-Eastern provinces. Subsequently, in 1876, Mr. (now Marquis) Masayoshi Matsukata, who was Director of the Bureau for the Development of Agriculture, brought to Japan beetroot seeds from France and planted them experimentally in the Norh-Eastern provinces. The results were highly satisfactory, and as a result of the above trials, a sugar manufacturing plant was purchased from France in 1879 at a cost of over Y130,000 which was installed by the Mombetsu Sugar Company, established at Mombetsu in Hokkaido under Government control. The whole business was subsequently transferred to a private concern, which commenced operations under the title of the Mombetsu Sugar Manufacturing Company. Some time afterwards a large sugar manufacturing company was established at Sapporo, in Hokkaido. However, after several years' experience, it was proved that the climate of the Hokkaido was not suitable for the culture of beet, and both of the above concerns were eventually compelled to cease operations, and for some years the question of sugar manufacture on a large scale was shelved. In 1895, however, when the island of Formosa was ceded by China to Japan, the Japanese Government issued regulations for the protection of the sugar industry, and ever since that time the subject of manufacturing the crude product from sugar cane has been attracting the attention of both the authorities and the people, immense strides having since been made in the progress of the industry. At the present time there are ten large sugar manufacturing concerns, worked by machinery, the total capital invested being Y50,000,000 and the value of the machinery installed exceeding Y10,000,000.

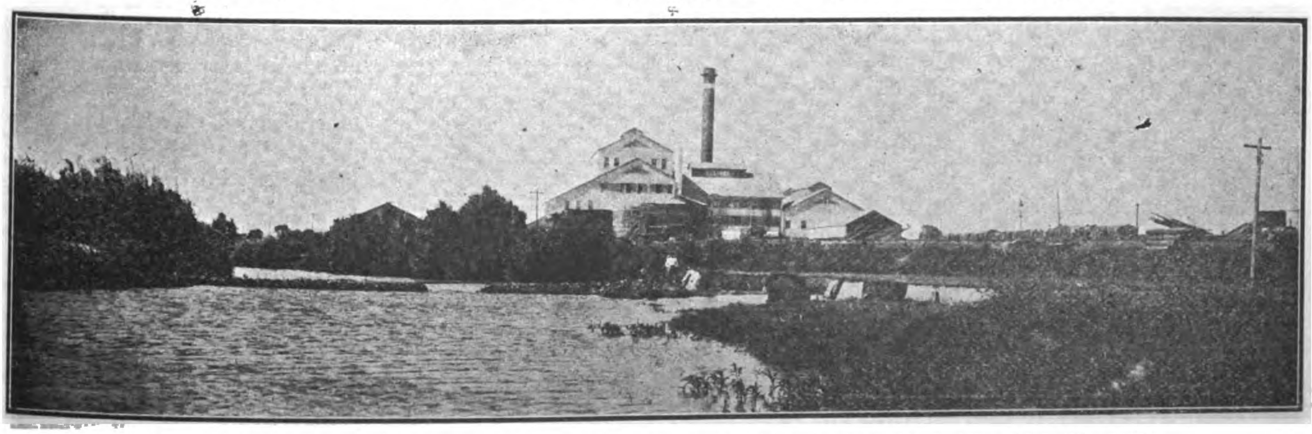
The general business is divided into two sections, namely, the sugar refining and crude sugar industries. In Japan the former industry was developed by degrees, and in 1895 the Nippon Sugar Refining Company was established by Baron Eichi Shibusawa and others, while in Tokyo Mr. Tosaburo Suzuki inaugurated The Nippon Refined Sugar Manufacturing Company, and in both machinery of the latest and most improved pattern was installed. Although afterwards a few other sugar refineries were established, these were either bought up or incorporated, so that at present there are only three sugar refining companies in Japan, namely, Dai Nippon Sugar Manufacturing Co., Ltd. (Capital Y12,000,000), Yokohama Sugar Refining Co. (Capital Y2,250,000) and Kobe Sugar Refining Co. (Capital Y2,000,000) excepting those under contemplation and a few concerns which are engaged in a subsidiary industry of sugar manufacture in Formosa. The total producing capacity per day is about 800 tons, the total output for 1908 being approximately 1,500,000 bags.

The companies manufacturing crude sugar are almost all located in Formosa where the industry has been engaged in for more than a century, though of course since Japanese capital and knowledge have been applied to the development of the industry in the island it has shown marked progress. The Formosan Sugar Manufacturing Co., the pioneer of the industry on the new basis, was established in 1900, and was followed by the Yensuiko Sugar Manufacturing Co. and a few others. As the result of assistance and encouragement afforded by the authorities, the yearly output has been speedily augmented so that in 1908 there were eight large companies and about 900 native sugar mills, the latter being of a most crude and primitive description. The producing capacity is as follows:—

Sugar Manufacturing Cos. with new machinery., ...	8	Companies.	184,140,000 lbs.
Improved native sugar mils......	53	do.	63,648,000 ,,
Old native sugar mills..............	845	do.	22,824,000 ,,
Total			270,612,000 ,,

Thus Formosa stands first as the sugar-producing locality of Japan, the Luchu Islands coming next, having developed their sugar industry as the result of the promulgation of the sugar protection regulations in 1906. A few other localities are also supplying crude sugar to the refineries on the main land.

The total amount of sugar consumed in Japan may fairly safely be estimated at from 500,000,000 lbs. to 550,000,000 lbs. per year. The amount of consumption about the year 1895 was not more than 350,000,000 lbs. and while there may have been some fluctuations during the interval as the result of the sugar consumption tax and the effects caused by the additional extraordinary special taxes levied after the late Russo-Japanese war, the demand for sugar has been gradually increasing to a considerable amount up to the present day, and it is also evident that there will be a further increase in demand in the future. Until a few years ago, 150,000,000 lbs. was supplied by domestic companies, while the balance, 350,000,000 lbs., was supplied by imports from foreign countries. Of late, however, the sugar industry of Formosa has undergone such unprecedented expansion



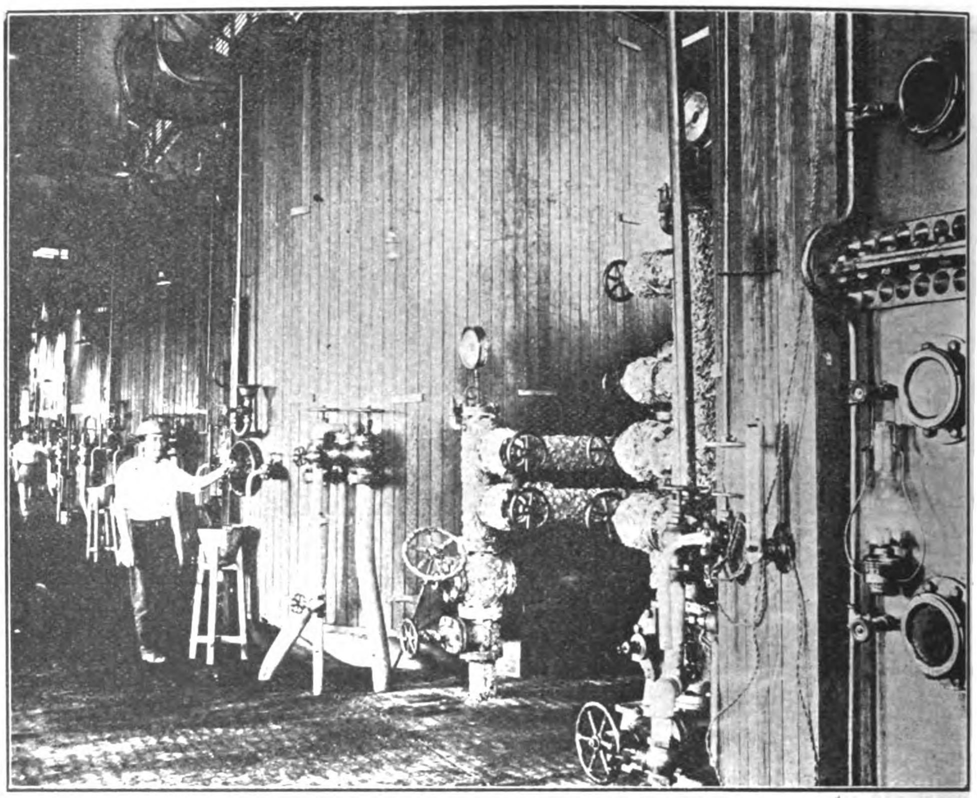
SHAROKEN MILL OF THE TAIWAN SUGAR COMPANY.—CAPACITY: 1000 TONS OF CANE PER DAY

that the island alone produces over 200,000,000 lbs. (Machine-made crude sugar 120,000,000 lbs. and crude sugar made by native mills 80,000,000 lbs.). If there are added to the above the products from Luchu Islands and Shikoku, approximately 80,000,000 lbs., the total domestic production of sugar for 1908 was approximately 280,000,000 lbs., thus supplying more than half of the total yearly consumption of sugar in Japan.

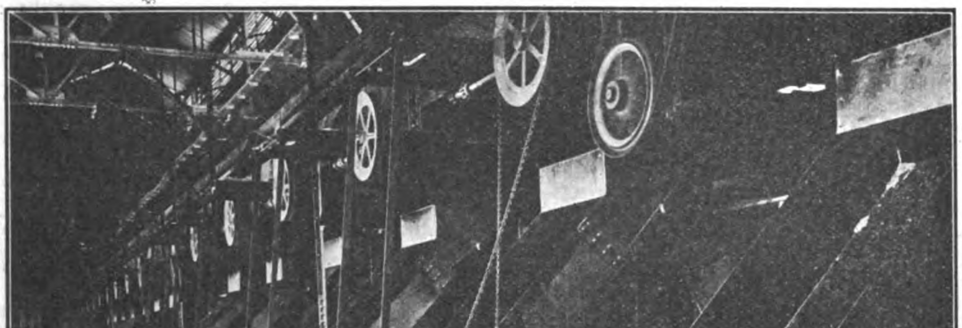
Viewed from climatic and geological standpoints, Formosa is most suitable for the cultivation of sugar cane as well as for the manufacture of sugar, and it is not surprising that the industry has made such rapid progress in the island.

Although the exact date of the origin of the sugar industry in Formosa cannot be stated with certainty, it may be taken for granted that it commenced together with the immigration of the Chinese into the southern parts of the island. After the occupation by the Dutch in 1624 they engaged in the manufacture of sugar quite extensively and exported a considerable quantity to Japan. Records of 250 years ago show that at about that time the process of sugar manufacture appears to have been improved, and the yearly production was greatly increased as the result of the increase in demand and expansion of trade on the island. Although there may have been some fluctuations during the interval, sugar formed the most important article of export from Formosa, ranking next to Oolong tea and on the same scale as rice and camphor. After the island had been ceded to Japan, the Japanese Government established a Government-General for the administration of the island and devoted its entire energy to the development of its natural resources. A Department for the development of resources was instituted in the Civil Administration Bureau, special attention being thus paid to the question of industrial and agricultural development. In 1902 a Formosan Sugar Bureau was established, followed by the promulgation of the regulations for the encouragement of the industry. In 1907 the Bureau was transferred to Tainan. Previous to the above, in 1903, an experimental sugar cane plantation had been established at Daimokuko in order to make various experiments on sugar manufacture and also for the cultivation of sugar cane, several plantations being also opened in other districts. The name of the above institution was afterwards changed to the Sugar Industry Experimental Office, and efforts were directed towards the improvement of the plants. Subsidies were granted for fertilising and irrigation so as to encourage the cultivation of waste land, and special privileges were granted to the promoters of sugar manufacturing concerns, such as allowing preliminary expenses, subsidies for the purchase of machinery, and giving free land for plantations. In fact, no efforts were spared by the authorities for the encouragement of the industry. At the same time steps were taken in the main island to encourage capitalists to invest in the establishment of sugar mills with the latest and most improved machinery. In 1900 the Formosan Sugar Manufacturing Company was inaugurated, this being the first of the kind entirely based on the new system. To this company the Government-General granted a subsidy of Y12,000 and the factory was considered a model one. The Government-General further purchased new machinery and encouraged its use, the result being the establishment of the Yensuiko Sugar Manufacturing Company, and a few other smaller concerns of a similar kind. The authorities not only paid great attention to the sugar manufacturing business, but also to the agricultural industry. As early as the year 1896, sugar cane plants were introduced from the Hawaiian Islands and experimented upon in Formosa, this being the first Hawaiian sugar cane ever planted in the island, those previously introduced being the South China or Java species. Careful attention was also paid by the authorities to the improvement of fertilisers, irrigation, cultivation and reclamation of waste land, etc., all of which helped the improvement and progress of the industry in the island, and thus it has attained its present development.

The following table shows the development of the sugar industry in Formosa:—



VACUUM PAN FLOOR OF THE AKO MILL



THE BOILER ROOM OF THE AKO MILL: SHOWING THE BAGASSE CONVEYORS FEEDING THE BURNERS AND DEPOSITING THE EXCESS FUEL ON THE SIDE

OUTPUT OF SUGAR CANE.

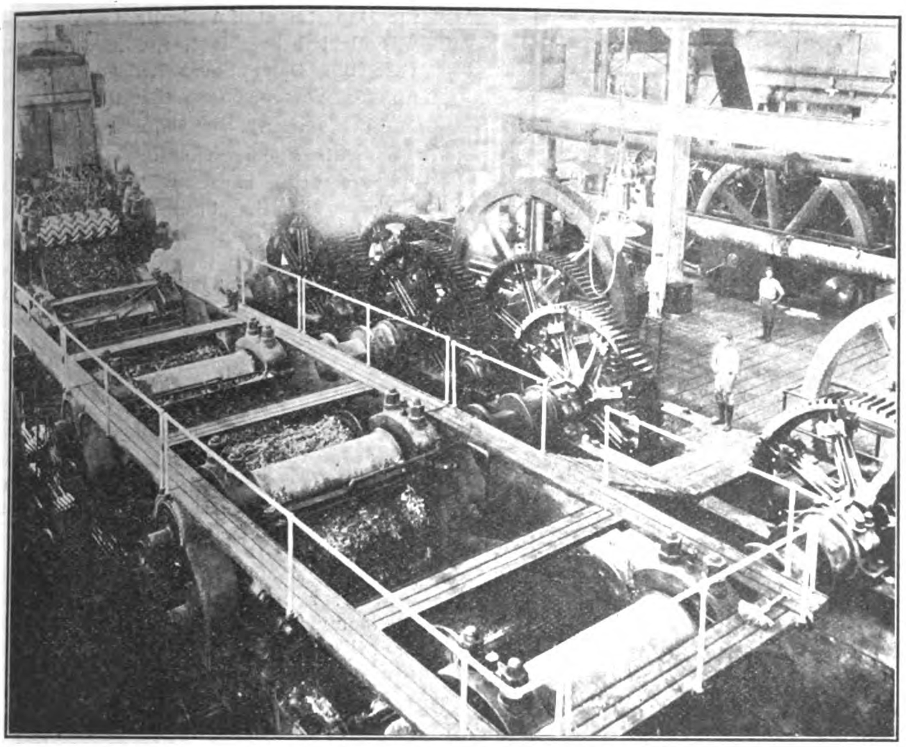
	Area planted with improved plants. ko.	Output of improved plants lbs.	Area planted with old plants. ko.	Output of old plants. lbs.
1903......	37	4,461,700	16,489	678,699,202
1904......	240	18,175,189	21,354	1,056,799,740
1905......	800	48,321,000	24,177	1,023,902,366
1906	2,615	182.308,882	32,190	1,496,987,524
1907......	7,872	520,489,502	21,987	843,105,789

OUTPUT OF CRUDE SUGAR

Year.	Total area. ko	Total amount of Sugar Cane. lbs.	Total amount of Crude Sugar. lbs.
1903......	16,526	863,157,902	50,680,561
1904......	21,594	1,074,974,929	75,834,854
1905......	24,976	1,072,223,366	82,632,658
1906......	34,806	1,679,245,906	127,388,416
1907......	29,859	1,368,595,291	106,175,955

PARTICULARS CONCERNING SUGAR COMPANIES WORKED BY MACHINERY.

Name of Co.	Establishment. Year.	Capital. Yen.	Paid-up Capital. Yen.	Compressing capacity per day. Tons.
Formosan Sugar Mfg. Co.	1900	12,000,000	....	4,300
Dai Nippon Sugar Mfg. Co. Formosan Factory....	1905	4,500,000	4,500,000	1.200
Yensuiko Sugar Mfg. Co.	1903	5,000,000	1.250,000	1,380
Meiji Sugar Mfg. Co.	1906	5,000,000	1,750,000	1,560
Toyo Sugar Mfg. Co.	1907	5,000,000	2,500,000	1,000
Shinko Sugar Mfg. Co.	1903	600,000	600,000	500
Bain Sugar Mill.	1905	350,000	350,000	300
			Total......	10,230



THE MILL ROOM OF THE AKO PLANTATION, A NINE ROLLER MILL WITH "KRAJEWSKI" CRUSHER AND A REGRINDER, MAKING IN ALL FOURTEEN ROLLS.—ONE OF THE LARGEST AND MOST POWERFUL MILLS IN THE WORLD

As may be observed from the above figures, the sugar industry on modern principles is but of recent origin in Japan, and there appears to be a great field for further development in the future. The climate and soil of Japan are very well adapted for the cultivation of both sugar cane and beet, although the production of sugar cane per *ko* in Formosa, for example, ranges from 90,000 to 120,000 lbs., and is rather low compared to the production in Java, Cuba and Hawaii. Ever since the introduction into Formosa of Hawaiian sugar cane, the quality of both Lahina and Rose Bamboo has improved, and the amount of production has been greatly augmented. As the superiority of the above qualities are fully recognised, they are being introduced in great quantities, so much so that in 1908 the area planted with them occupied 80% to 90% of the total area of the sugar cane plantations. It is expected that so long as it does not interfere with the rice paddy fields there will be a further increase in the area of sugar cane plantations, as well as for the improved varieties. Moreover, in the event of a more superior quality of sugar cane being cultivated, a further impetus will be given to the development of the sugar industry; and if the best variety of sugar cane is selected, proper attention is paid to manuring, etc., by skilled labour, the necessary steps are taken for irrigation and drainage, improved agricultural machinery such as steam ploughs, etc., are introduced, and the method of cultivation is based on scientific principles, it is expected that there will be almost no limit to the expansion of the industry. Moreover, many sugar manufacturing concerns have arisen lately with the most improved types of machinery, some of the sugar mills being more extensive than those in Hawaii, so that the present productive power of the industry in Formosa has reached an immense amount.

With regard to the refining of sugar, its import, which averaged 200,000,000 lbs. per year for the period of six years from 1895 to 1900, decreased to below 100,000,000 lbs. on an average during the following six years—1901-1906—which forms most striking evidence of the marked development of the industry. If progress is continued at the present rate, Japan will be in a position to supply in the near future the entire home demand of 500,000,000 lbs. and export her surplus product to foreign countries, and it would not then be a difficult matter for Japan to occupy the foremost position among sugar-producing countries of the world.

In concluding the present treatise there is one point which requires consideration, and that is the question of taxation. In Japan ever since the beginning of the sugar industry, protective measures have been adopted, which have helped the rapid development of the industry. But with the promulgation of the Sugar Consumption Tax Law in 1901, followed by the Special Extraordinary Tax levied in 1904, and again the increased taxes in January, 1905, the tendency of increase in the demand for sugar suddenly suffered a check, and the expense and labour which had hitherto been expended by the Government were to a large extent nullified, and consequently the development of the sugar industry suffered considerably. The fallacy of such a policy at last appears to have been appreciated, and some of the taxes are destined to be abrogated sooner or later. At the same time, if on the one hand, by the economical utilisation of land and improvement in the agricultural side of the industry, the cost of production is economised, there appears to be a bright prospect before the sugar industry in Japan. Moreover, the soil of Korea and Manchuria, being very well fitted for the cultivation of beet, if that is developed, it will not fail to be of great benefit to the sugar industry of Japan by thus supplying cheap raw material. The cheapness of labour in the above localities is also another great advantage which will contribute towards the further progress and development of the sugar industry of Japan.

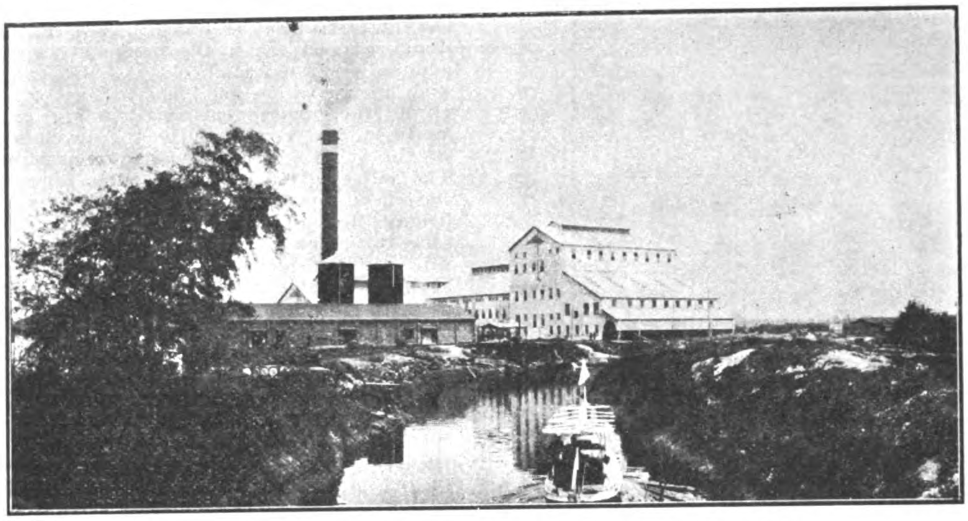
Note:—"Ko" corresponds to 25 acres.

DAI NIPPON SEITO KABUSHIKI KAISHA

(THE JAPAN SUGAR MANUFACTURING CO., LTD.)

This company is the pioneer of the sugar refining concerns of Japan. The development of the Japanese sugar refining industry is of quite recent date. Even after the Restoration of the Meiji era it was found impossible for Japanese refined sugar to compete with that imported from Java and Hongkong. This being a very great loss to the country, an undertaking was set on foot, about the year 1892, for the purpose of refining sugar, but this had to be dropped on account of the outbreak of war between Japan and China. Subsequently, in 1895, the Yayeyama Sugar Refining Company was floated, but the concern was worked on old methods and therefore was not altogether a success. In 1896, the Nippon Sugar Refining Co., the predecessor of the present Japan Sugar Manufacturing Co., Ltd., was established in Tokyo, a year after the war had been concluded between Japan and China, by Mr. Tozaburo Suzuki and a few others, with a capital of Y300,000, the object of the new enterprise being the refining of sugar by means of the latest and most improved machinery, and also the

CANE UNLOADING DEVICE AT THE KYOSHITO MILL OF THE TAIWAN SUGAR CO.



THE KOHEKERU MILL AND CANAL OF THE TAIWAN SUGAR CO.

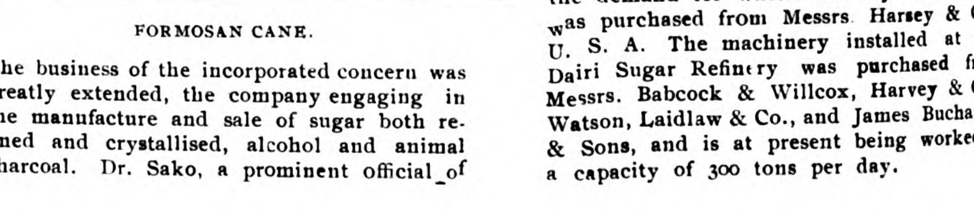
manufacture of crystal sugar by machinery, and by a new process invented by Mr. Suzuki. In the following year a new branch of the undertaking, that for the manufacture of rum, was opened, and business gradually expanded, so that in 1899 the capital had to be increased to Y2,000,000. However, a reaction set in soon after this. In addition to the great increase of imported Hongkong sugar, a large increase of beet sugar was also coming in from European countries, as the result of subsidies afforded to the beet sugar industries in those countries. Moreover, as the revised tariff was to come into force imposing an increase of duty on sugar, many firms imported large stocks in anticipation, the result being a marked fall in the price of the article. The company was thus beset with difficulties on all sides, which, however, it was able to successfully overcome. After some years several causes combined to improve the condition of the company. Within a few years the cheap raw sugar imported in anticipation of the increase of duty was entirely consumed, the price of sugar all over the world improved, and with the failure of the beet crop in Europe and the rebate law coming into force in Japan in 1902, the business of the company was involuntarily placed on a better footing. Also, as a result of the resolutions adopted at the Sugar Conference held in Brussels in 1902, by which subsidies on beet sugar were abolished in the European countries, the import of beet sugar into Japan entirely ceased The above circumstance proved of great advantage to the business prospects of the company, and the crystal sugar manufactured was not only sufficient to supply the demand for the home market but was also exported to China and Korea.

In the same year that the present company was inaugurated, the Nippon Sugar Refining Company, of Osaka, was established, under the joint promotion of Messrs. Eiichi Shibusawa (Baron), Jutaro Matsumoto, and a few others with a capital of Y1,500,000. Subsequently, in 1902, Messrs. Suzuki & Co., of Kobe, established a sugar refinery at Dairi, in the vicinity of Moji harbour, with a capital of Y2,000,000. These three sugar refining concerns competed with each other for some time, but the disadvantages of useless competition being ultimately fully recognized, the question of amalgamation was mooted, and as the first step in that direction, the present company was amalgamated in 1906 with the Nippon Sugar Refining Co., of Osaka, and a new company was then established, called the Dai Nippon Sugar Manufacturing Co., with a capital of Y 6,000,000.

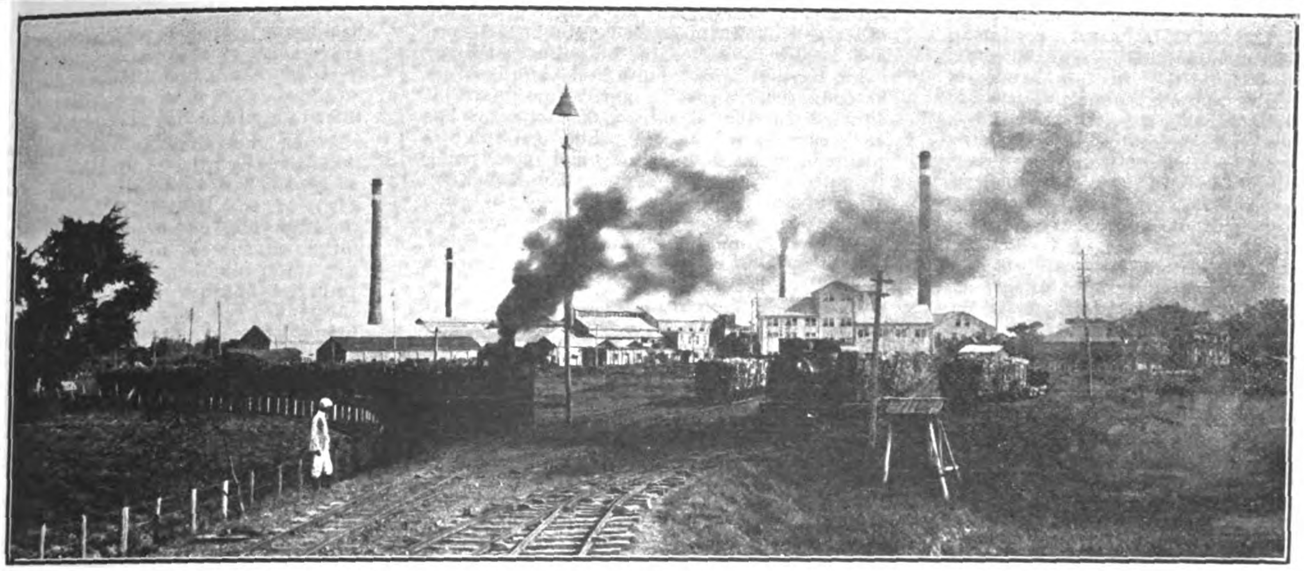
FORMOSAN CANE.

The business of the incorporated concern was greatly extended, the company engaging in the manufacture and sale of sugar both refined and crystallised, alcohol and animal charcoal. Dr. Sako, a prominent official of the Department of Agriculture and Commerce, was elected President, and in the following year the Dairi Sugar Refinery was bought up for Y6,500,000 so that the total capital of the company was augmented to Y12,500,-00 with a corresponding expansion in its manufacturing capacity. The subsequent depression in the business world caused a decrease in the sale of the products, which fact, coupled with several other causes, placed the affairs of the company in a most difficult position and resulted in the resignation of the entire Board of Directors, and in the election of the present members of the Board. Since the present directors have taken up office they have been strenuously labouring for the readjustment of the company's affairs in order to place its business on a sound basis. It is confidently expected that with the revival in the conditions of the market and the readjustment of the Sugar Tax Law, the company will be able to regain its former prosperity. Moreover, as there is a tendency towards a marked increase in the export of the company's crystallised sugar to the Chinese and Korean markets, the future prospects of the company's business are very encouraging.

REFINERIES.—The refineries of the company are located at Tokyo, Osaka, and Dairi, the Tokyo refinery being divided into two, known as the No. 1 and No. 2 Refinery respectively. The capacity of No. 1 Refinery was increased to 127 tons per day in 1908, while the No. 2 Refinery, which was established in 1901, was extended in 1904 to a capacity of 100 tons and in 1907 to 127 tons per day. The machinery installed in the above two refineries was first purchased from Messrs. Blair, Campbell & McClean, of Scotland, James Buchanan & Sons, of Liverpool, and the Caledonian Foundry and Engine Works, Greenock, and also from Messrs. Watson, Laidlaw & Co., of Glasgow. Later, the centrifugal molasses separator was ordered from the Suzuki Iron Works, under the management of Mr. Tozaburo Suzuki. The crystallised sugar factory was first established in 1896 and it was extended in 1906, the addition being made of a new crystallised sugar manufactory. The machinery installed at the Osaka Sugar Refinery is by Messrs. Blake, Barclay & Co., Greenock, Scotland, with a capacity of 150 tons per day. Recently machinery for the manufacture of cube sugar, the demand for which is daily increasing, was purchased from Messrs. Harsey & Co., U. S. A. The machinery installed at the Dairi Sugar Refinery was purchased from Messrs. Babcock & Willcox, Harvey & Co., Watson, Laidlaw & Co., and James Buchanan & Sons, and is at present being worked at a capacity of 300 tons per day.



WAURI MILL OF THE TAIWAN SUGAR CO.—CAPACITY: 180 TONS OF CANE PER DAY.



KYOSHITO MILL OF THE TAIWAN SUGAR COMPANY.—CAPACITY: 1100 TONS OF CANE IN 24 HOURS

Thus the total yearly output from the three refineries amounts to about 350,000,000 lbs., which is more than sufficient to supply the total yearly consumption of refined sugar in Japan, estimated approximately at 230,000,000 lbs. The quality is of first grade, competing successfully with the imported foreign sugar. It has also been exported to China and Korea of late to the extent of about Y10,000,000.

Besides the sugar refineries above mentioned, a new raw sugar factory was established in January, 1907, within the jurisdiction of Torokucho, in Formosa, with a capital of Y4,500,000 having a sugar cane plantation of over 15,000 acres. The producing capacity being 1,200 tons per day, it is in a position to supply 14,000 or 15,000 tons of raw sugar per year. Within the plantation there are over one hundred miles of railway for the company's special use. As more new machinery has been ordered from Braunschweigische Maschinen Bonanhalt, Germany, the producing capacity will be still further increased in the near future. Up to the present raw sugar has been almost exclusively imported from Java, but with the development of the raw sugar industry in Formosa it has been decided to use 250,000 bags of Formosan raw sugar for 1910, and it is expected that Formosan raw sugar will ultimately replace that from Java.

At the time of the inauguration of the company it undertook the manufacture of crystallised sugar together with sugar refining. In June, 1896, when the capital of the company was increased to Y600,000, the manufacture of rum was added. The crystallised sugar (sugar candy) is made by means of a new invention of Mr. Tozaburo Suzuki, which gives results not yet attained in Europe and America, and which is the cause of the increase in the demand in China and other countries. Besides this, alcohol is made from the molasses and is of pure quality, and in compliance with the pharmaceutical regulations. The manufacture of cube sugar was commenced in 1907. Another product of the company is moist sugar, for which the Japanese have a great liking. This variety is very palatable and is more advantageous in use for the manufacture of confectionery, having properties which cannot be obtained from the imported sugar.

The company has been granted the privilege of specially supplying its products to the Yokosuka Naval Station, and also to the Imperial Household Department, these honours greatly enhancing the credit of the company. The company was also awarded a First Class Medal at the 5th National Industrial Exhibition, in 1903, and a Silver Medal at the Tokyo Industrial Exhibition in 1907.

The present Board of Directors is composed of the following, who are all prominent members of business circles in Japan:—

President: Raita Fujiyama, Esq. Managing Directors: Nagayuki Takayama, Esq., Ryoritsu Izawa, Esq. Directors: Seki Hoshino, Esq.; Yoshikane Hamamoto, Esq.; Seizo Nakamura, Esq. Auditors: Yoshio Sashida, Esq.; Hisayoshi Ounabara, Esq.

MEIJI SEITO KABUSHIKI KAISHA

(THE MEIJI SUGAR MANUFACTURING CO., LTD.)

The promising position which Formosa occupies as a sugar producing district is fully recognised. The Formosan Sugar Manufacturing Co., Ltd. (Taiwan Seito Kabushiki Kaisha) was the first concern of the kind to be established and many others followed in its train at the period of the great business boom which occurred in Japan upon the conclusion of the Russo-Japanese war. The Meiji Sugar Manufacturing Co., Ltd., was inaugurated in December, 1906, being one of those factories installed with machinery of latest type which has continued to carry on business up to the present.

The company owns three sugar factories, namely No. 1, No. 2 and Mato. The first mentioned is located in the proximity of the main office, the No. 2 factory is situated at Saiho Matosho, Daitoro, Kagicho, and the Mato factory is in Matosho, Tainancho. The total number of hands employed, including both the clerical staff and labourers is about 260.

The work at No. 1 factory was commenced from November, 1907, and that at the No. 2 factory is expected to begin from 1910. The sugar extracting capacity per diem of the No. 1 factory is estimated at 750 tons, No. 2 factory at 1,000 tons and the Mato factory at 60 tons. Thus, if the average production of compressed sugar from the factories, excepting No. 2, be taken at 800 tons, the total amount of sugar extracted for 120 days—one sugar manufacturing term—would amount to 96,000 tons, and assuming the percentage of refined sugar per ton to be 10, the total amount of refined sugar produced would amount to 9,600 tons or 14,400,000 lbs. The above is the actual average yearly output of the company's refined sugar, but in the event of the raw materials obtainable from the sugar plantations in the locality being increased there is no doubt that the productive capacity of the concern would be considerably augmented, and this without taking into consideration the completion of work of the No. 2 factory.

The company has a line of railway in operation for the transportation of raw materials, the total length of the line at present working being about 50 miles. When the whole length of the line is completed the total mileage will amount to 100. There are eight locomotives of 15 tons weight each, 400 freight cars of 4-5 tons capacity each, which are chiefly employed in the transport of raw materials but also in general railway traffic for freight and passengers.

The sugar manufactured by the company is all sold to the sugar dealers of the main island, being intended for home consumption. As the amount of production is gradually increasing it is intended to send a part of the raw sugar to the main island to be used as raw materials for the refineries.

The present conditions of the company's business are as follows:—

Capital	Y5,000,000
Paid-up capital	Y2,750,000
Annual productive capacity	1,810 tons.
Railways	100 miles,
Fields	29,685 *ko.*
Sugar Plantations	2,526 *ko.*

The present members of the Board of Directors are as follows:—

Presiding Director: Senkichi Ogawa, Esq.
Managing Director: Hanji Soma, Esq.
Directors: Masabumi Asada, Esq.; Yoshihisa Usui, Esq.; Sumisaburo Uemura, Esq.
Auditors: Naoyoshi Yamamoto, Esq.; Baron Morimasa Takei.

TAIWAN SEITO KABUSHIKI KAISHA.

(THE FORMOSAN SUGAR MANUFACTURING CO., LTD.)

Formosa has been noted since olden times for its suitability in climate and geological

TAIWAN SUGAR COMPANY.—PLANTATION RAILWAY BRIDGE (5300 FEET) OVER THE TAMSUI RIVER

formation for the cultivation of sugar cane, and is well known as a sugar producing country. The manufacture of sugar, however, having been left entirely in the hands of the natives who knew nothing but the old primitive methods, the article produced was very inferior. Such being the state of affairs, the Formosan Government has, ever since the occupation of the island by the Japanese, been giving protection and encouragement to the development of the industry. On the other hand, in 1900, as one of the results of this encouragement, a syndicate of Japanese millionaires, including the Mitsui and Mori families, established the Formosan Sugar Manufacturing Co., Ltd., with a capital of one million yen, the object of which was the renovation of the process of sugar manufacture. The main office and the factory were established at Kyoshitosho, in Tainan, Formosa, and the manufacture of sugar by means of the latest type of machinery was commenced, the appliances being the very first of the kind ever used in the island. In order to encourage the development of the industry the Formosan Government granted a subsidy of 6% per annum on the paid-up capital, the Imperial Household Department taking up one thousand shares.

In the following year (1902) the work was commenced, and although very many difficulties were experienced at first, the business flourished, so that although the term of subsidy terminated in 1905, the concern was not only able to maintain itself, but the business was greatly expanded, the capital being increased to Y5,000,000, two new factories being erected, sugar cane plantations opened, and a special railway constructed within the company's grounds in order to facilitate the conveyance of raw materials and the manufactured sugar. Subsequently, in 1905, a new company, the Daito Sugar Manufacturing Co., was inaugurated with a capital of Y5,000,000, and with a factory at a place called Ako, which, being incorporated with the Formosan Sugar Manufacturing Co., became at once one large concern with a capital of Y10,000,000. Previous to this, several other sugar manufacturing enterprises were started, among the most important of which was the Tainan Sugar Manufacturing Co., which was established in 1904. The latter company owned a very rich sugar-cane plantation, and was also granted a subsidy from the Formosan Government. The company being in close proximity to the Formosan Sugar Manufacturing Co., it was eventually incorporated in 1909 its capital being augmented to Y12,000,000 and the business further expanded. Thus the business of the company, notwithstanding the fact that not more than ten years had elapsed since its inauguration, was greatly enlarged as the result of the enthusiastic backing of both the Government and the people, as well as by the able management of the Directors, and it is now one of the most flourishing sugar mills in Japan. In the management of the business a most conservative policy was followed, aiming at a sound and healthy development, and a certain portion of the yearly dividend being set aside for placing the foundation on a firmer basis, so that the company is at present not only one of the largest but also one of the soundest sugar manufacturing concerns in Japan.

The company owns a most rich and extensive sugar-cane plantation in the Ako and Tainan districts, the locality being noted for its fertility and being also the centre of the sugar industry. The whole area is divided into four sections, namely Ako, Kyoshito, Tainan and the Kohekirin sections. The locality is well irrigated and is best suited for the cultivation of sugar cane. The area of the plantations already under cultivation by the natives is over 7,000 *ko*, the whole of the raw material being supplied under contract to the company. The total area for the planting of sugar cane is over 76,000 *ko*, but the area planted with cane can be increased to several times the present extent as the manufacturing capacity of the company is increased. The company owns two agricultural farms, one at Kyoshito and the other at Kohekirin, as well as eight factories, and is also interested in the culture of sugar cane, having imported the best varieties from abroad. The Kyoshito agricultural farm is situated in the Kyoshito district, and has an area of 1,428 *ko*, the whole of which is planted with sugar cane, and part being irrigated by means of pumps. The Kohekirin farm is situated near the factory of the same name, and has an area of 2,989 *ko*. The plantation formerly consisted of paddy fields, the rice from which was harvested twice a year. The whole country is perfectly level and is well suited for farming on a large scale, and also has the advantage of suitability for continual cultivation, the land being very fertile and well watered. The company is at present engaged on an improved deep ploughing process with several sets of steam ploughs manufactured in England. The factories are located in eight places, and are all quite close to the port of Takao, the best harbour in the South of Formosa, the Kohekirin factory having direct communication by water with the harbour. The factory buildings are all constructed of strong iron frames, and the machinery installed is of the latest and most improved types. They have also appliances, specially suitable for Formosa, adopted in conformity with the experience gained by the company during the past few years. The following are some details of the factories:—

Factory.	Situation.	Raw Material compressing capacity per day.	Works started.
Kyoshito No. 1. Factory.	Kyoshito, Tainan.	650 tons	January, 1902.
Kyoshito No. 2. Factory.	"	450 "	January, 1908.
Kohekirin Factory.	Koshiken, Tainan,	1,000 "	December, 1908
Ako Factory.	Kiraisho, Ako,	1,200 "	November, 1908
Do.	extension.	1,600 "	Under construction.
Sharoken Factory.	Sharoken, Tainan.	1,000 "	" "
Wanri Factory.	Wanri, Tainan.	200 "	Already erected.
Alcohol Factory.	Kyoshito, Tainan.	...... "	April, 1908.
Alcohol No. 2. Factory.	At present under construction.	...... "	....

The quantity of sugar-cane which is worked at present is the above factories is enormous, the total amount of raw material compressed being 3,500 tons per day and 450,000 tons for one term extending from December to April of the following year. The output of sugar is over 50,000 tons. In the event of the extension works at Ako and the new factory at Sharoken being completed, and if worked at full load, it will not be a difficult matter to increase the output to 90,000 tons of sugar per year. In order to effect economy in freight of the raw material and the manufactured product, the company has constructed miles of railways for each factory; and has also many locomotives and hundreds of cars for transporting the cane. Telephones have also been installed. The railways are also utilised for general passenger and freight traffic, the Ako line being connected with the Formosan Government's Railway at the Kyukyokudo terminus. In regard to the Ako line, the transportation of over 300,000 piculs of rice and cereals is carried out by the line in one year, so that the income from the passenger and freight traffic is expected to form a considerable source of revenue to the company. The mileage of special railways of the company within each respective-area is as follows:—

	Total length.
Kyoshito Section	39 miles.
Kohekirin "	23 "
Ako "	135 "
Tainan "	62 "
	259

The capital, reserve fund, etc., of the company are as follows:—

Capital	Y-12,000,000
Paid-up Capital	10,402,500
Reserve Fund	1,347,300
Last Dividend	14% per annum.

Ever since its establishment, the company has been paying careful attention to the improvement of the quality of the sugar-cane in its plantations, and these efforts have been attended with success, so that at present the inferior qualities have become entirely extinct.

When the company was inaugurated it was honoured by the Imperial Household Department who subscribed for 1,000 shares. Also, in 1907, when its capital was increased the Imperial Household Department subscribed for 8,000 shares, so that at the present time the total number of shares owned by the Imperial Family amounts to 9,000. On the completion of the Trans-Formosan Government Railway in 1908 His Imperial Highness Prince Kan-in attended the function, and the company was also honoured by a visit from his Highness at the Kyoshito factory and the Kohekirin Agricultural Farm.

Chairman:—Shiro Fujita, Esq.

Managing Directors: Teijiro Yamamoto, Esq.; Tadamichi Takechi, Esq.; Taro Masuda, Esq.

Director: Tozaburo Suzuki, Esq.

Auditors: Teikiu Okamoto, Esq.; Kinzaburo Kada, Esq.

Advisors: Takashi Masuda, Esq.; R. W. Irwin, Esq.

YENSUIKO SEITO KABUSHIKI KAISHA

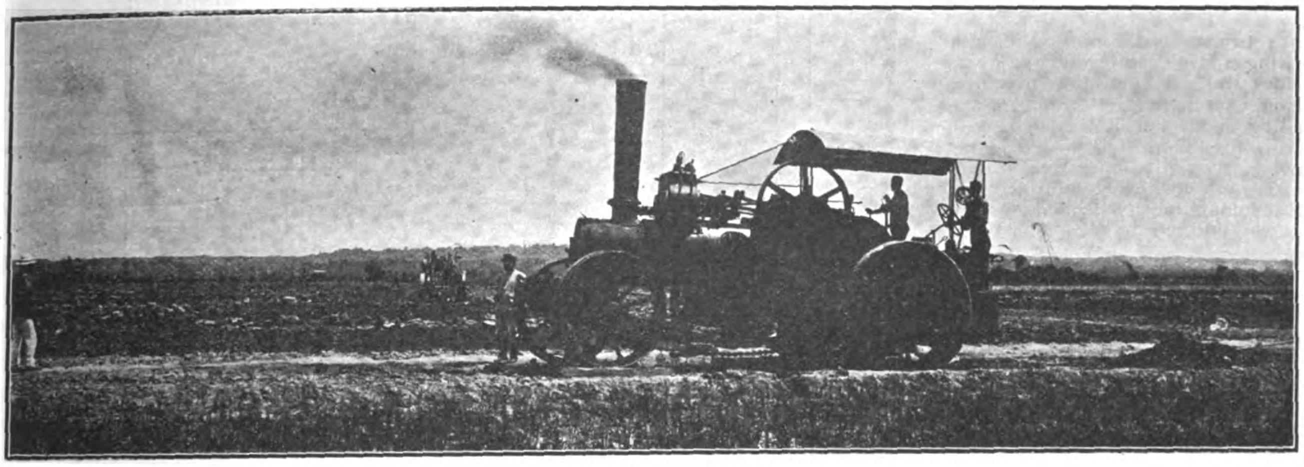
(THE YENSUIKO SUGAR MANUF CTURING CO., LTD.)

The Formosan Government-General, after the annexation of the island by Japan, adopted the policy of the protection of the sugar industry, on account of the fitness of the island for sugar-cane cultivation on the one hand, and on the other hand taking into consideration the probable demand in future for sugar. The regulations for the encouragement of the sugar industry were duly promulgated and a Provisional Sugar Administration Bureau was inaugurated in 1902, and ever since that time very careful attention has been paid to both the agricultural and manufacturing sides of the industry. In 1903, the Yensuiko Sugar Manufacturing Company was established, with a capital of Y300,000 by Mr. Osetsuno with more than 1,700 natives of the island. This concern, which was afterwards reconstructed, was the predecessor of the present company. It was in fact inaugurated on the advice of Mr. Murakami, chief of Yensuiko Administration Office at the time, at the instance of the late General Kodama, the Governor-General, and Baron Goto, Chief of the Civil Administration Bureau. Mr. Soichi Hori, chief of the Tainan Branch of the Sugar Administration Bureau, resigned his post and entered the company as chief engineer. In spite of that gentleman's strenuous and untiring efforts, the fortunes of the company fell into a very depressed condition on account of depreciation in the price of general merchandise and of sugar as the result of the Russo Japanese war, which was still raging at the time. The present managing director, Mr. Maki, joined the company as manager, and in co-operation with Mr. Hori, succeeded in readjusting its affairs, refunding the losses of the preceding term. Moreover, the products of the company gradually gaining a fair reputation in the market, business generally showed considerable improvement. Upon the conclusion of the war, great activity was experienced in industrial circles and a marked improvement was seen in the company's business. The sugar industry of Formosa was at this time attracting the attention of the people of the mother country, and the present company was established with an increased capital of Y5,000,000; it took over the entire undertakings of the former company, a great extension of business being immediately shown. As the result of the protection afforded, direct as well as indirect, by the Government-General and the able management of the company's officials, the business of the company has been very satisfactory and it is at present in a prosperous condition.

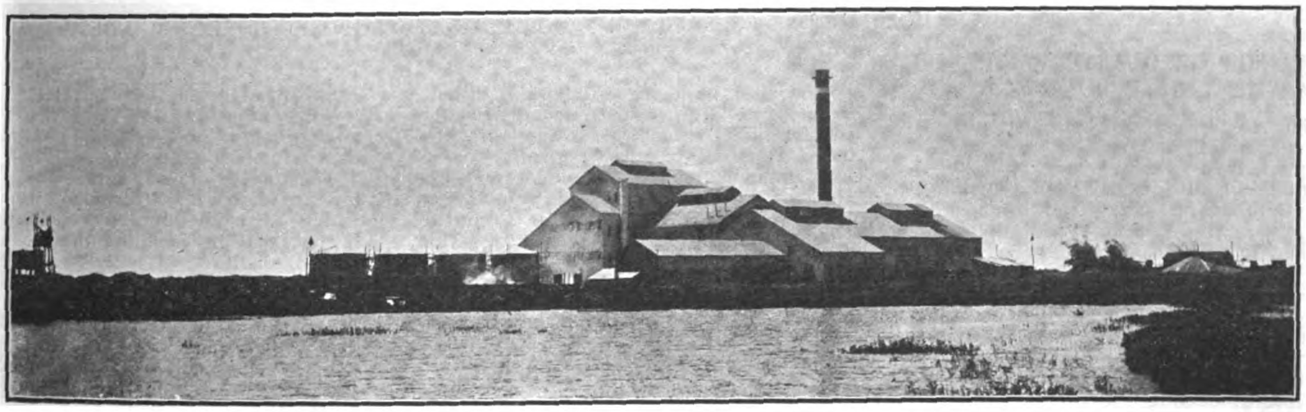
The No. 1 factory of the company, with a capacity of 350 tons per day, was extended in order to meet the increased demand, and in addition a second factory was newly set up with a capacity of 1,000 tons. The machinery installed is all of the latest type, and a special railway system has been constructed for the transportation of raw materials. The company is now entirely free from Government protection and supervision, its business being conducted on absolutely independent lines. The following figures show the present condition of the company:—

Capital	Y5,000,000
Paid-up capital	2,000,000
Capacity	1,550 tons.
Railway	66.47 miles.
Farms	33,638 *ko.*
Sugar plantations	2,616 ,,
Latest dividend	20%

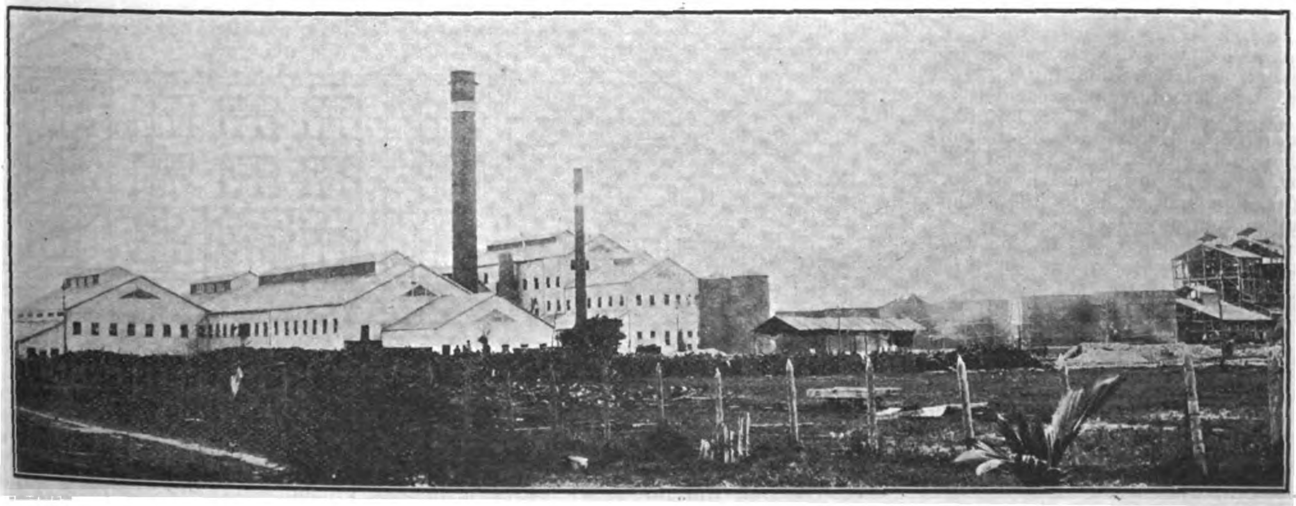
The yearly output of the company is at present about 18,000,000 lbs., which is, however, only a portion of the total producing capacity, it being possible to considerably increase the output of the factories if worked at full load. Two varieties of sugar, Refined Crystal and White, are manufactured, the brands being "ESB," "EBB," and "ESW." They are intended for the home market as well as Manchuria, Korea and Southern China. Recently, as the result of the Sugar Consumption Tax, there has been an increasing demand for the refined sugar of the company, the quality of which is in no way inferior to the same of Java, and it being held in high repute in the market. From 1910 two new varieties of white sugar manufactured by a special process originated by the company will be put on the market, branded



FOWLER STEAM CABLE PLOUGH ON THE KOHEKIRU PLANTATION OF THE TAIWAN SUGAR COMPANY



SHAROKEN MILL OF THE TAIWAN SUGAR COMPANY



REAR VIEW OF THE AKO MILL, SHOWING MOLASSES STORAGE TANKS AND DISTILLERY

YOUNG MEN'S CHRISTIAN ASSOCIATION'S NEW BUILDING IN PEKING

The contribution of $60,000 made by Mr. John Wanamaker to the International Committee of the Young Men's Christian Associations to be utilized in the construction of a large building for the headquarters of the association in Peking marks a new era in the Princeton Work in the Chinese capital. The building proposed will be a model for all future buildings of the society throughout China.

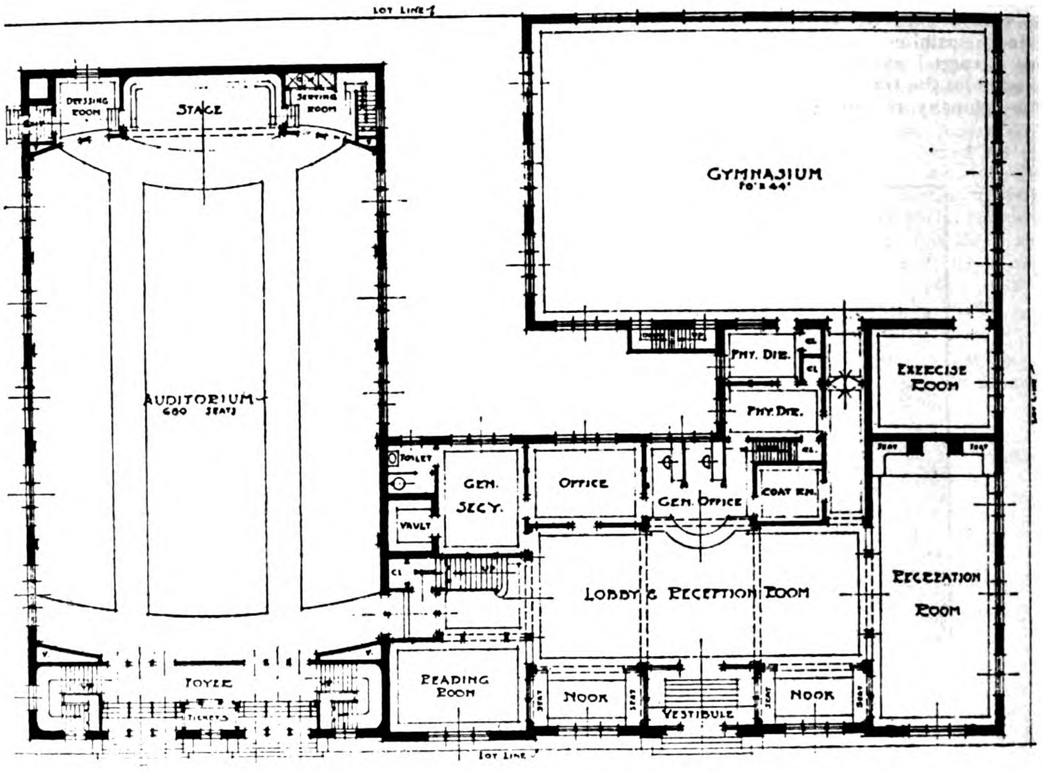
It will be a two-storey building, the main floor comprising a large auditorium and gymnasium, besides the offices of the directors, with recreation, exercise and reception rooms. A large reading room and library will also be included in the plans.

The architect who will supervise the construction is now on his way and a physical director from among recent Princeton graduates has been selected to take charge of the gymnasium.

Accompanying this sketch is a floor plan and front elevation of this new structure appearing in a recent bulletin.

The Princeton Work in Peking during the year 1910 proved very encouraging. The financial statement shows a total of receipts of $6,585.35. Liberal support was received from the Chinese and foreign residents in Peking.

A special fund for the erection of secretarial residences is being raised and out of $13,800 required $10,750 has already been contributed. It is expected that the residences will be built simultaneously with the main Y. M. C. A. Building.



MAIN FLOOR PLAN OF PROPOSED PEKING BUILDING.

NEW VESSEL FOR THE QUARTERMASTER'S DEPARTMENT OF U. S. ARMY

The Taikoo Dockyard & Engineering Co. of Hongkong have just completed a finely modelled steel twin-screw steamer built to the order of the United States Army, Quartermaster's Department. The vessel is named the "Miley" and is 140 feet overall by 26 feet beam and 13 feet 6" moulded depth, and has been built equal to the highest classification of Lloyd's Society.

The vessel has a continuous main deck, with a long shade deck, two steel masts, and is rigged as a fore and aft schooner. A powerful steam winch is fitted at the fore hatch, capable of dealing with weights up to 10 tons, while in the fore part of the vessel a capable steam warping windlass is fitted. There are two large insulated compartments in the fore hold fitted up for the carrying of fresh meat and perishable goods.

The accommodation for passengers and officers is a special feature of the vessel, the rooms being spacious and well fitted up, panelled in teak and finished in glossed white. The saloon is handsomely finished in polished teak, light brown leather cushions and curtains to match. Special bathrooms, fitted with showers, have been installed for passengers, officers, crew and soldiers.

Triple-expansion engines of the builders' own make, and two boilers, capable of driving the vessel at a speed of 12 knots, have been fitted. Alley and McLellan's patent steam steering gear has also been installed.

The vessel is lighted throughout by electricity, and has a powerful searchlight fitted over the wheel house.

On the trial trip the vessel easily maintained her guaranteed speed, the engines and auxiliaries working very smoothly.

"(Daihaku) A" and "(Daihaku) B," and raw material for sugar refining will also be sold, this being intended for refineries on the main island. The immediate prospects of the company, therefore, are very promising.

The total number of employees and labourers is over 400, of which 148 are Japanese and 258 Formosans. Houses are allotted to each of them, and a club house is provided for their recreation during leisure hours. A system of pensions is in vogue for those who retire from the company's service, a certain part of the profits being set apart for the pension fund, this being a special feature of the company's organization.

The present members of the Board of Directors are as follows, the Directors being all actively engaged in the thorough development of the company's business. Although the company may not be in point of magnitude so extensive as some, the great merit of its having been able to produce goods of the best quality and serving as a model for other concerns should not be overlooked:—

President: Taiji Arai, Esq.

Managing Director: Tetsu Maki, Esq.

Directors: Soichi Hori, Esq.; Shidzuo Sakai, Esq ; Saburosuke Fujisaki, Esq.; Tatsuji Ando, Esq.

Auditors: Sojuro Iwasaki, Esq.; Susumu Murakami, Esq.; Kobei Abe, Esq.; Ryu Shin Gaku, Esq.

Chief Engineer: Yuji Okada, Esq.

FRONT ELEVATION, Y. M. C. A. BUILDING AT PEKING

LARGE CONTRACT SECURED BY MESSRS J. G. WHITE & CO.

The Augusta Railway & Electric Company and the Augusta Aiken Railway Company of Augusta, Georgia, have arranged for the following extensions and improvements to their power houses and systems: Estimated cost, approximately $500,000.

The power house extension is planned for two 2,500 K. W. steam turbines, one of which, with the necessary boilers and auxiliaries, will be installed this year. A seven and one-half (7-½) mile transmission line will be built from the power house in Augusta to the power house of the Augusta-Aiken Railway Company near Clearwater, S. C., and a 500 K. W. motor generator set will be installed at this point, and a 300 K. W. set in the present substation near Aiken.

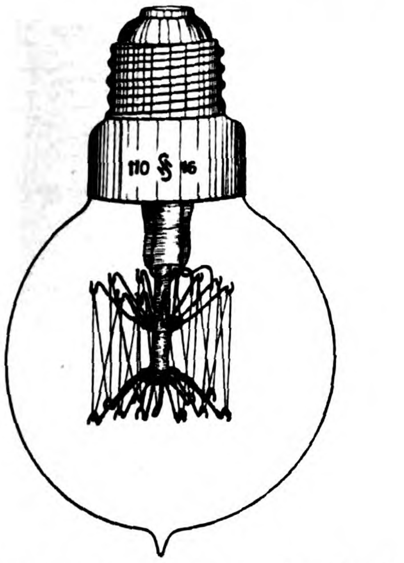
Under an arrangement with the City, the wires in the City of Augusta will be placed underground on three of the principal streets, involving the laying of about three (3) miles of conduits. In connection with this underground work, the Company will also install ornamental poles on Broad Street, Augusta, for carrying its trolley wires and feeders and also clusters of tungsten lamps for street lighting. An extension of about one mile of single track will be made and the reconstruction of a large amount of the present tracks is planned.

The contract for the above work has been

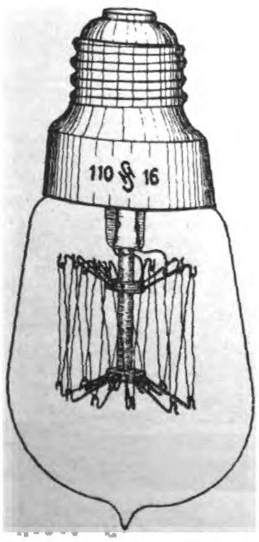
awarded to J. G. White & Co., Engineers and Contractors, 43 Exchange Place, New York.

TANTALUM RAILWAY LAMP TESTS

An investigation has been carried out by the Chicago Railways Company in regard to "Tantalum" lamps, the object being to ascertain the proper allowance for renewals, energy, economy and correct voltage rating of lamps for street car service. Attention was paid to the current consumption of various types of lamps under actual running conditions. It was shown that in the case



of a car burning 25 16 c.p. "Tantalum" lamps, as compared with a similar equipment of carbon lamps, there was a saving of 1,301 kw.-hours in energy on the basis of 1,800 hours lamp burning a year, while a test extending over 600 car-months showed the renewals of carbon-lamps to be 4,269 per car-month and of "Tantalum" lamps 2.21 per car-month. The "Electric Railway Journal", in analysing the results, shows that there was an average saving of 2.5d per car-day on the basis of 1,800 hours of illumination per car-year, and that when "Tantalum" lamps have been installed in all the cars operated by the company there will be a saving of about £5,000 a year. The higher cost of "Tantalum" lamps over carbon lamps is claimed to be balanced at the end of the first year by the longer life of the metal filament. The saving in the current consumption is important in the case of the Chicago Railways, as the Company purchase the power and pay a premium on peak loads.



Development of Visayan Trade and Industries

Philippine trade reports during the last two years show a very remarkable increase in volume both in imports and exports due largely to the operation of the Payne Bill, and from present indications the percentages of increase annually will continue. The total value of imports during the fiscal year 1910, according to customs reports, was $37,061,925, U. S. C., as against $27,794,482 in 1909, and the exports for 1910 were valued at $39,886,852, U. S. C., as against $31,044,158 in 1909. The total volume of trade for 1910 amounted to $76,948,777, U. S. C., as against $59,038,940 in 1909, a gain of $17,909,537. While the bulk of the trade is controlled by Manila, the ports of Iloilo and Cebu in the Visayas are moving rapidly to the fore. In 1909 Iloilo imported goods to the value of $2,106,685 and exported to the value of $3,267,310 a total volume of trade for that fiscal year of $5,374,995. In 1910 Iloilo imported to the value of $2,286,285 and exported the same year $5,413,020, a total volume of trade valued at $7,699,305, an increase in one year of $2,314,310. In 1909 Cebu imported goods to the value of $2,232,619 and exported to the value of $5,678,523 making a total volume of trade of $7,911,242. In 1910 Cebu imported $2,730,379 worth of goods and exported $6,922,169 making a total volume for the year of $9,152,548, or an increase over the previous year of $1,241,304.

During the current fiscal year the increase in trade continues. For the nine months ended March 31, 1911, Iloilo's total volume of trade was $6,821,416 as against $5,583,205 for the corresponding nine months of the fiscal year 1910, an increase of $1,238,211. When it is understood that the greater portion of sugar crop was held in Iloilo storehouses until after March 31, the figures denoting increase over the previous term fall short of the truth.

The same may be said of Cebu. During the nine months ended March 31, 1911, the total volume of trade reached $8,095,854 as against $6,937,295 during the corresponding period in the fiscal year 1910, an increase of $1,158,559.

In both ports there is every evidence that the returns for the fiscal year will show a much greater percentage of increase over the previous year than any other annual return.

While the Payne Bill may well be credited with giving Iloilo a market for its sugar and thus increased the purchasing power of Negros and Panay, another influence has been steadily working for the last two years with the object in view of making it possible for the farmers and businessmen to participate in the phenomenal prosperity that has come to the Visayas. Without transportation facilities, large tracts of rich agricultural lands remained unproductive and all the Payne Bills that might be enacted would not induce the farmer to invade these lands unless he were assured that it were possible to get his products to market.

We refer to the operations of the Philippine Railway Company in Panay and Cebu. When this company undertook to construct modern lines of railway in these two Islands, its officials were not sanguine of immediate success. They realized, as did the pioneer railway lines that invaded America's great west, that the uncultivated country traversed must be settled up and returns in products for industry realized before there could be hope for carrier dividends. The Philippine Railway Co. had, however, the advantage over the American lines, in that they had the benefit of the latter's experience, and were able to proceed to the encouragement of native settlers along the line of railway in an intelligent, effective manner. The company did not expect that there would be a net revenue over and above all charges fixed or otherwise within ten years and the officials proceeded to inaugurate a constructive policy along their lines that has brought returns anticipating expectations by more than five years.

In Cebu the company investigated the soil conditions and proceeded to encourage the planting of maguey. In this work the Philippine Agricultural Bureau gave every assistance. The farmers were instructed and encouraged in producing the best quality of plant and the company placed at their disposal a stripping machine free of charge at the different stations and sidings along the line to demonstrate the advantages of modern machinery. The result has been very satisfactory. Large areas heretofore unproductive were planted in maguey and last year's export returns show an export of this product alone amounting to $231,688 U. S. C.

In the Island of Panay the Company has established an experimental farm at Passi, a point on the railway almost in the center of the great fertile valley traversed.

The adaptability of the soil and climate to successful cultivation of tobacco and bush cotton was here demonstrated and while these industries are in their infancy, there is growing interest among the Filipinos in watching their development.

Active investigation and experimentation on this farm is continual. The latest innovation is the introduction of California grapes, oranges, and lemons and instruction as to the best methods of cultivation. Other fruits will be introduced to supersede the wild uncultivated product of the islands, and with such encouragement and assistance as the railway is now giving the natives, Manila may soon expect to realize a fruit supply of superior quality from Panay.

It must be remembered that the territory traversed by the railway was all virgin land, with the exception of a small fringe here and there in the vicinity of the coast and small rivers where markets were available by water transportation. As the construction of the railway proceeded, these lands were rapidly taken up, and from the evidence available of successful effort during the last two years it is only a matter of a few years more when this valley will represent the greater part of the agricultural wealth of Panay. As for instance, the output of tobacco this season was five times as great as ever before and the sugar increased 300%. The area of rice planted was largely increased and with the advance of the railway two modern rice mills were installed on this new agricultural reclamation. The same may be said of the corn crop.

All this was no easy task. It required great tact and considerate dealing with the Filipinos. It took time to win their confidence and patience and perseverance to keep it, but once the benefits of modern methods of cultivation and better facilities for transportations were realized, it was easy sailing.

And the company is already reaping a substantial benefit. The estimated period to elapse before dividends may be expected has almost been cut in two, and there are those more optimistic. When it is realized that the lines both in Cebu and Iloilo were constructed largely through virgin areas and those cultivated, inhabited by natives whose agricultural methods were no improvement on those of the ancient Egyptians, the progress made has been phenomenal.

The line in Cebu went into commercial operation on July 1, 1909, and it has already developed its carrying revenue to a point where it now covers operating expenses and there is a fair sum available to apply to interest on bonds. For the period ended March 31, 1911, the net operating revenue increased over 100% over the corresponding term for 1910. For the month of March, 1911, alone, the increase over the corresponding period, 1910, was over 50%.

In Panay for the period ended March 31, 1911, the total increase in traffic earnings was over 100%. When it is remembered that this line is not yet in commercial operation and that only the minimum of development along this railway has been accomplished, this enormous increase is remarkable. Indeed, there is every reason to believe that when the line is once

operating commercially, it will not only pay all the operating expense, but immediately make an impression on the interest on bonds. As a compliment to the promoters of this enterprise and to the Philippine Government who gave it encouragement, even the most pessimistic are beginning to realize that the Visayan railway lines will prove a most advantageous investment, and at the same time encourage many blades of grass to grow where none grew previously in those fertile islands, bringing to the inhabitants an area of prosperity of which they never dared even dream.

REVIEWS

Drop Forging, Die Sinking and Machine Forming of Steel—by Joseph V. Woodworth and issued from the presses of The Norman W. Henley Publishing Co., New York. Price $2.50.

This is a practical treatise on the hot and cold machine forming of steel and iron into finished shapes and comprises much valuable practical information having reference to the tools, dies and machinery used in the manufacture of duplicate forgings and interchangeable hot and cold pressed parts from bar and sheet metal.

"*It Tickled Him*," by George Hoyt Allen. This unique volume contains in narrative form a review of the author's experiences during a trip round the world in the humorist's best vein. Mr. Allen was discovered by *La Follette's Weekly* and was sent by that periodical to gather impressions for the magazine in many climes. Included in this work are the author's experiences in all the ports of the Far East so that the book may give a few hours entertainment to the residents of those cities to see themselves through the kindly specs of Mr. Allen.

Cement Age and Concrete Engineering Consolidated.—Cement manufacturers, architects, engineers and contractors will be interested in the announcement that *Cement Age*, of New York, and *Concrete Engineering*, of Cleveland, two of the leading monthly publications in the cement field, have been consolidated. *Cement Age*, which was established in 1904, has been issued under the editorship of Mr. Robert W. Lesley, Vice-President of the American Society for Testing Materials, and an Associate of the American Society of Civil Engineers, who is also one of the most prominent figures in the cement industry in this country. *Cement Age* has covered the popular features of cement construction, as well as the engineering and manufacturing side of the industry, and *Concrete Engineering* has been especially devoted to that branch of the industry indicated by its title. Beginning whith the January 1911 issue, the two magazines will be consolidated under the title: "*Cement Age* with which is combined *Concrete Engineering*". The magazine will be slightly larger than the present size of *Cement Age*, and will have a type page 6 × 9 inches, thus retaining the distinctive magazine form which has been a popular feature of the older publication.

From Will Irwin's "The Awakening of the American Business Man" in the April Century.

Correlative with this task system, an outgrowth of it, is the scientific selection of men. That few make their choice of vocation from natural bent is an axiom of economics. Born artists there are, born mechanics, born sailors, born builders; these few are driven by something within them to their best lines of endeavor. The rest are pawns of destiny. The average bricklayer, for example, is a bricklayer because that was his father's trade, because friends of the family offered him a good position as an apprentice, or because, when he first plunged into the world, he happened to find work on a new building. No one, he least of all, has taken natural ability much into account. Yet so subtly are men differentiated, and so wide are the processes of industry, that almost every man has his special task in the world, could he but find it.

The Vulcan Shipyard at Hamburg

The branch establishment of the "Vulcan" Shipyard and Engine Works, of Stettin-Bredow, commenced operations about the middle of 1909. The number of the large Hamburg Shipyards was thereby increased by a very prominent concern, and it will, perhaps, interest the reader to learn something about this important establishment and the main yard at Bredow.

In 1851, when the first steps were taken in Germany to build iron steamers and sailing ships, two enterprising citizens of Hamburg—Franz Dietrich Früchtenicht and Franz Wilhelm Brock—established at the village of Bredow near Stettin a small shipyard under the firm of Früchtenicht & Brock. Their business was so successful that already, six years later, the concern has been turned into a joint stock company—the Stettiner Maschinenbau-Actiengesellschaft Vulcan. As a result of the continuous energetic management, and owing to the introduction of locomotive engineering, the works had to be steadily enlarged. Nevertheless, the fact that the German shipbuilding industry was as yet dependent on England with respect to the supply of building materials, auxiliary appliances and fittings, still hampered to a certain extent the free development of this industry. It was not until the German iron and steel industry undertook the production of the half-manufactured and ready-made articles required by the shipbuilder, that a thorough revolution set in and enabled the German shipyards to develop into shipyards and engine works on a grand scale and fully

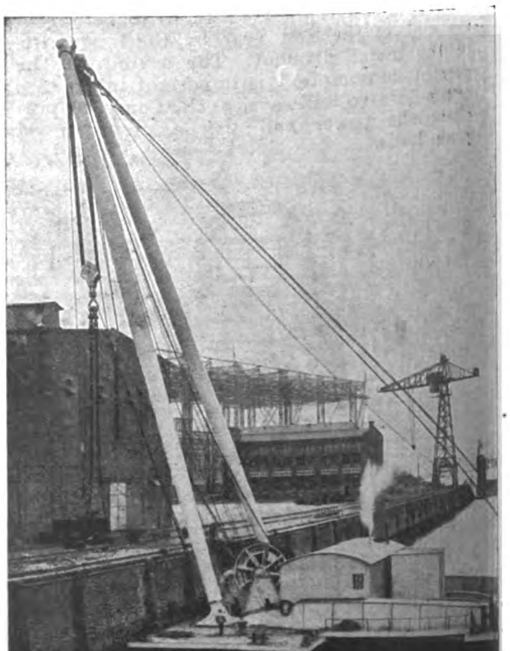
VISIT OF H. I. H. PRINCE TSAI HSUN TO THE VULCAN SHIPYARD

The Manila Times Second Annual Edition, edited by Eleanor Franklin Egan and issued from the presses of the Times Publishing Co. of Manila is one of the most strikingly comprehensive illustrated special editions yet published devoted exclusively to the potentialities of the Philippines. The number if profusely illustrated with reproductions os photographs of scenes in the Philippines portraying native life and customs and presenting in attractive form the natural beauties of America's Farthest Frontier.

The extensive developments of public works, the opening of railways, together with the impetus given native industries by the liberal policy of the American Government is splendidly set forth. Typographically, the issue is a credit to the publishers and compares favor ably with the most modern pictorial magazine of the day.

The number has been widely circulated and will certainly aid greatly in directing more favorable attention to the islands and serve in large measure to remove much of the prejudice that only total ignorance of the rich promise to industry and well directed effort for which the islands stand, makes possible.

Among the leading articles are "The New Philippines" by Martin Egan; "Change in Trade Channels" by Col. H. B. McCoy; "The March of Empire Westward to the East," by Harold M. Pitt; "Progress of Scientific Research" by Dr. W. E. Musgrave; "Medical Education in the Philippines," by Dr. Paul C. Freer; "The Philippine General Hospital", by Dr. John R. McDill; "Medieval and Modern Manila," by Lewis Harsant; "Education in the Philippines," by Frank R. White, and many other articles covering the industries and resources of America's richest insular possession.



FLOATING CRANE AT THE VULCAN SHIPYARD

equal to the English yards. Among the German shipyards the "Vulcan" to-day holds a leading place. Since its establishment the Company turned out over 300 ships and more than 2500 locomotives for Germany and abroad, besides numerous lighters, dredges, floating cranes, pontoons, dock gates, stationary engines, turbines and boilers.

Among the constructions for the German mercantile marine, it is especially the express steamers and imperial mail steamers—besides the freight and passenger steamers—which have produced for the "Vulcan" its prominent position in the shipbuilding industry of the world. World-famed among these masterpieces of naval engineering are the express steamers "Kaiser Wilhelm der Grosse," "Kronprinz Wilhelm," "Kaiser Wilhelm II" "Kronprinzessin Cecile," and the twin-screw freight and passenger steamer "George Washington" (the largest of the German mercantile fleet, displacement 35,850 tons) all built for the Norddeutscher Lloyd, of Bremen. The "George Washington" represents quite a new type of steamer. Typical among the ships built for the Hamburg-American Line are the express steamer "Deutschland," the "Kaiserin Auguste Victoria" and the turbine steamer "Kaiser."

The achievements of the "Vulcan" in the construction of men-of-war have met with the entire approval of the German Emperor and the Naval Office. The company built for the German Navy.

9 battleships, among them H.M.S. "Mecklenburg," "Preussen," "Pommern" and "Rheinland."

5 protected cruisers.

6 second class cruisers, among them the "Hamburg," the "Lubeck," the "Stettin" and the "Mainz."

The latter three are fitted with turbines. Besides these vessels the "Vulcan" turned out a number of special type ships, among them H. M. Yacht "Hohenzollern."

Very successful was of late another branch of the Company's works, viz: the torpedo boat yard, where more than 25 torpedo boats—all fitted with A.E.G. turbines—were built for the German Navy. Of these, "V. 164" made the highest speed record hitherto attained, viz: 34.5 knots. But these home orders were not the only ones; the "Vulcan" true to its motto: "My field is the wide world," secured orders also from foreign navies and built numerous men-of-war of various types—from the heavy battleships to the swift, graceful torpedo boats—for Russia, Greece, Japan, China, Brazil, and Uruguay.

In due consideration of the progress made with the turbine system the "Vulcan" gave special attention to its construction, and the results obtained with turbines for the Navy and the mercantile marine are truly remarkable.

The launching conditions on the river Oder and the Baltic coast not being favourable for very large ships, the "Vulcan" company decided to establish a branch shipyard on the North Sea. After many preliminaries Hamburg was decided upon, as the conditions there were the most favorable as regards launching space and building sites. Negotiations with the Senate of Hamburg made it apparent that the authorities at Hamburg themselves expected a considerable profit from the opening of a branch shipyard of a company whose reputation was well established all over the world, and as the Hamburg Burghership was of like opinion, the contract was readily concluded.

The work of laying out and building the shipyard and the offices was undertaken with all possible speed, so that within less than three years the whole concern—the towering frameworks of the building slips of which are a typical feature of Hamburg Harbour—was completed and ready for operation.

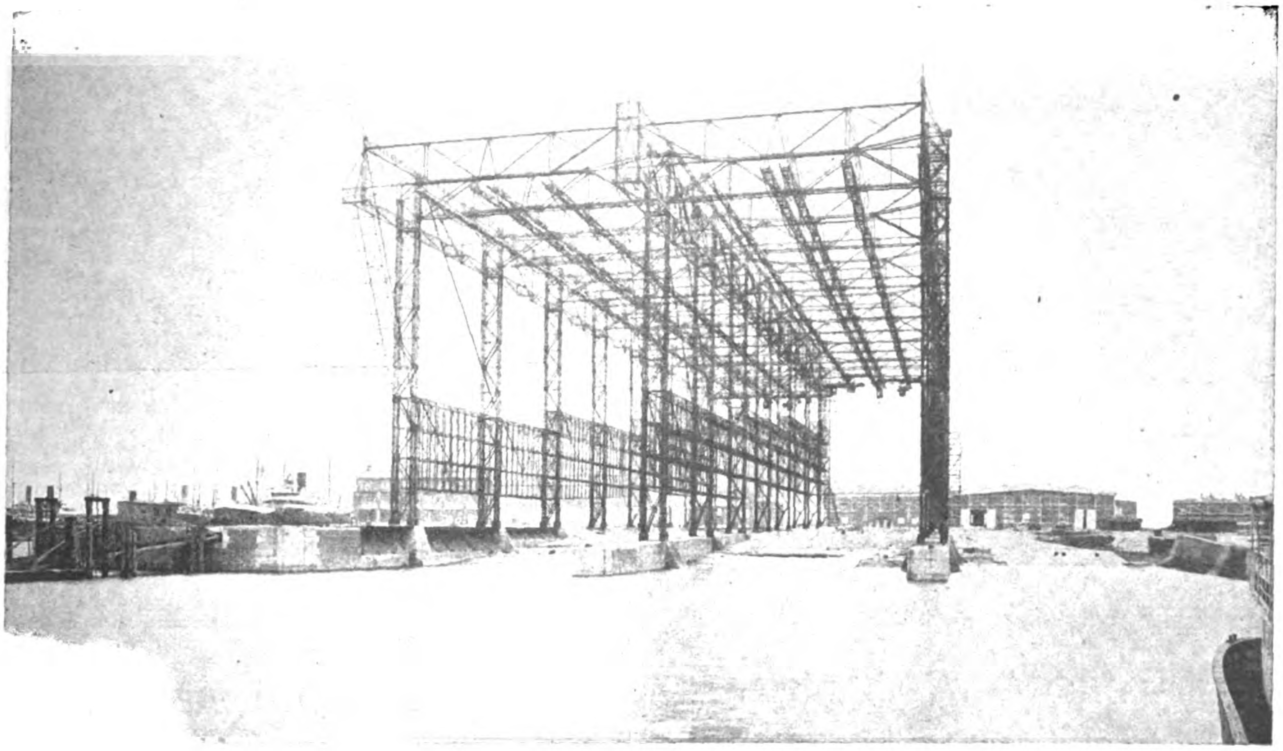
On entering the main gate of the shipyard—which covers an area of 232,000 square metres and is intersected by normal gauge railway tracks—the visitor passes through the angle-bar and frame forge, the riggers' and carpenters' shops, the joiners' shops and the saw mill to the four gigantic building slips, all fitted with cranes, where ships of up to 1000 feet width can be constructed. From the building slips one passes through a workshop of 8,250 sq. metres floor space, containing the furnaces and the drawing loft, to the shipbuilding shop, the platestacks, covering an area of 10,000 sq. metres and fitted with a huge iron scaffolding on which run cranes, by which the material arriving by railway is rapidly conveyed to the adjoining workshops.

At the boiler forge and the copper smithy, as well as at the hammer forge, the painters' shop and the rivet store, in the engine workshops as well as at the electric central power station, everything is arranged according to the very latest methods. Especially up-to-date is the vast new hall for the construction of high power turbines, with adjoining power station, where the turbine plant for the battleship "Ersatz Heindall" is under construction. All workshops are fitted with electric travelling cranes and with all those appliances that ingenious engineers have devised for rational and cheap working.

The floating docks, immediately adjoining the shipyard, are fitted with perfectly independent power stations and are able to lift ships weighing up to 11,000 tons. The docks, too, are equipped with the most up-to-date mechanical appliances.

With a view to rapid and safe working, floating cranes and, on the quays, travelling tower cranes are available.

It is desirable that the Vulcan branch works at Hamburg should develop as favorably as the mother works at Stettin, and the



SHIPBUILDING SLIPS, VULCAN SHIPYARD

Company considered it a good omen that H. M. the German Emperor on the occasion of the opening of the new shipyard on June 21st, 1909, sent the following message to the president of the board of trustees:—

"On returning from an inspection of "the new Vulcan Yard, which magnifi-"cent and model establishment has given "me great pleasure, I express to you "and the Vulcan Company my most cor-"dial congratulation upon the brilliant "success of the enterprise. I doubt not "that the new shipyard will justify the "good reputation of the Stettin Vulcan's "capability by further remarkable con-"structions, and propagate it in the in-"terest of German shipbuilding and to the "satisfaction of your well-disposed

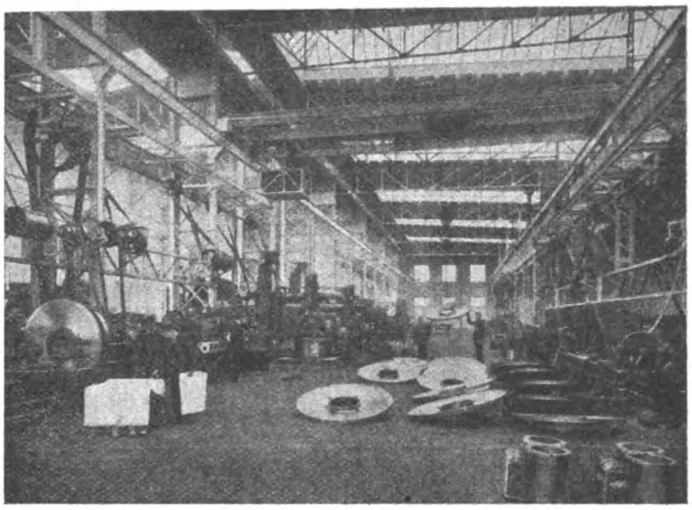
Wilhelm I. R."

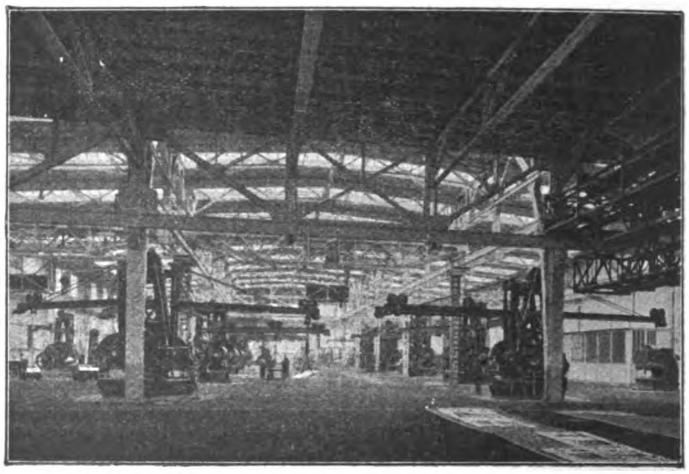
The beginning is made. The ships at the quays and in the docks promise a good progress of the repairing business.

Amidst a veritable forest of scaffoldings the outlines of the battleship "Heimdall," an order from the German Imperial Navy, are already recognizable whilst on the largest of the building slips the keel is being laid for a leviathan freight and passenger turbine steamer, the construction of which puts the capability of the young enterprise to a severe test, while at the same time it is a proof of the confidence placed in the ability of the shipyard.

Meanwhile the construction of the great dock, built by the company itself, is making good progress.

The number of workmen is expected soon to exceed 3000, and more hands will be required. In consideration of this, a company has been established for the purpose of building healthy cottages for the workmen at the neighbouring village of Neuhof, so that the men employed at the "Vulcan" yard will have comfortable homesteads in close proximity to their place of work.





"THE FLYING FISH". A COMBINATION OF MOTOR BOAT AND AEROPLANE

About six months ago the idea was conceived in the shop of the Michigan Steel Boat Company, 1250-1500 Jefferson Ave., Detroit, Mich., of building a combined motor boat and aeroplane. In the beginning very little was thought of the idea and nobody ever dreamed of this craft becoming a commercial success, but so practical does the invention appear that A. A. Schantz, President of the D. & C. Aerial Navigation Company, has given a tentative order for six of them to be used in service between Detroit, Cleveland, and Buffalo.

"The Flying Fish" is the practical use of the flying machine. Some few weeks ago the first working model was taken out on the River above Belle Isle and skimmed over the ice scarcely touching it at a speed of sixty-five miles an hour. This was with a less powerful engine than that which the second "Flying Fish" is equipped and which was recently exhibited at the National Motor Boat Show in Madison Square Garden, New York City.

The hull of the "Flying Fish" is a water tight steel and aluminum tank 5′7″ wide, 7′2″ long and 2′ deep. The bow end is slanted but all other angles are 90 degrees.

In this is set an 8 cylinder aeroplane engine, the only 8 cylinder aeroplane engine in the world. It is a model of compactness but belying its size, it eats up gasoline at a great rate and whirls the propeller at terrific speed.

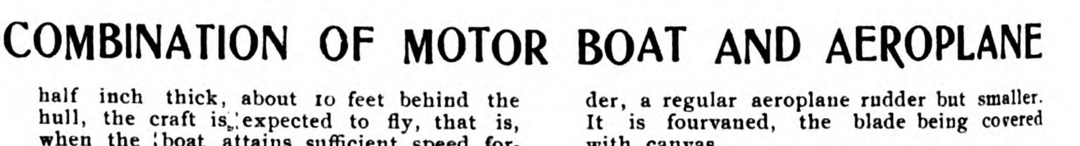
Above the hull is a single plane 26 feet from tip to tip and 6½ feet wide. The frame is covered with oil soaked canvas, khaki in color. It is convex.

Extending behind the hull for the world like the handles of a baby buggy, except that the arms are steel and the wooden cross piece is a foot wide, is the tail, and this flat board 5′7″ long, a foot wide and one-half inch thick, about 10 feet behind the hull, the craft is expected to fly, that is, when the boat attains sufficient speed forward, the plane is expected to lift the hull out of the water entirely, only the "tail feathers" touching the surface. As the speed increases it is believed that the "Flying Fish" will rise from the water entirely and leap over the top of the waves, the "tail feathers" touching at intervals and steadying the mad flight.

Also extending behind the hull is the rudder, a regular aeroplane rudder but smaller. It is fourvaned, the blade being covered with canvas.

At the foot of the hull is the propeller, a double blade of wood over 6 feet from tip to tip.

In the rear of the hull is the cock pit into which the feet of the skipper extend as he sits on the caned back chair. Immediately in front of him are the two levers, one controls the rudder, the other warps the single plane which combats the air currents.



THE FLYING FISH.

STEEL WIRE CONCRETE REINFORCEMENT

The Broadening Uses of Woven Fabric in Various Forms of Granolithic Construction

Starting from the coincidental receipt of unusually heavy orders for fencing wire from two widely separated sections of the country, which upon investigation disclosed a new use of the material, there has grown in recent years the wide use of woven wire fabric in reinforcing concrete construction, says the *Iron Trade Review*. This branch of the wire business is now extending broadly in different directions and some very interesting applications are now being made with very satisfactory results.

THE BEGINNING OF AN INDUSTRY

The credit for the use of woven wire fabric as a reinforcement belongs to a number of widely separated contractors. As early as 1904 the American Steel & Wire Co., which is now producing the triangle mesh reinforcement, received its first intimation that its "Ellwood" fencing was not only being used for fence purposes, but was also being bought by contractors to reinforce concrete. Comparatively large sales made in western New York and southern California attracted attention and developed, upon investigation, a broader use of their product than the manufacturers themselves had at that time anticipated. For a number of years prior to this time, the fence had been upon the market as one of its standard products. The Ellwood fence machines were the inventions of the late Isaac L. Ellwood and the material was manufactured by him and his immediate successor, the American Steel & Wire Co., of Illinois, until its manufacture reached a large tonnage. Among the companies later amalgamated with the American Steel & Wire Co. was the Consolidated Steel & Wire Co., which controlled the sale of what is known as the "American" fence, a square mesh fabric. When the possibilities of the Ellwood fence, or the diamond mesh fabric, for concrete purposes was grasped, means for improving the product for reinforcement were immediately sought.

IMPROVING THE DESIGN

It was found that the objections to the use of fence fabric for reinforcing concrete were two fold. In the first place, woven wire fencing designed for farm usage in the enclosing of live stock is ordinarily manufactured with close meshes at the bottom and the spaces are gradually increased towards the top. This was manifestly wrong for concrete construction, as to insure a perfect distribution of the strain the tension members must be uniformly spaced and must be of absolutely uniform strength, while in fencing the regular grade of market wire serves the purpose admirably.

After considerable experiment, F. H. Daniels, chief engineer of the American Steel & Wire Co., effected an improvement on the Ellwood fence machines, which would enable them to make a generally acceptable reinforcement fabric, and which was put on the market by the American Steel & Wire Co., in the spring of 1907 and is now recognized as a standard building material.

The triangle mesh steel woven wire reinforcement is made with both single and stranded longitudinal or tension members. Both kinds are illustrated in Figs. 1 and 2. That with the single wire longitudinal is made with one wire varying in size from a No. 12 gage up to and including a one-half inch diameter and that with the stranded longitudinal is composed of two or three wires varying from No. 12 gage up to and including No. 4 wires stranded or twisted together with a long lay. These longitudinals, either single or stranded, are invariably spaced 4 inch centers, the sizes being varied in order to obtain the desired cross sectional area of steel per foot of width. The transverse or diagonal cross wires are woven between the longitudinals so as to form triangles, thereby lending additional carrying strength to the longitudinal or tension members and positively spacing them to provide a more perfect distribution of the steel. These diagonal or transverse wires are woven either 2 or 4 inches apart. A hinge joint is provided on each longitudinal which enables this reinforcement to be folded longitudinally in any desired shape, making it adaptable to all kinds of concrete construction. Its design provides a perfect mechanical bond between the steel and the concrete and since it is not galvanized unless so ordered, the maximum adhesive bond is developed. A sufficient area of section is provided in the cross wires to prevent temperature cracks, thereby eliminating the necessity of laying additional reinforcement at right angles to the longitudinal or tension members.

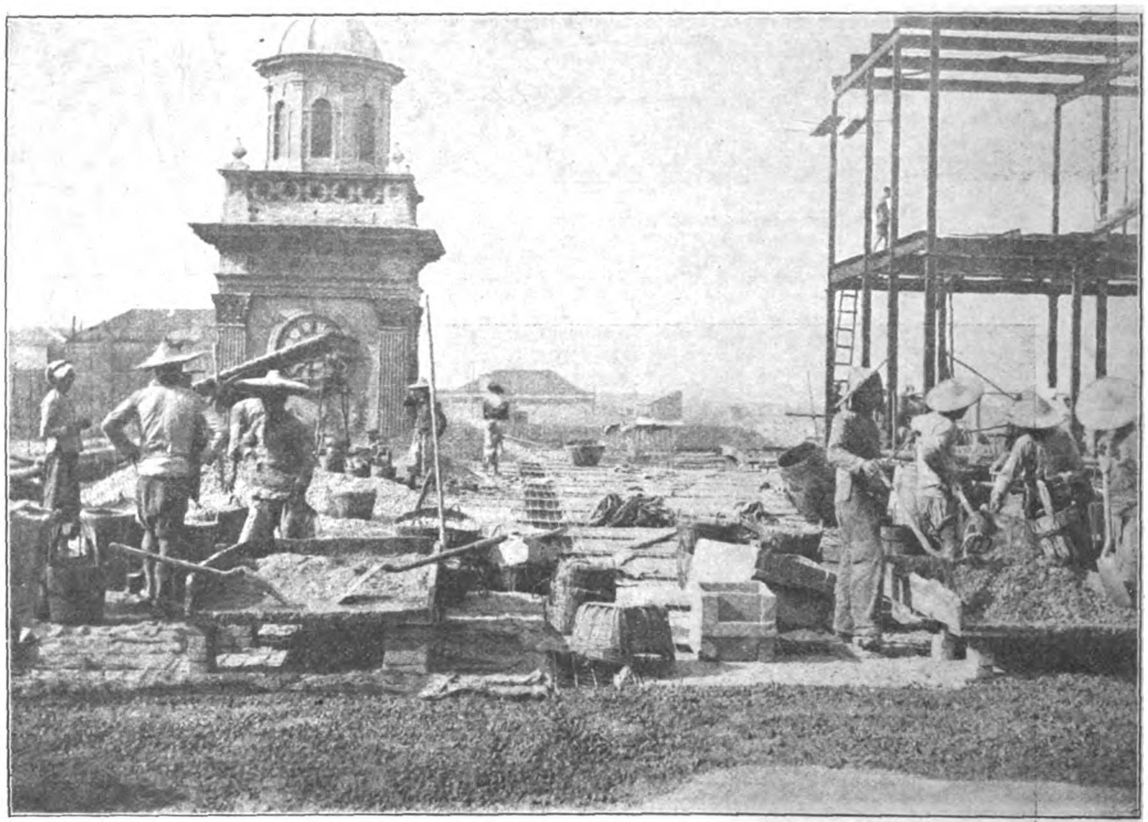


FIG 1—LAYING TRIANGLE MESH REINFORCEMENT, HONGKONG HOTEL ROOF

THE FLYING FISH.—Continued

The weight of this craft is 750 pounds.

Both for sport and business purposes the new air boat is expected to be at once popular. With its great speed it will surpass any boat that is forced to depend entirely on the water for sustaining the hull.

There is less danger of it tipping than in any ordinary boat for the plane will act as a preventive. In our boat the passenger will have all the sensations of flying, the rush of speed through the air and there will be something more substantial than air beneath should anything go wrong. The air is a pretty thin cushion to land on. Even should the boat be entirely out of the water and the engine failed, there would be merely a drop of a few feet in a nonsinkable, perfectly balanced and safe hull.

"The Flying Fish" is not expected to fly at any length or height, except as a rush of air catches the plane and lifts her up 8 or 10 feet for a short distance. The tail piece will be always in the water sustaining her in steady flight. The tail piece will offer no resistance to the rudder. There will be nothing else to offer any resistance, except the insignificant front surface of the craft, so what is there to prevent great speed?

With the first machine we made 65 miles an hour over the ice. The tail piece skimmed the ice every fifteen feet or so. There was no jar as we touched the surface, the sailing was perfectly smooth.

We believe the "Flying Fish" can be launched in ordinarily smooth water and while in flight will not be bothered by heavy waves. Aeroplanes nowadays fly in heavy winds and we believe "The Flying Fish" and her successors can do at least as well.

The present model is small with only accommodations for one person, but with a little larger craft passengers can be accommodated.

A. A. Schantz, who has worked out a plan for a system of dispatch boats between Cleveland, Buffalo, and Detroit, is enthusiastic over the aerial motor boat. It was his original plan to have a fleet of six airships for emergency service between the three cities and possibly with the bigger boats of the D. & C. fleet, the airships to be capable of carrying one or more passengers, but the new style motor boat has all the qualifications of speed and adaptability and he believes a far greater element of stability. People who would fear to use the aeroplane in its present undeveloped state would trust themselves to the aerial motor boat he believes.

However, the aeroplane companies will be given every chance to make good in competition with the air-water craft.

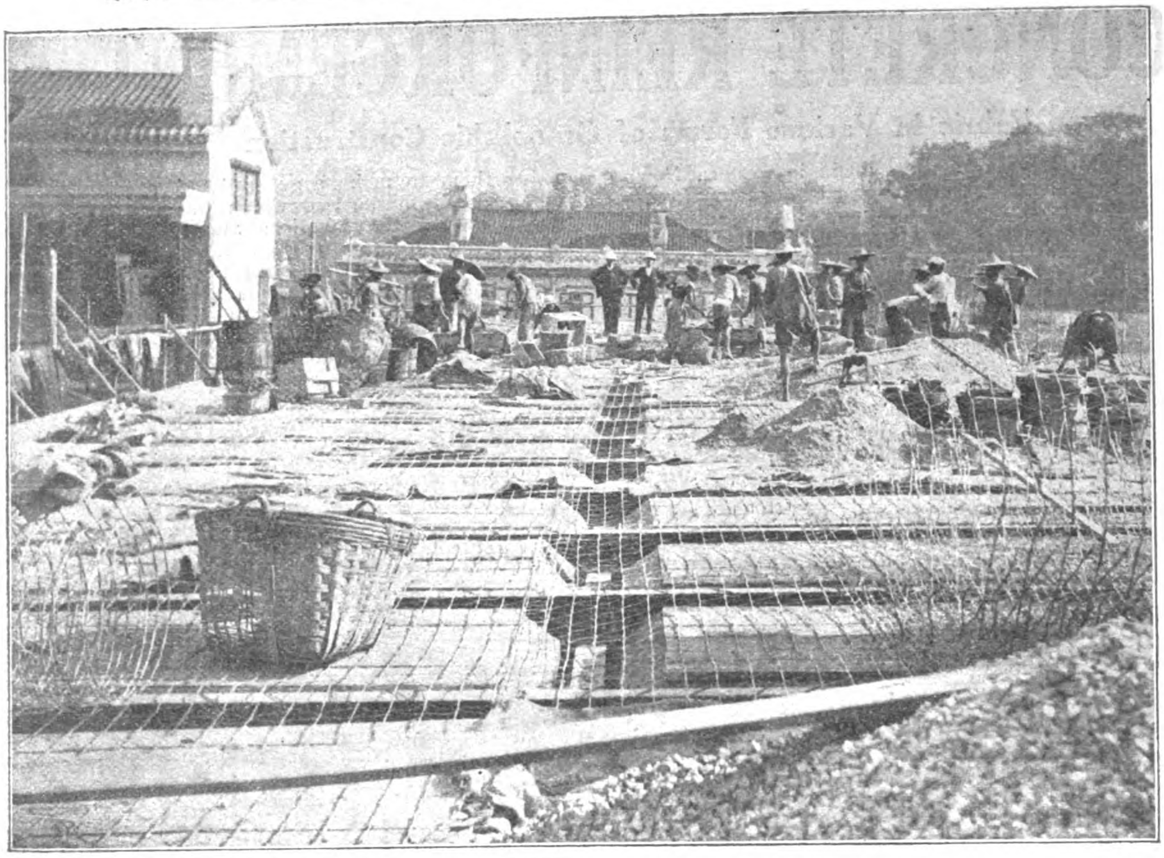


FIG. 2—HONGKONG HOTEL ROOF—LAYING TRIANGLE MESH

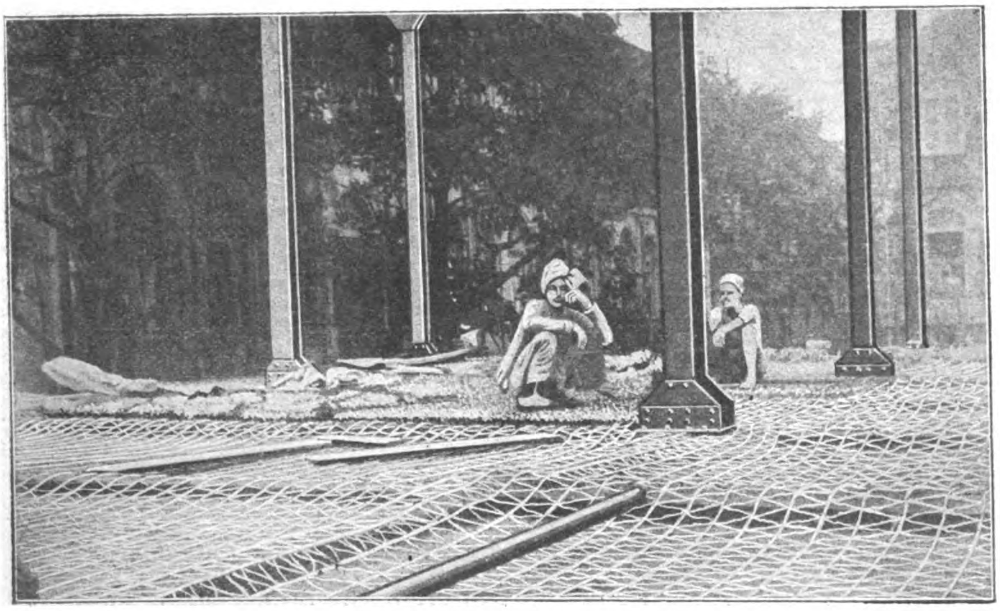


FIG. 3—VIEW OF PORTION OF FIRST FLOOR OF MESSRS. WATSON & SONS' PREMISES, RANGOON.—TRIANGLE MESH No. 33 WITH CONCRETE PARTLY FILLED IN.—SPANS 7 FOOT—CONCRETE 5".

DIVERSITY OF APPLICATIONS

While its original use was presumed to be limited to reinforcing concrete floors, it has been found to be also well adapted to other uses. One of the principal applications is that of reinforced concrete pipe. Under the Meriwether system of manufacture, this pipe is built above ground and later lowered in the trench. The molds used, as seen in Figs. 3 and 4, consist of cast iron bottom rings and inner and outer truly cylindrical and concentric casings of sheet steel. The reinforcing metal is centered in the mold rather closer to the interior circumference of the section, thus insuring the proper location in the tension of the crown and invert. Each section is made with a bell and a spigot end. The reinforcing fabric extends the length of the section and projects both into the bell end and out of the spigot end for several inches. The spigot is shorter than the bell so that when two sections of the pipe are placed together the reinforcing metal from one section overlaps the reinforcement of the other section in an internal recess. The recess in this joint is filled with cement mortar, thus locking the sections together and sealing the joint at one operation. On all pipe of 36 inches in diameter or larger, the joints are made from the interior after the back filling has been placed by forcing the grout behind a shield.

On sizes less than 36 inches in diameter, the joints are made from the outside through openings in the crown portion of the bells before the black filling is placed. Pipe under the Meriwether system is manufactured in sizes ranging from 24 to 96 inches diameter and in 3 and 4-foot lengths. Under test it has revealed surprising strength, showing a test recently made at Wichita, Kas., on a 42-inch section in which a load of 37,700 pounds was applied. A most interesting recent service to which reinforced concrete pipe has been put is sub-aqueous work. The pipe has been used with much success in the building of sewer outlets, water works intakes, etc. For this purpose the short sections are usually jointed above ground into lengths of 20 feet with cast iron flanges molded into each end. These lengths are then lowered into place and the flanges bolted together by divers. The Lock Joint Pipe Co., 165 Broadway, New York City, is now furnishing 40 miles of this pipe for the sanitary and storm system of sewerage in Havana, Cuba. This pipe ranges in diameter from 36 to 84 inches and is said to be the largest contract for reinforced pipe ever awarded. The contract will require the use of 1860 tons of steel wire reinforcement.

The use of wire fabric as reinforcement in road construction is another field of usefulness which has been opened to this material. The Vanderbilt automobile cup course on Long Island contains over 1,500,000 square feet of this mesh on the reinforced concrete roadway. A layer of 1 inch of crushed stone was placed upon the roadbed and upon this was laid the wire reinforcement, which in turn was covered by 4 inches of crushed stone. The roadway was then rolled with a 60 ton steam roller, and stone and cement grout in liquid form was distributed over the entire area until the mixture remained liquid on the surface, the result being a reinforced concrete slab with, out a break, 28 feet wide and 6 miles long. The reinforcement is essential because of the possibility of the grade settling over small areas, which would, without this steel fabric cause a depression in the roadway. The material which was furnished for this purpose is the triangle mesh reinforcement, style No. 8, galvanized.

Another use that has been found for this fabricated material is in the reinforcement of concrete piles. By reason of the hinge joint formation of this type of fabric, it is believed that this application is destined to be considerably extended. A very large percentage of the fireproof buildings in Greater New York during the past year has used the steel wire mesh reinforcing material in the construction of floors and roofs. Over 1,000,000 square feet alone have been placed in the new Grand Central terminal improvements of the New York Central railroad. Among other important new buildings in the metropolis in which this fabric has been used are Kent Hall, Columbia University, Stern Brothers department store, Bronx theater, Sinclair building, and numerous other loft, office and apartment structures.

Triangle Mesh Steel Woven Wire Reinforcement is made with both single and stranded longitudinal, or tension members. That with the single wire longitudinal is made with one wire varying in size from a No. 12 gauge up to and including a ½-inch diameter, and that with the stranded longitudinal is composed of two or three wires varying from No. 12 gauge up to and including No. 4 wires stranded or twisted together with a long lay. These longitudinals, either sold or stranded, are invariably spaced 4-inch enters, the sizes being varied in order to obtain the desired cross sectional area of steel per foot of width.

The transverse or diagonal cross wires are so woven between the longitudinals that perfect triangles are formed by their arrangement, thereby not only lending additional carrying strength to the longitudinal or tension members, but positively spacing them and providing a most perfect distribution of

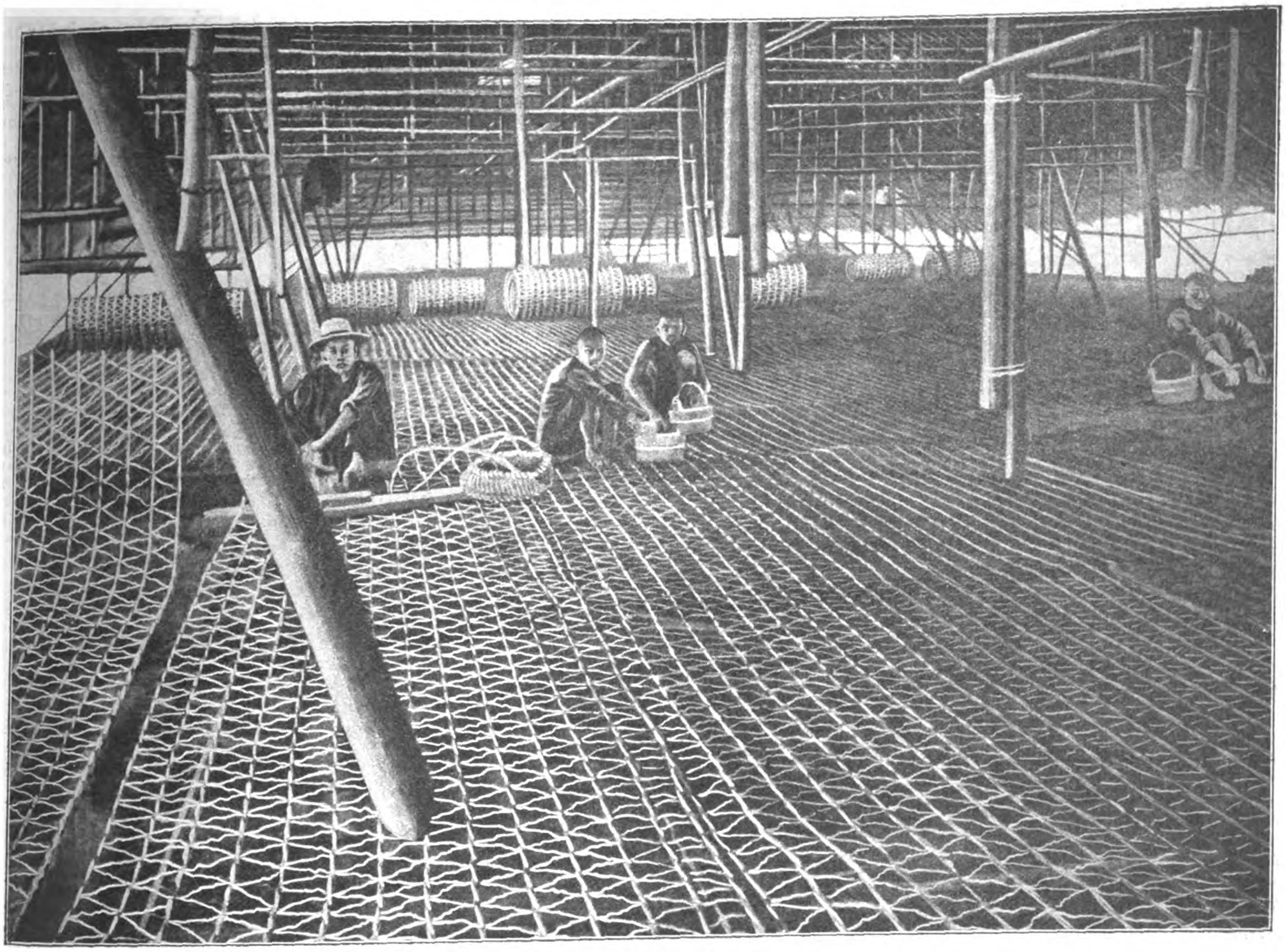


FIG 4—NEW OUT DOOR CUSTOMS BUILDING, HONAM, CANTON.—TRIANGLE MESH NO. 9.—MESSRS. PURNELL AND PAGET, ARCHITECTS

the steel. These diagonal cross or transverse wires are woven either 2 or 4 inches apart, as is desired. It is the most perfect reinforcement for concentrated loads, distributing the stress imposed by the load throughout the floor slab. A hinge joint is provided on each longitudinal, which enables this reinforcement to be folded longitudinally in any desired shape, making it adaptable to all kinds of concrete construction. Its design provides a most perfect mechanical bond between the steel and the concrete, and from the fact that it is not galvanized (unless specifically ordered) the maximum adhesive bond is developed.

A sufficient area of steel is provided in the cross wires of Triangle Mesh Reinforcement to prevent temperature cracks, thereby eliminating the necessity of laying additional reinforcement at right angles to the longitudinal or tension members.

By the use of Tables 1 to 12, inclusive, giving the resisting moments of reinforced concrete slabs, suitable fabric may be selected to use either with or without bars for all kinds of loads and spans and conditions met with in the construction of buildings, bridges and reinforced concrete in general. In these tables we h ve assumed different allowable stresses in the steel, namely, 16,000, 18,000, and 20,000 pounds per square inch, depending on its elastic limit, and different proportions of cement, sand and stone in the concrete. We, however, recommend in general using a 1:2:4 mixture for floors or other structures subjected to high stresses.

While we recommend the use of a fabric made with a mild steel we can furnish it in any grade of steel desired.

Triangle Mesh Woven Wire Reinforcement for Concrete is made with either solid or stranded longitudinal members, properly spaced by means of diagonal or cross wires so arranged as to form a series of triangles between the longitudinal or tension members; the longitudinal members being invariably spaced 4 inches apart, the cross wires either 2 inches or 4 inches apart, as desired, providing either a 2-inch or 4-inch mesh. The sizes of both longitudinals and cross wires are varied in order to provide the cross sectional areas of steel required to meet the conditions.

Triangle Mesh Reinforcement, we believe, is the most efficient material on the market for the purpose:

It provides a more even distribution of the steel, reinforcing in every direction.

Tension or carrying members accurately spaced.

A most perfect mechanical bond.

When a specific size of fabric or area of steel is specified it is impossible to leave out any portion of the reinforcement.

Minimum cost of installation.

Easily handled and stored on the work.

Low cost of inspection.

An absolutely continuous action from one end of the structure to the other.

Higher elastic limits with the same quality of steel, due to cold drawing.

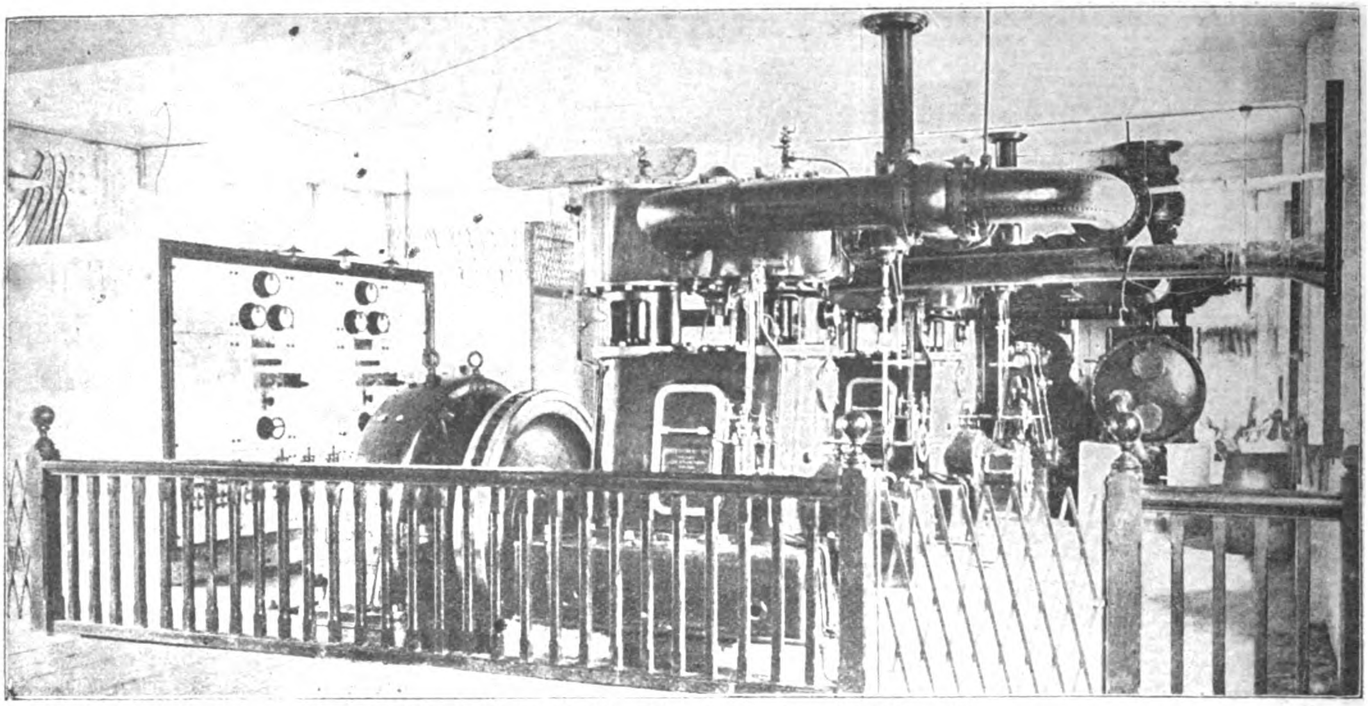
Distributes the stresses due to a concentrated load over a greater area.

Triangle Mesh Reinforcement is the only design of woven wire fabric in which the cross or diagonal wires assist the longitudinal or tension members in carrying the load.

While reinforcing fabrics are made both galvanized and not galvanized, we strongly recommend the latter, due to the fact that a much better adhesive bond is provided and also greater strengths. In the case of a galvanized wire the adhesion between the reinforcement and the concrete is to the coating on the steel and not to the steel itself, and also in the galvanizing process the steel is annealed or softened, thereby reducing its elastic limit and ultimate strength.

It is a well known fact that steel thoroughly imbedded in a proper mixture of concrete does not rust, and in the case of a smooth round rod used as reinforcement it is more desirable to have a thin surface coat of rust, than if it were perfectly bright and smooth, provided the rust has not penetrated sufficiently far to pit the steel and produce a scale. This slight coating of rust provides a rougher surface and therefore a better bond.

SHANGHAI NATIVE CITY ELECTRIC LIGHT PLANT



GENERAL VIEW GENERATING ROOM AND SWITCHBOARD

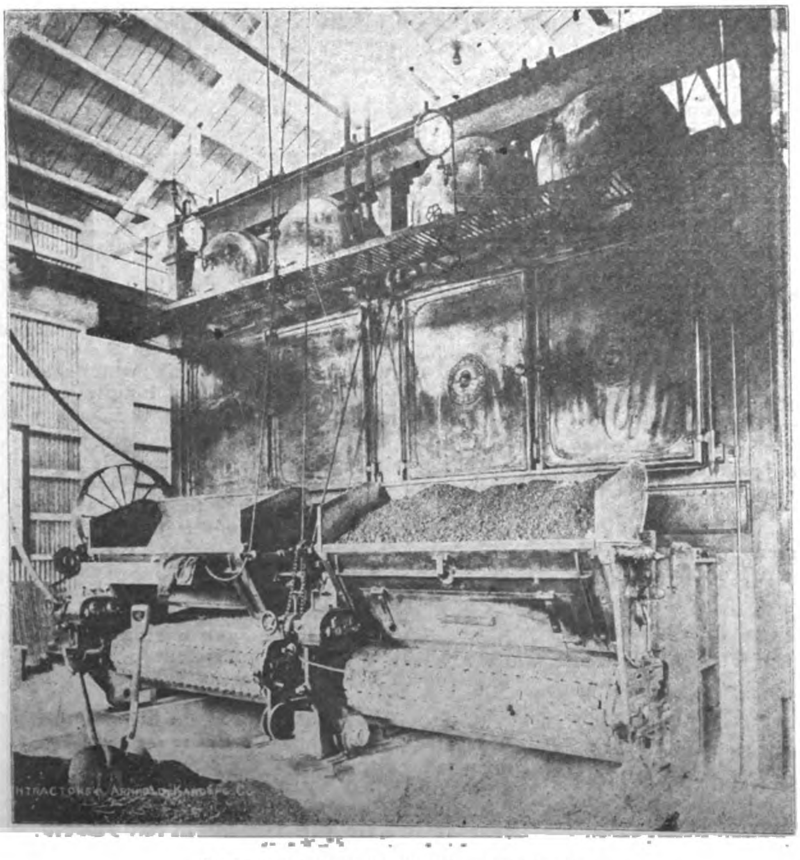
The second electric plant for lighting the Native City of Shanghai was recently erected and placed in operation. One was already at work inside the walled town, but the new plant is located in the Compound of the Native City Waterworks near the Chinese Bund and the Kiangnan Arsenal. The contract was carried out by the Electrical Department of the well known firm of Arnhold Karberg & Co., under the direction of their Chief Electrical Engineer, Mr. L. Junginger.

The equipment of the plant consists of 2 Babcock and Wilcox double drum type patent water tube boilers of 3140 sq. heat of heating surface each, capable of evaporating 20,000 lbs. of water per hour working at a pressure of 160 lbs. per sq. inch. Babcock & Wilcox mechanical chain grate stokers, of 59 sq. ft. grate area each, are used, and arranged for electric motor drive.

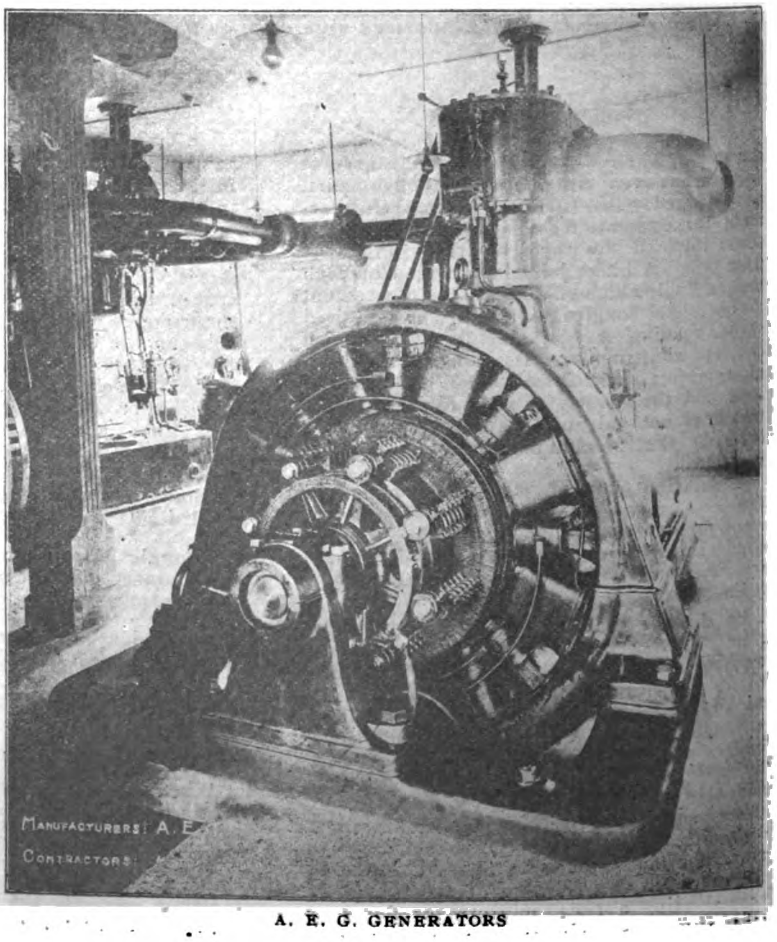
The motive power is furnished by 2 Bellis & Morcom patent 2 Crank, Compound, high speed, self lubricating engines; each of 380 B. H. P. at 375 r. p. m. working at a pressure of 160 lbs. per square inch, and running under condensing conditions.

The engines are direct connected to 2 A. E. G. direct current 250 Kilowatt dynamos, generating at 440-500 volts. They are eight pole machines fitted with interpoles. Static balances are used and the armatures fitted with slip ring contacts.

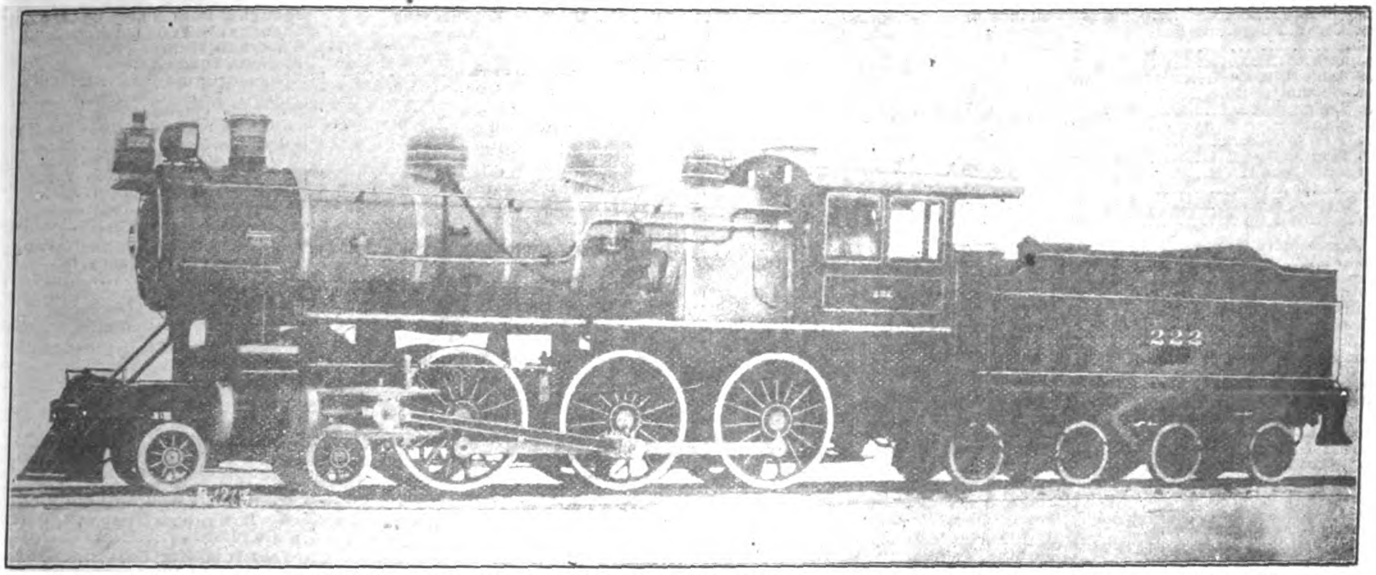
The switchboard is a 5 panel A. E. G. Standard, provided with the usual instruments and devices. The three wire system is used on the street mains, using 440 volts on the outer and 220 volts on the neutral wire, having static balances with a 15 per cent capacity for under or over load. A. E. G. Metalamps are used exclusively in the city and are giving every satisfaction.



BOILER PLANT: BABCOCK AND WILCOX

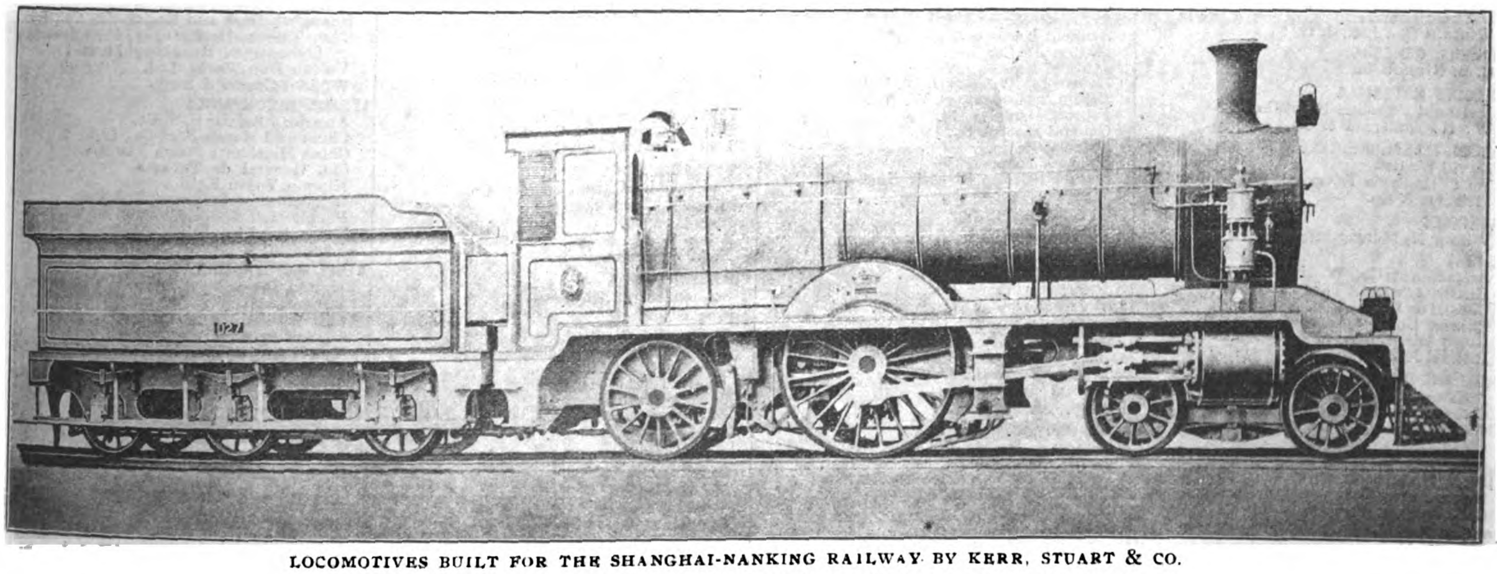


A. E. G. GENERATORS



8-WHEELED TENDER LOCOMOTIVE BUILT FOR THE IMPERIAL GOVERNMENT RAILWAYS OF JAPAN (KOREAN LINES) BY THE AMERICAN LOCOMOTIVE COMPANY OF NEW YORK.

The accompanying illustration is of a locomotive built by the American Locomotive Co. of New York for the Japanese Railway Board for the Korean lines. It was constructed for standard gauge track 4″ 8.5″ and its dimensions and description follow: Cylinders, 20″ dia., 26″ stroke; driving wheel-dia. 66″; boiler, dia. 64″, pressure 180 lbs.; fire box, length 96.125″, width, 60.25″; tubes, number, 310, dia., 2″, length 15′ 2″; wheel base-driving, 13′ 6″, engine 24′ 4″, engine and tender, 49′ 8.5″; weight in working order, leading 31900 lbs., driving, 117200 lbs.; engine, 14900 lbs., tender, 86400 lbs.; fuel, soft coal; heating surface, tubes 24480 sq. ft., fire box, 132 sq. ft.; total 2580 sq., ft.; grate area, 40 sq. ft.; maximum tractive power, 24,100 lbs; factor of adhesion, 4.86; tender, type 8-wheeled; capacity—water 4,000 gals., fuel 7 tons.



LOCOMOTIVES BUILT FOR THE SHANGHAI-NANKING RAILWAY BY KERR, STUART & CO.

The illustration above is of one of four passenger locomotives built for the Shanghai-Nanking Railway by Messrs. Kerr, Stuart & Co., Limited, of London and Stoke-on-Trent. The Consulting Engineers were Messrs. Sir John Wolfe-Barry and A. J. Barry.

As will be seen from the illustration, the engines are of the four two type with six-wheeled tenders. The leading dimensions are given below:—Gauge 4′8½″; Driving Wheels 7′0″ dia., Bogie Wheels 3′6″ dia., Trailing Wheels 4′9″ dia., Total Wheel Base 48′9″, Length over couplers—engine & tender—57′3¾″. Tender capacity—fuel 7 tons, water 3500 gallons; Weight empty—Engine, 50 tons 6 cwts, Tender 19 tons 9 cwts, Weight in working order, Engine 56 tons 1 cwt, Tender 42 tons 13 cwts. Total 98 tons 13 cwts.

The cylinders are 18″ in diameter with a stroke of 26″, and are fitted with bronze "D" slide valves driven by Stephenson link motion.

The boiler is designed for a working pressure of 180 lbs. per square inch, and has an outside diameter at the front of 4′9½″, the telescopic barrel being 12′10½″ in length. The internal fire box is of copper and is fitted with copper stays. Brass tubes to the number of 188 are used in the boiler, these giving a heating surface of 1567.39 square feet. With 182.61 square feet in the fire box, this gives a total heating surface of 1650 square feet.

These engines were wanted urgently, and the order was placed with Messrs. Kerr, Stuart & Co., Ld., on April 12th-1909. Notwithstanding the Whitsuntide Holidays and the period of mourning for the late King, the first two engines were steamed on the 8th and 11th June, a record, we believe, in British Locomotive engineering.

These engines have been in operation for some time on the express service between Shanghai & Nanking, and we understand from experiments conducted by the Locomotive Superintendent, Mr. E. J. Dunsaan, M. I. M. E., that this type of engine shows considerable economy in coal consumption.

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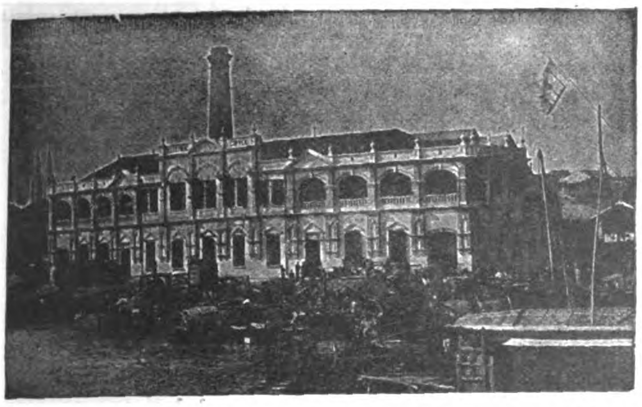

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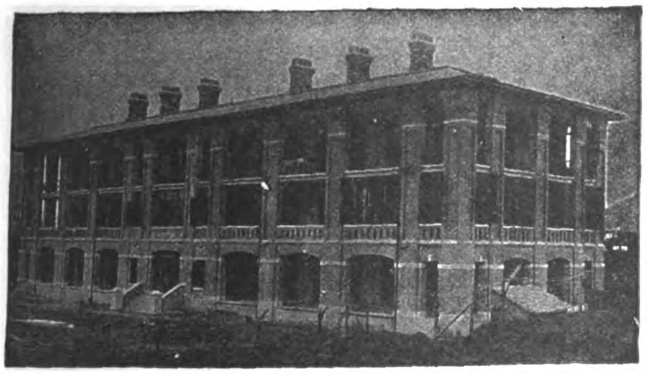

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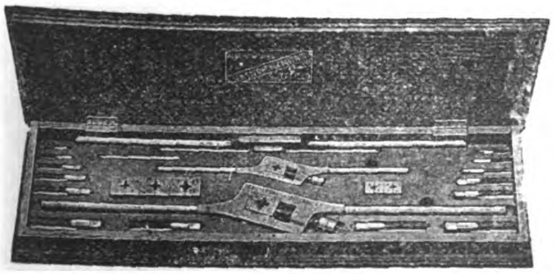

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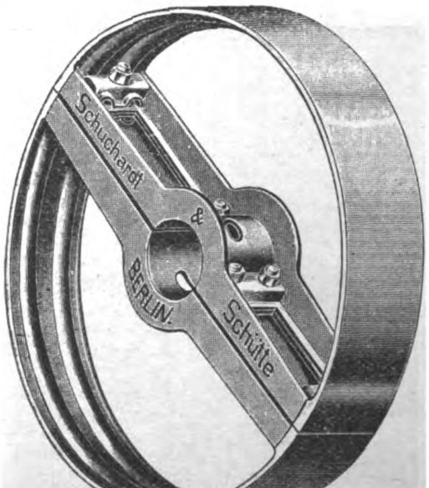

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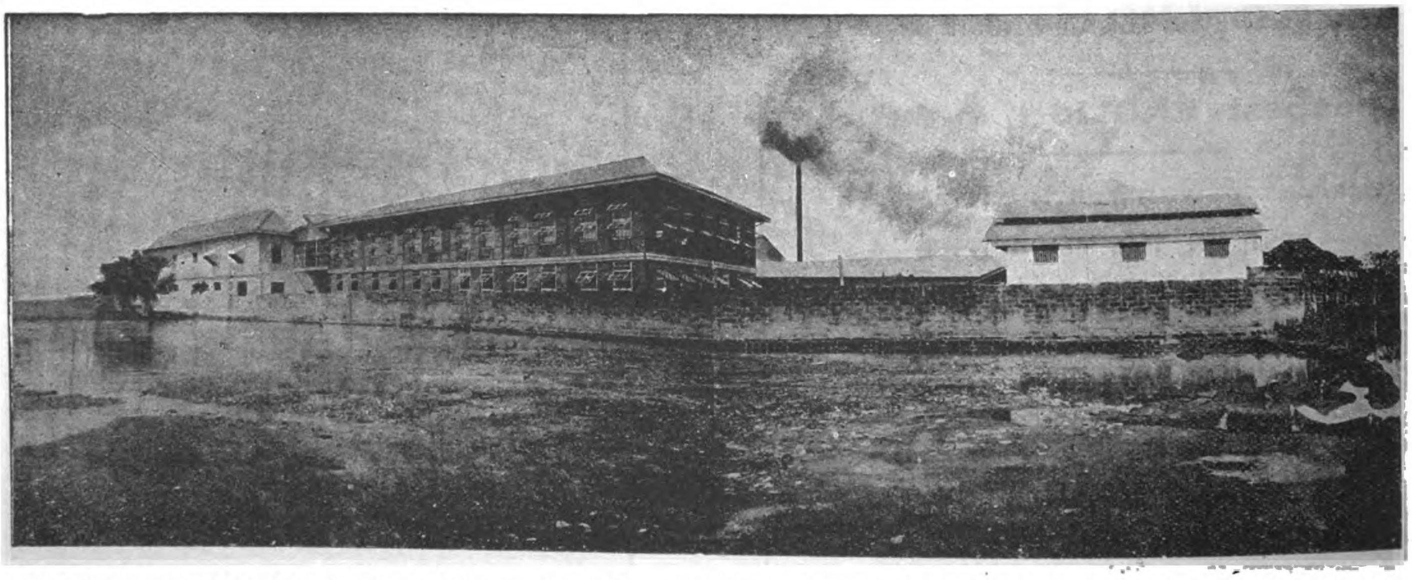

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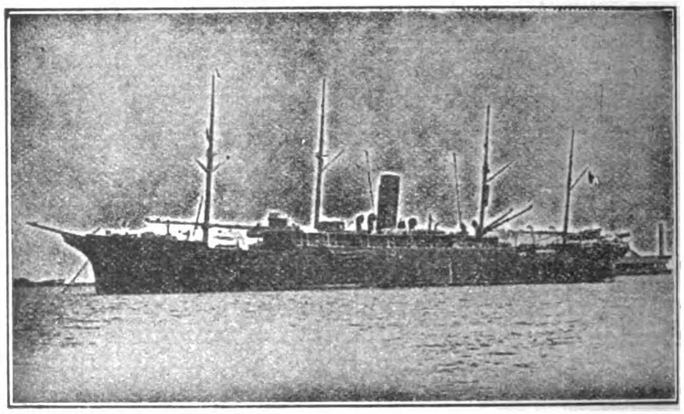

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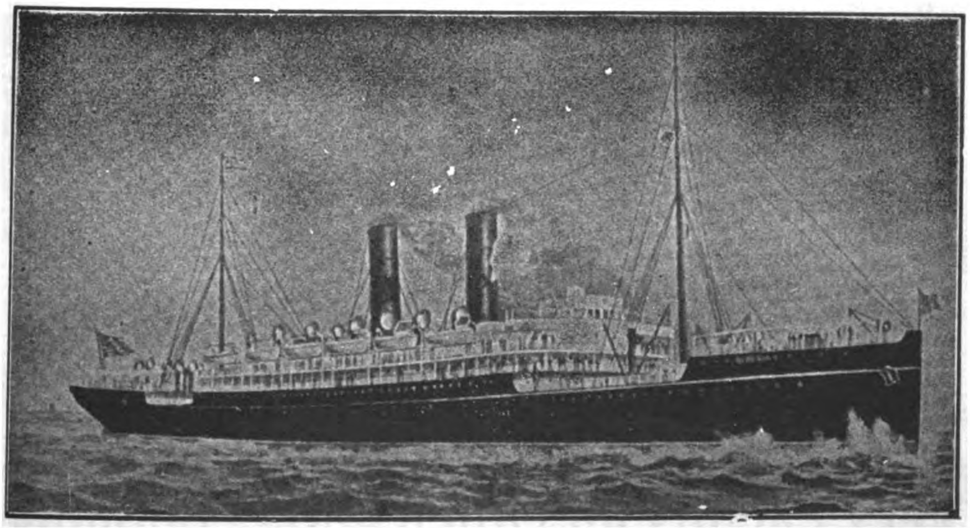

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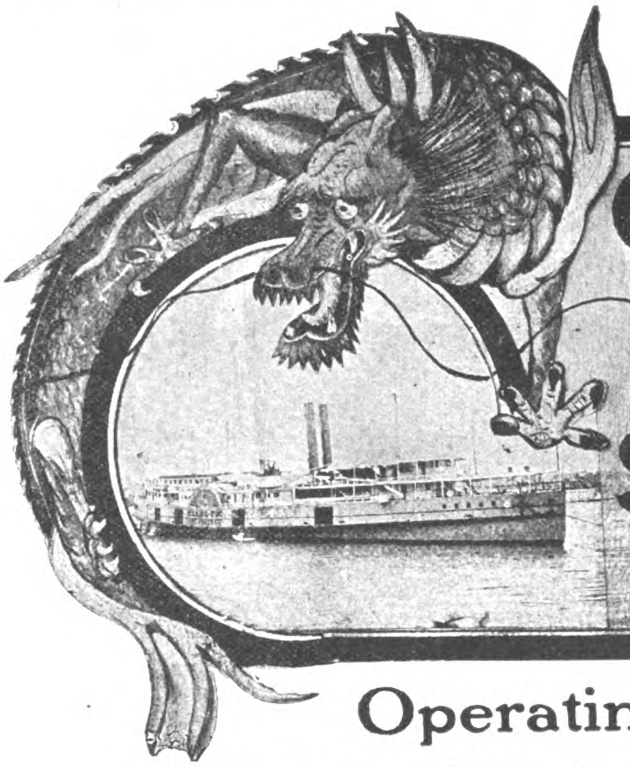

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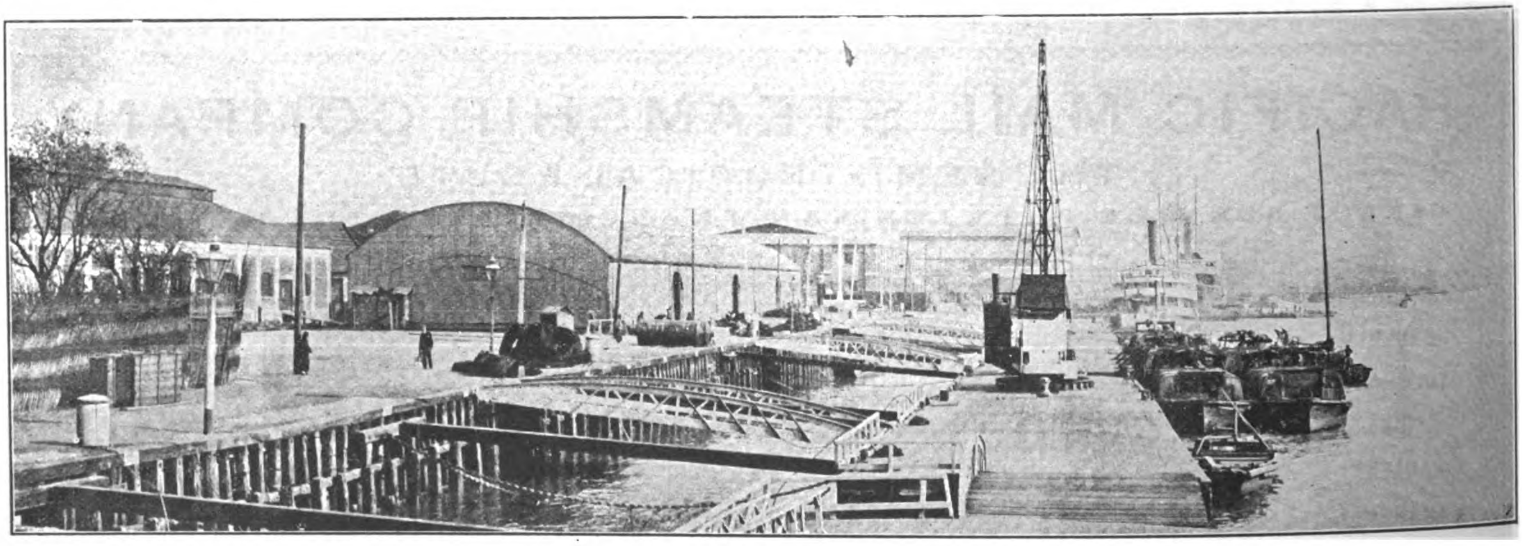

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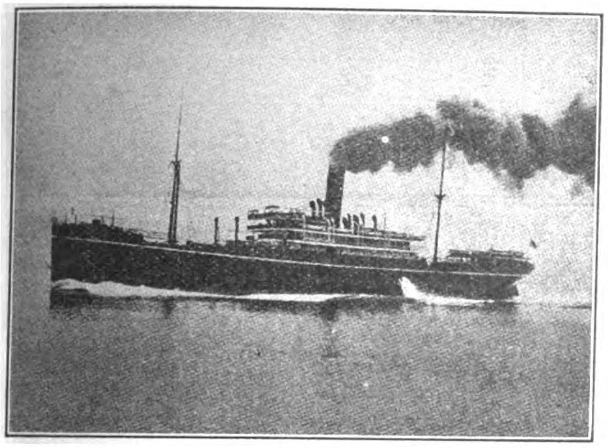

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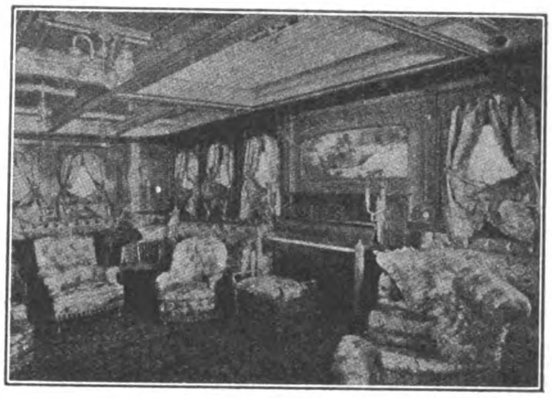

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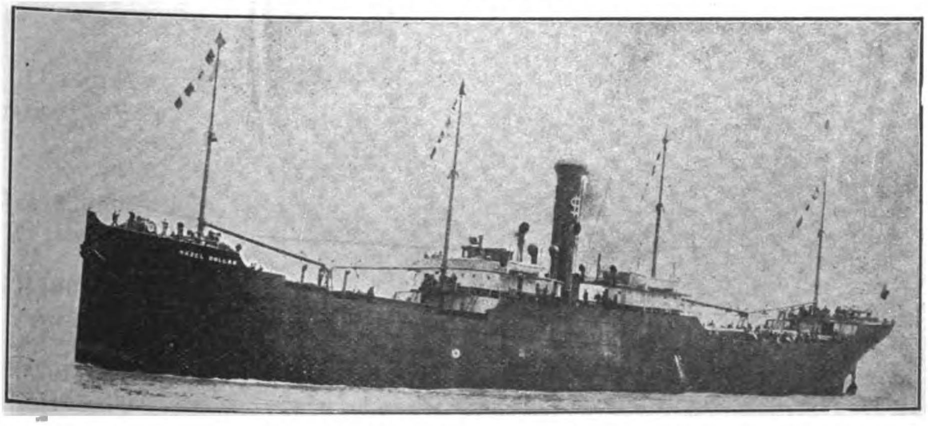

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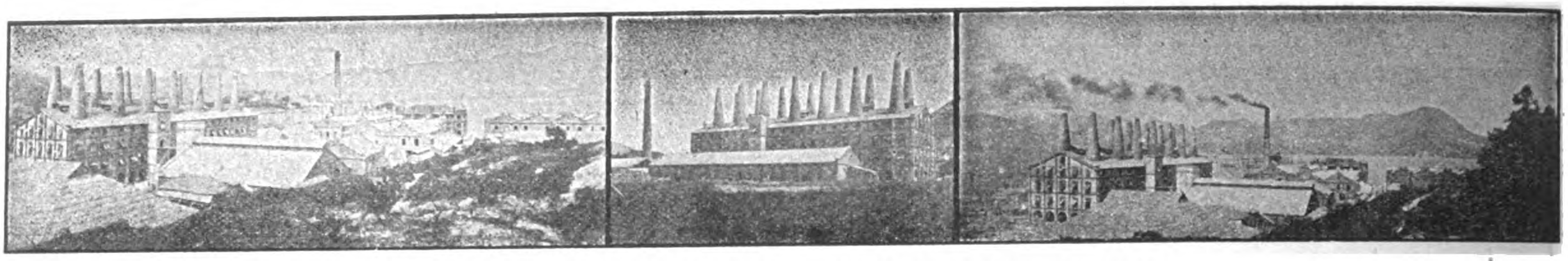

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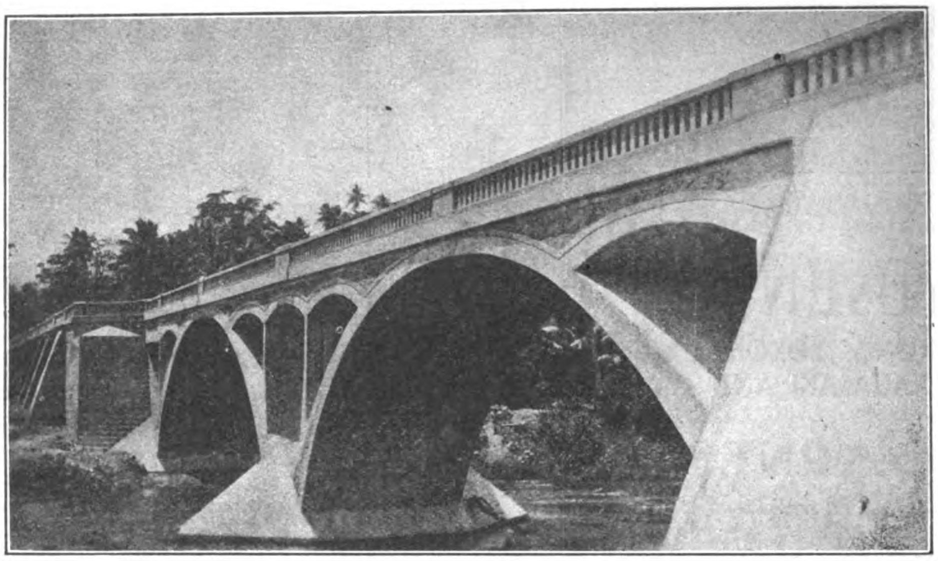

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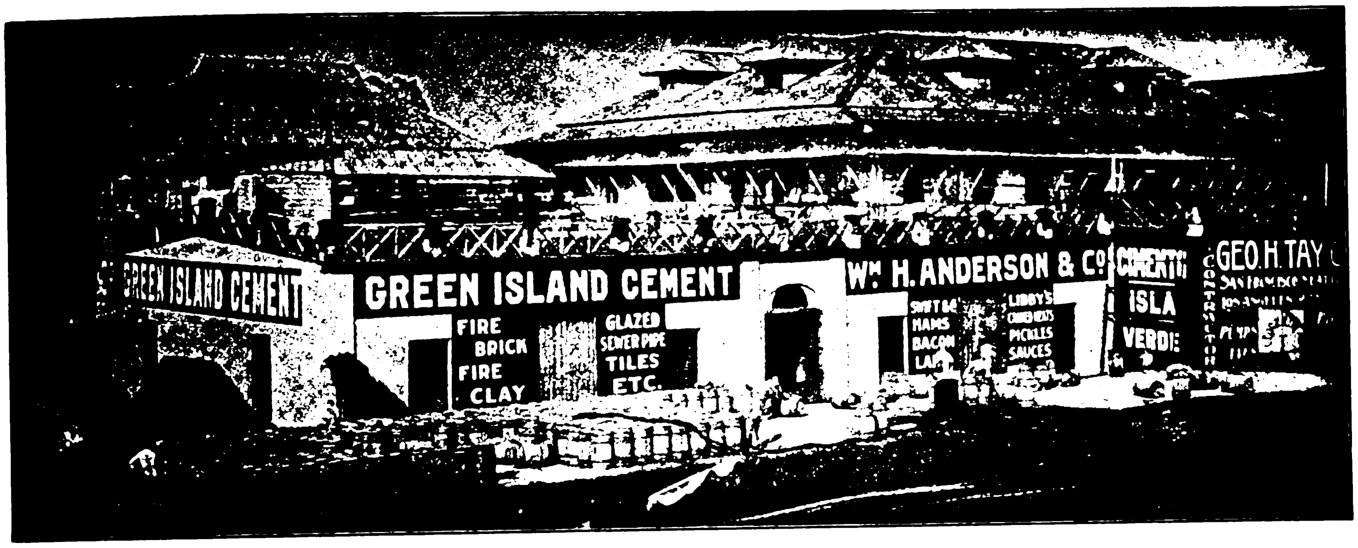

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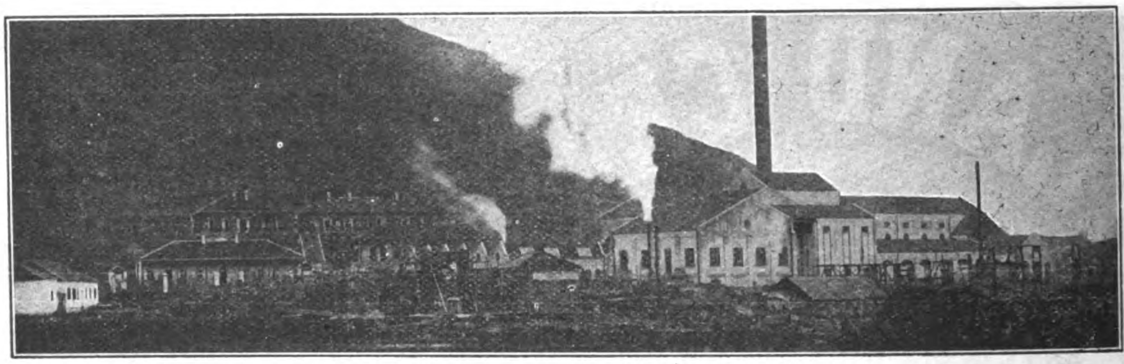

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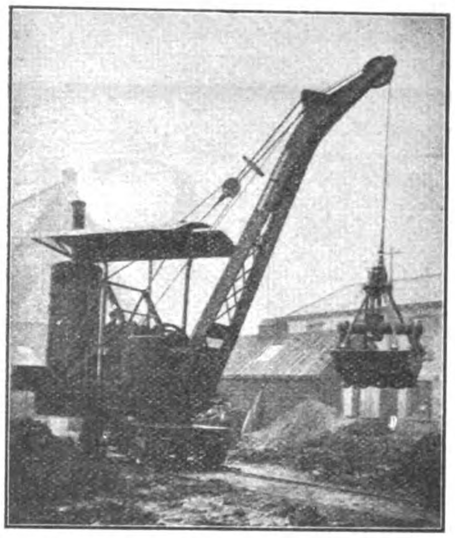

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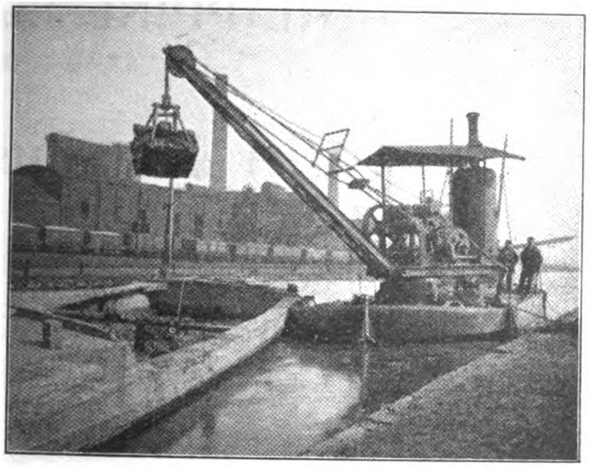

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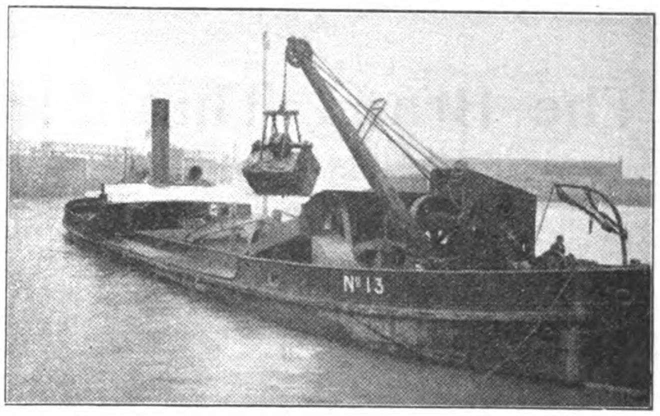

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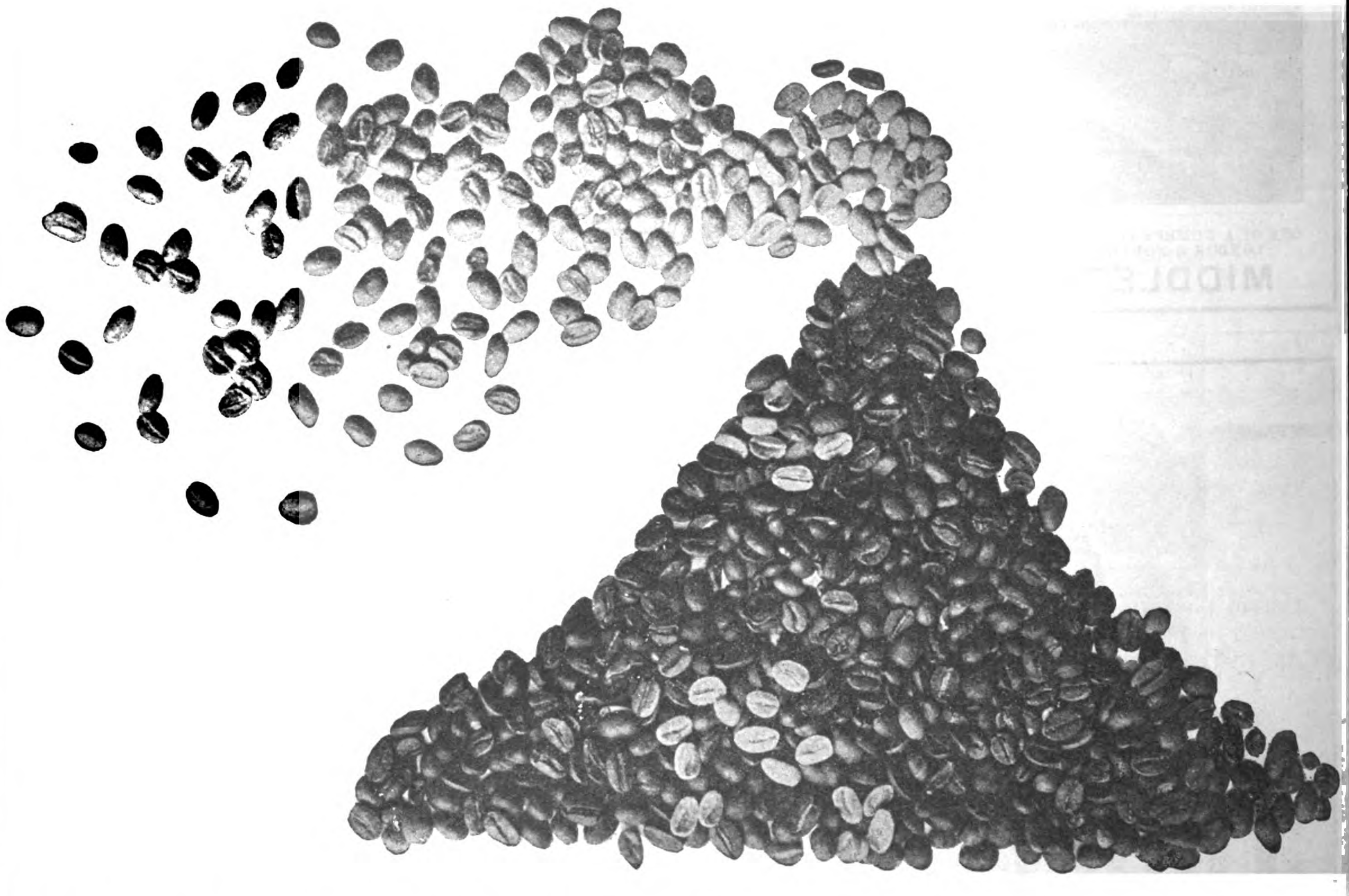

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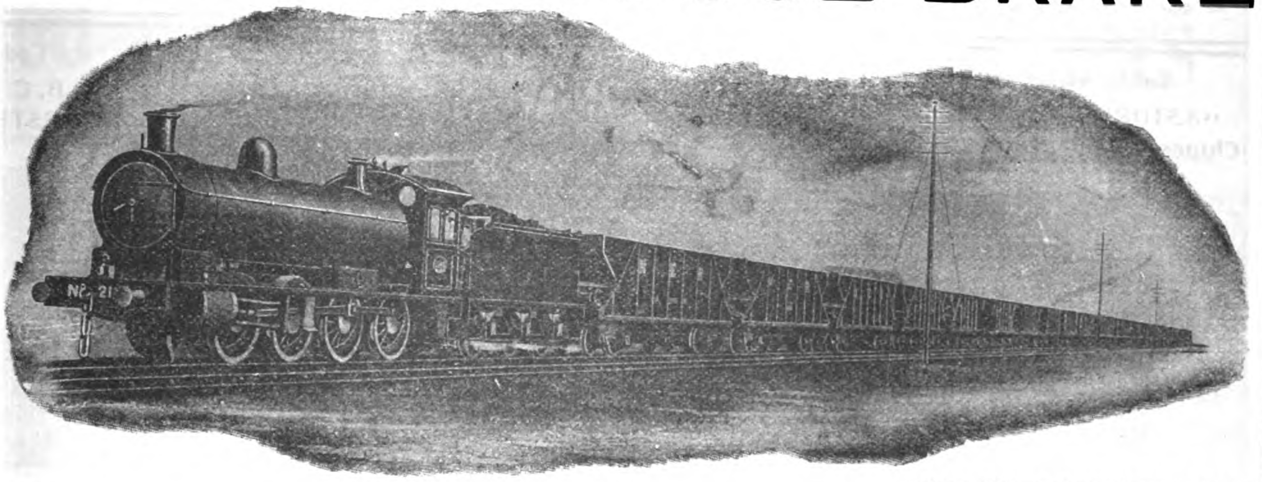

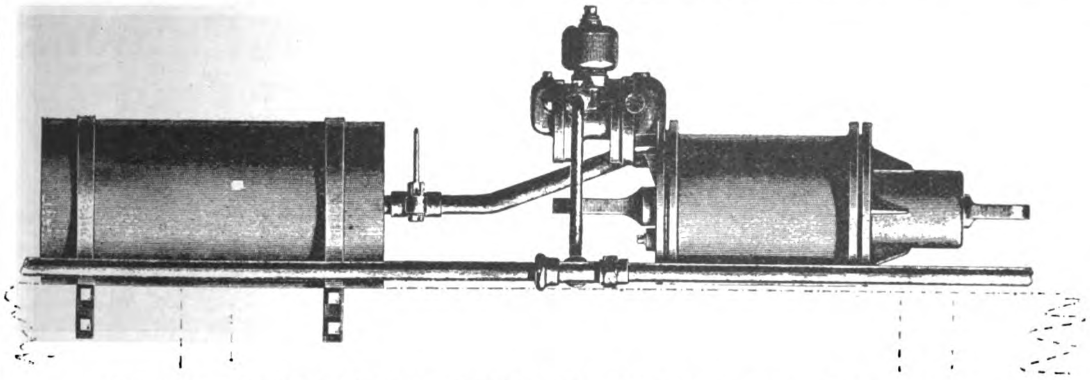

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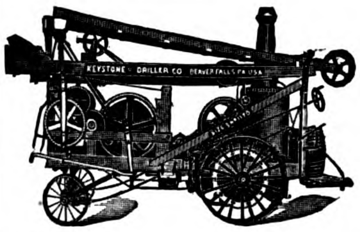

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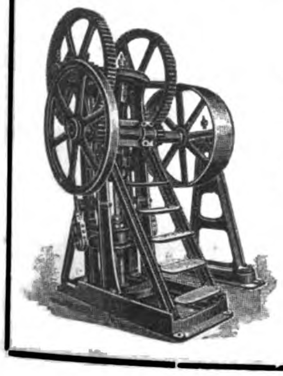

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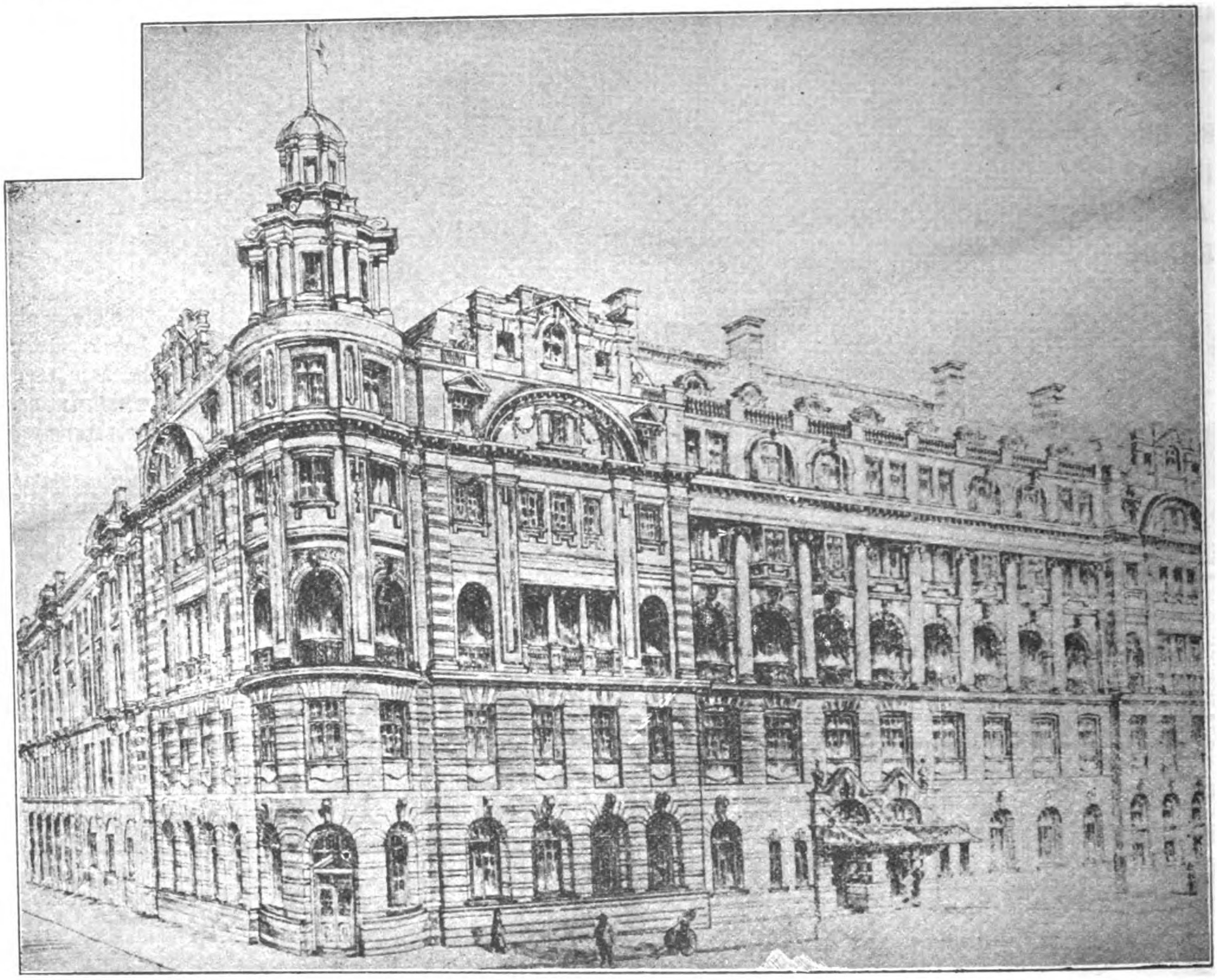

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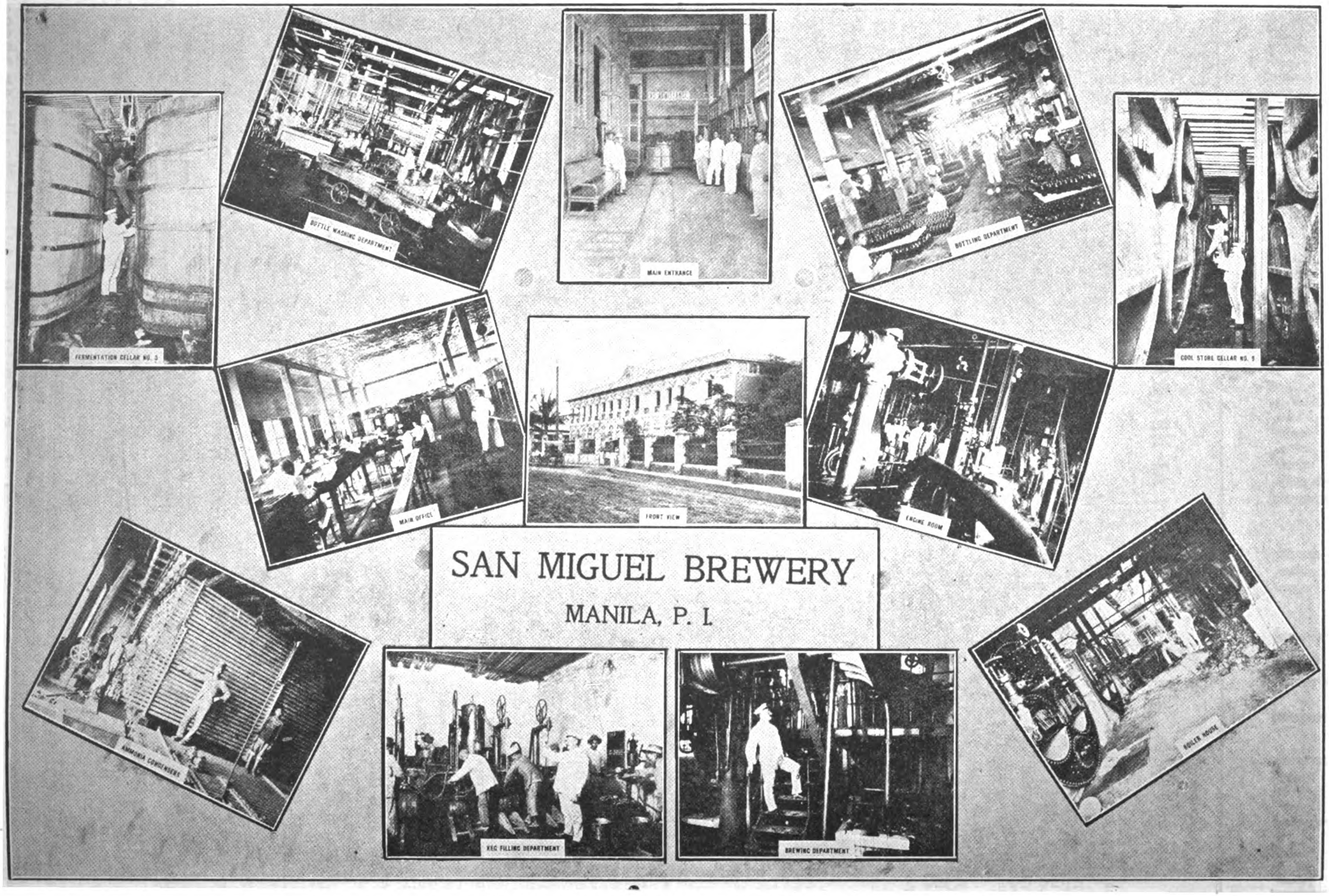

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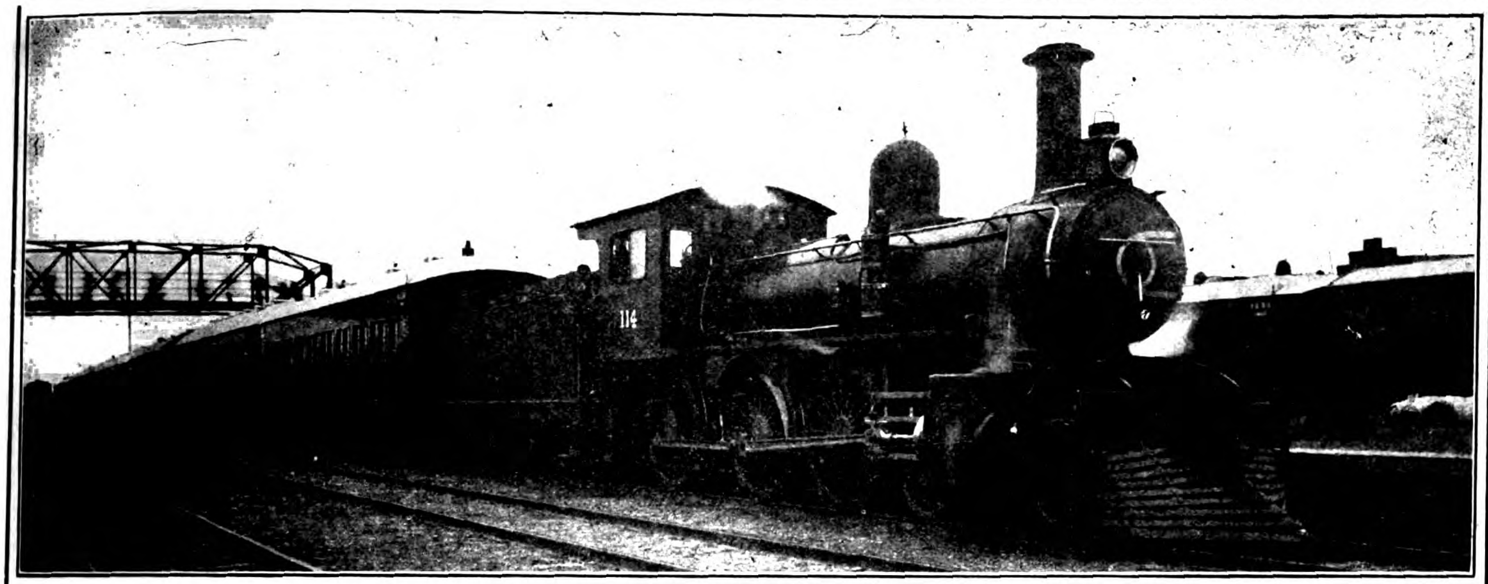

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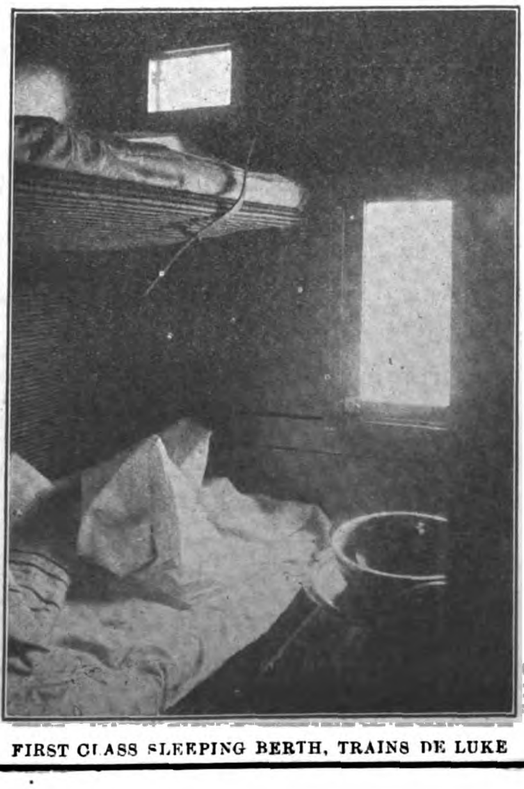

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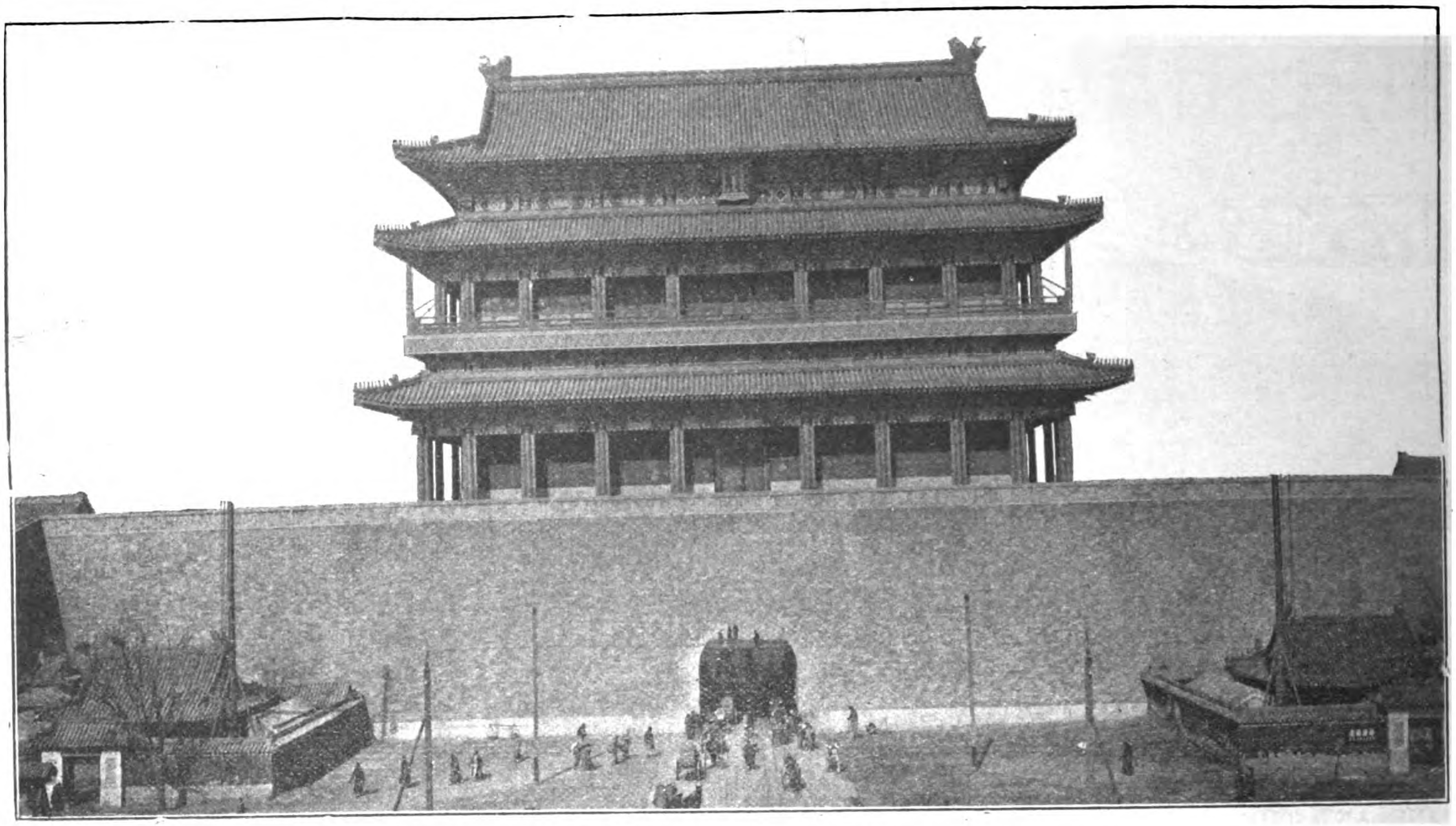

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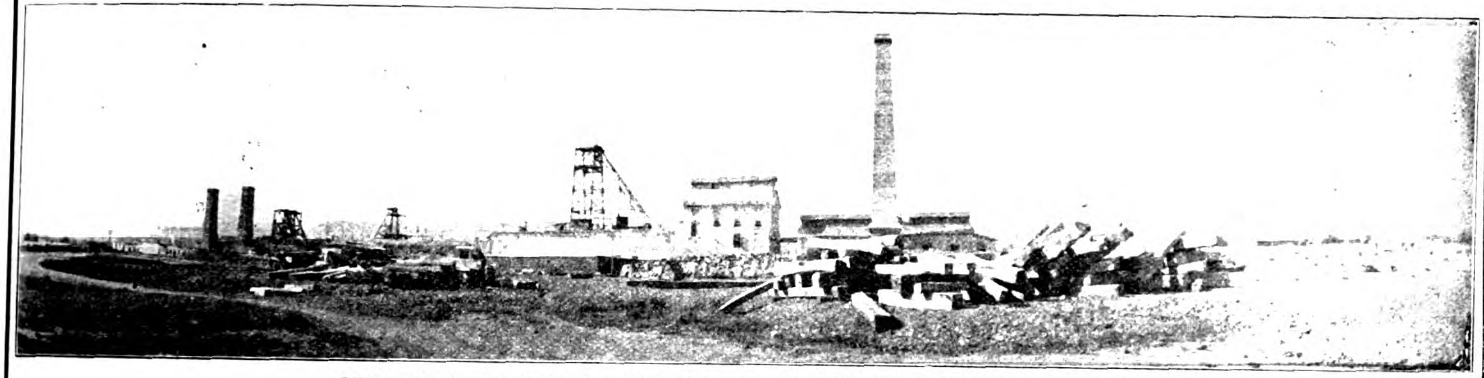

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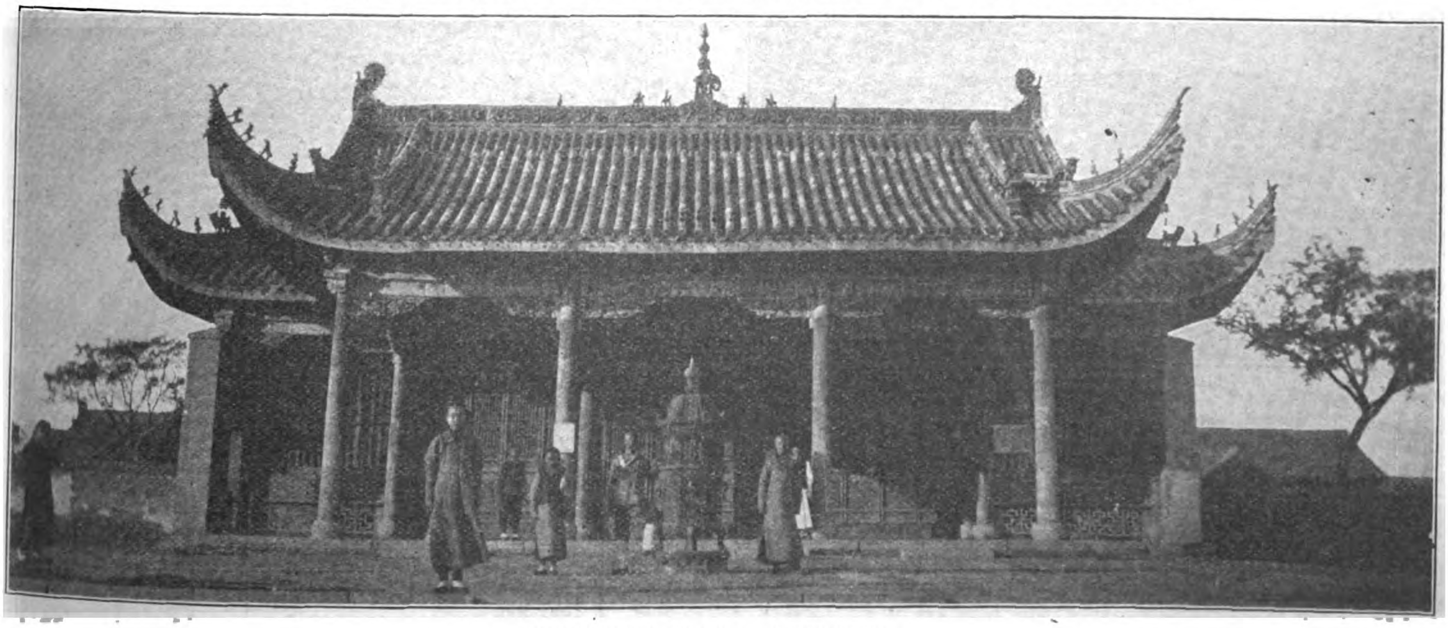

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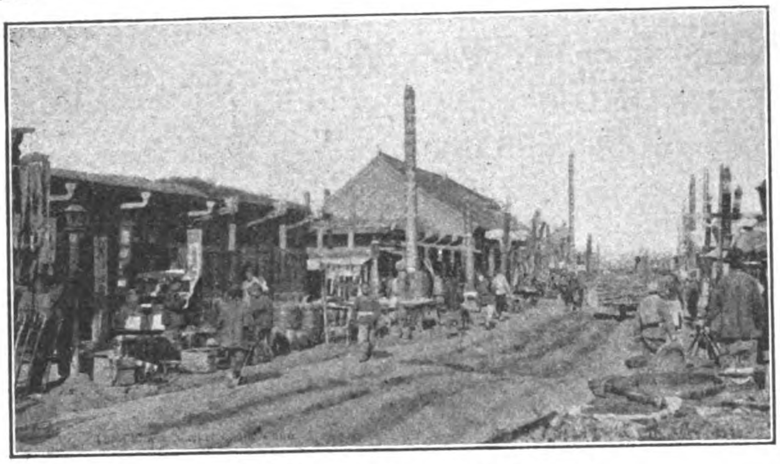

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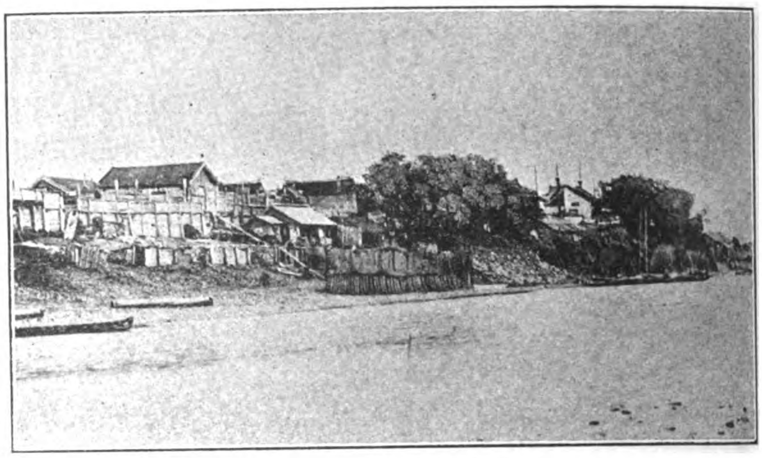

VIEW OF KIRIN FROM THE SUNGARI RIVER

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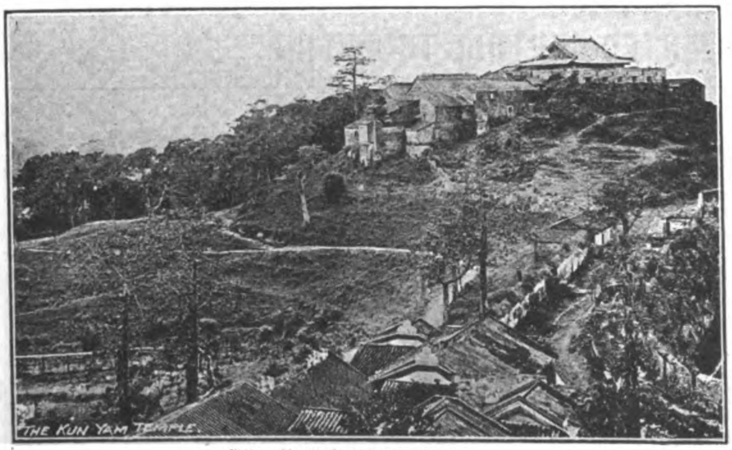
TIME TABLE
The Kirin-Changchung Railway

Down Train			Up Train		
Station	*No. 1* a. m.	*No. 2* a. m.	*Station*	*No. 2* a. m.	*No. 4* p. m.
Changchung	7:00	12:00	Coran	10:00	5:00
Coran	8:17	1:17	Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS
CANTON-KOWLOON LINE



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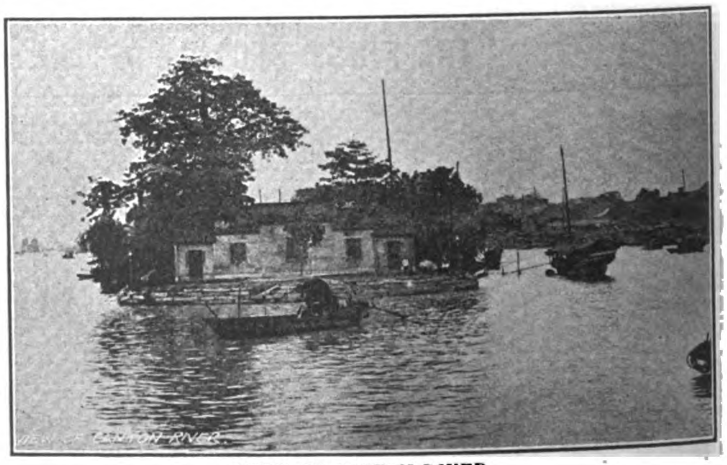

VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 10th JANUARY 1911 UNTIL FURTHER NOTICE.

Canton (Tai Sha Tou) to Sien Tsun.

Miles	STATION		Daily Passenger Trains. No. 1 A. M.	No. 3 P. M.
	Canton (Tai Sha Tou)	dep	7.30	2.00
8.63	Shiek Pai	arr	7.39	2.09
		dep	7.42	2.12
7.90	Che Pi	arr	7.53	2-23
		dep	7.57	2.27
12.58	Wu Chung	arr	8 08	2.38
		dep	8.11	2 41
17.09	Nam Kong	arr	8.22	2 52
		dep	8 26	2.56
21.67	Sun Tong	arr	8.38	3.08
		dep	8.41	3.11
23.61	Tong Mei	arr	8.46	8.16
		dep	8 50	3 20
25.54	Nga Yeo	arr	8.55	8.25
		dep	8 58	3.28
29.00	Sien Tsun	arr	9.07	3 37

Sien Tsun to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2 A. M.	No. 4 P. M.
	Sien Tsun	dep	9.25	4.00
3 46	Nga Yeo	arr	9.34	4.09
		dep	9.37	4.12
5.39	Tong Mei	arr	9.42	4.17
		dep	9.46	4.21
7.33	Sun Tong	arr	9 51	4.26
		dep	9.54	4.29
11.91	Nam Kong	arr	10.06	4.41
		dep	10.10	4.45
16.42	Wu Chung	arr	10 21	4.56
		dep	10.24	4.59
21.10	Che Pi	arr	10.35	5.10
		d p	10.[illegible]	5.14
25 87	Shiek Pai	arr	10 50	5 25
		dep	10.53	5.28
29.00	Canton (Tai Sha Tou)	arr	11.02	5 37

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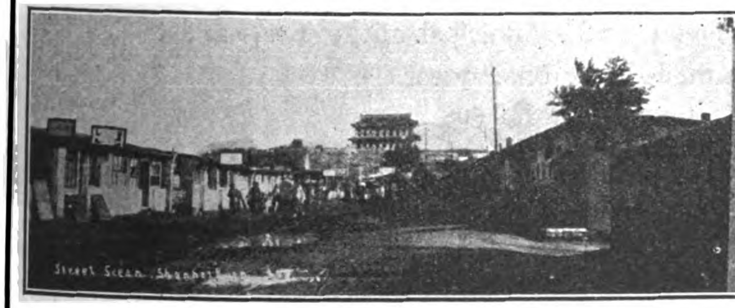
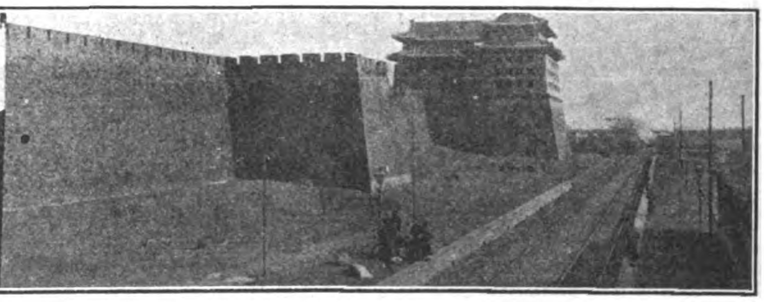


STREET SCENE AT SHANHAIKUAN



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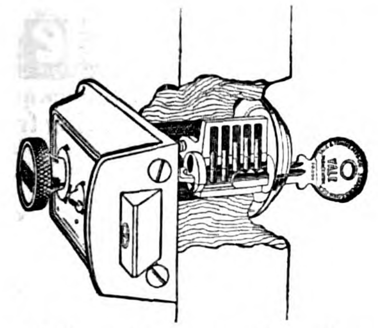

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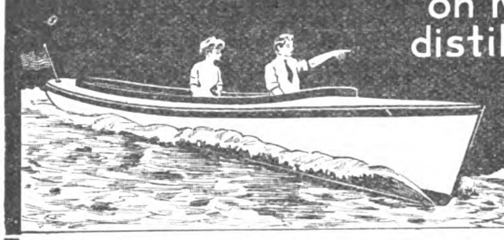

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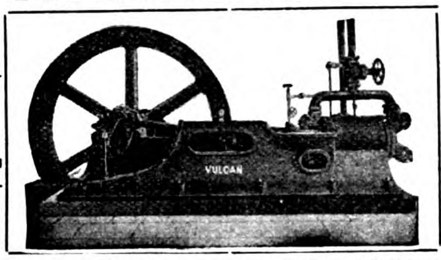

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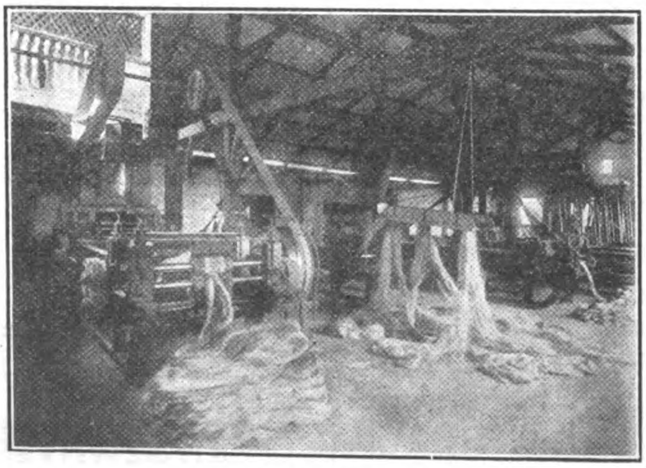

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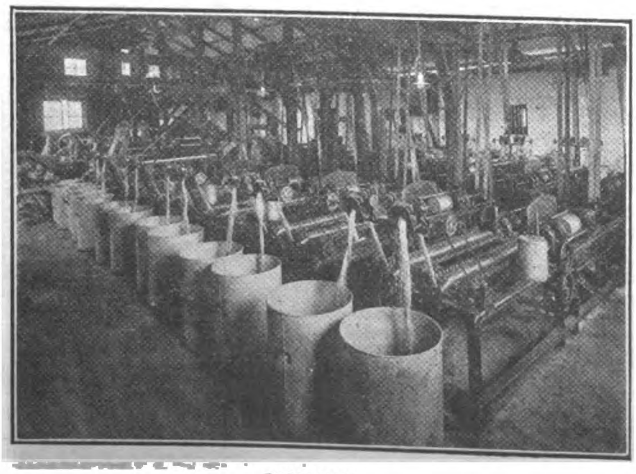

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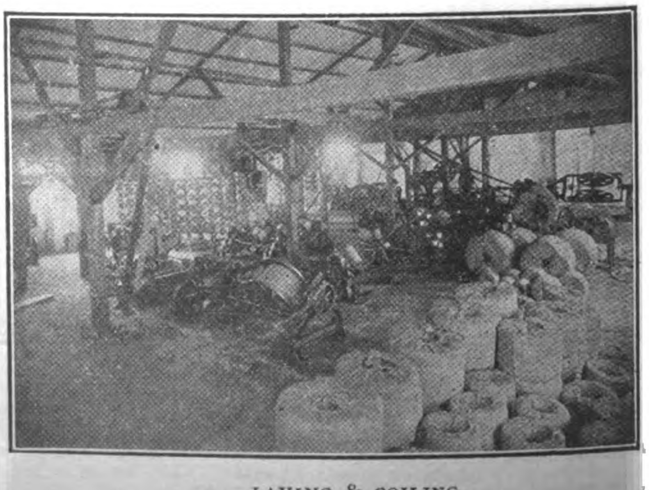

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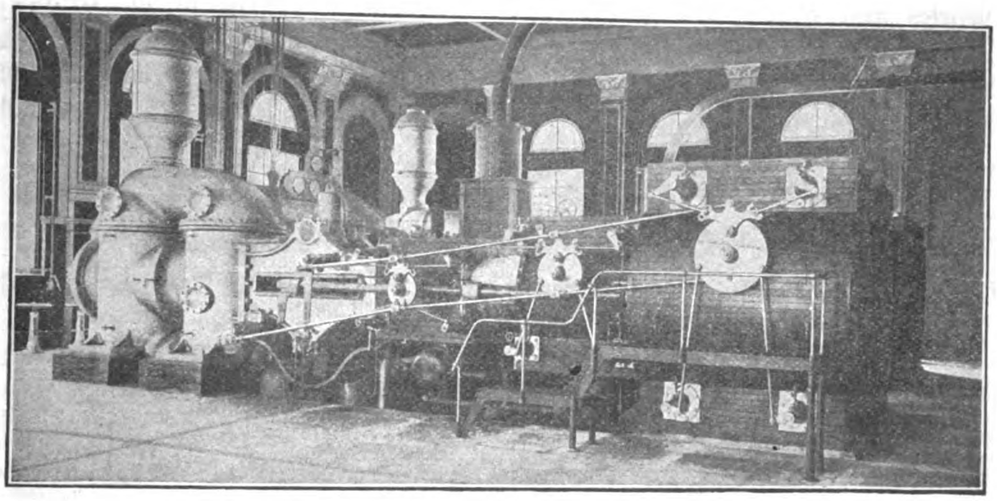

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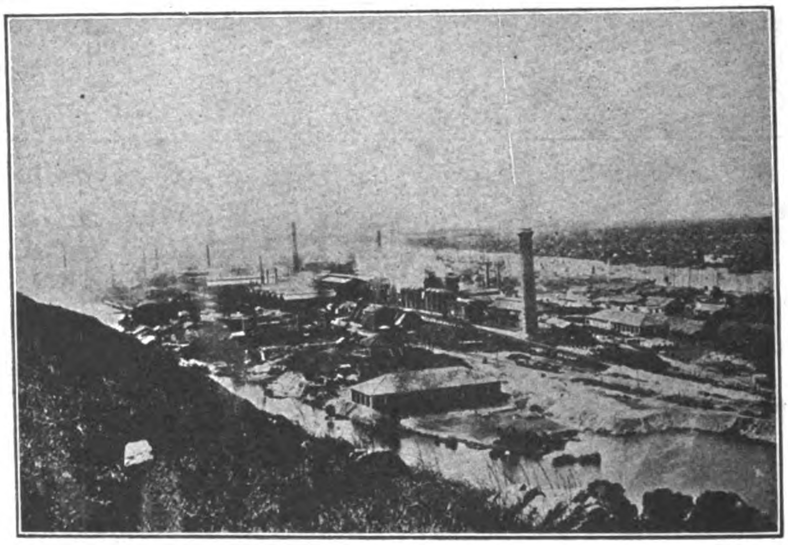

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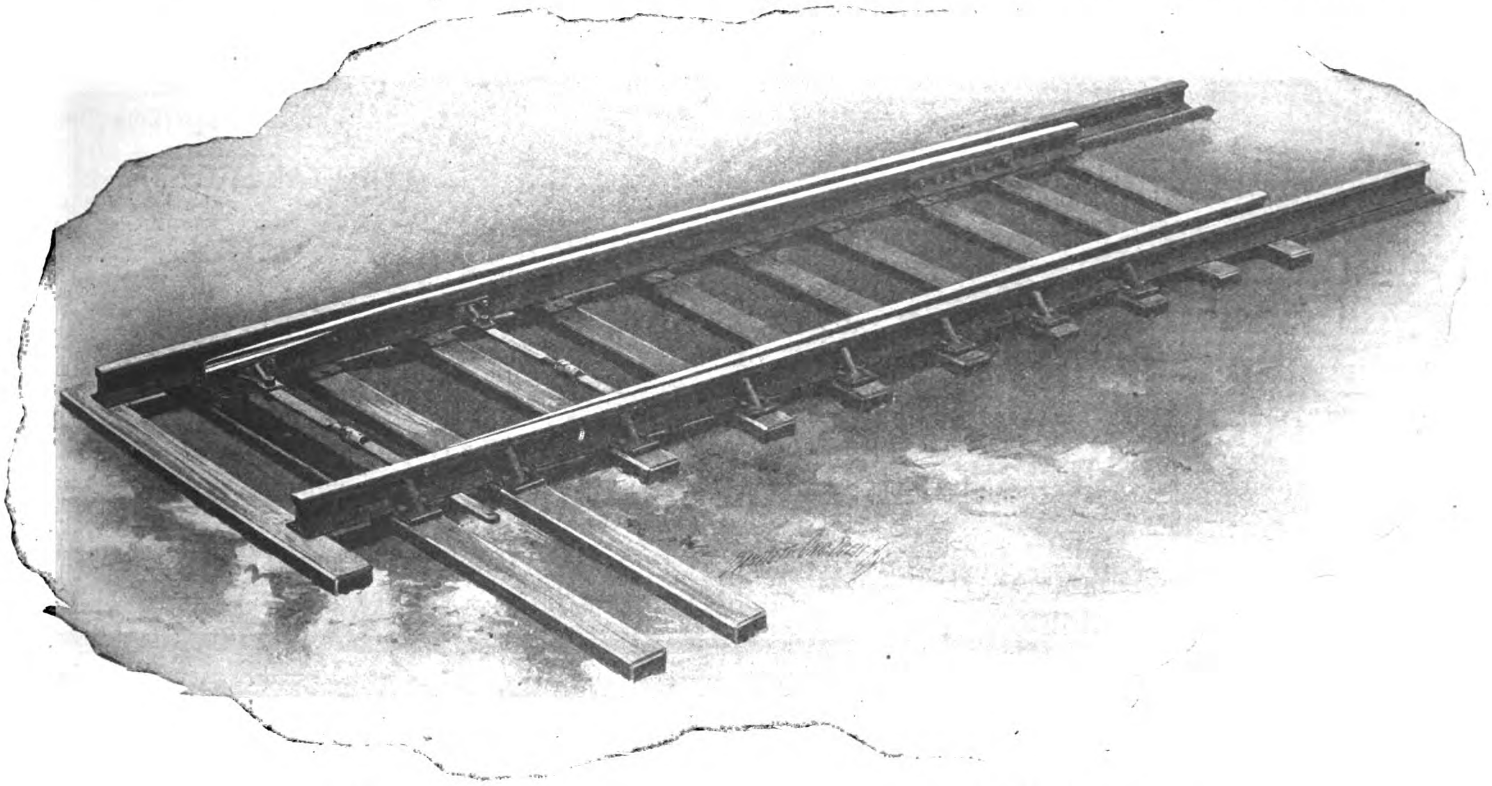

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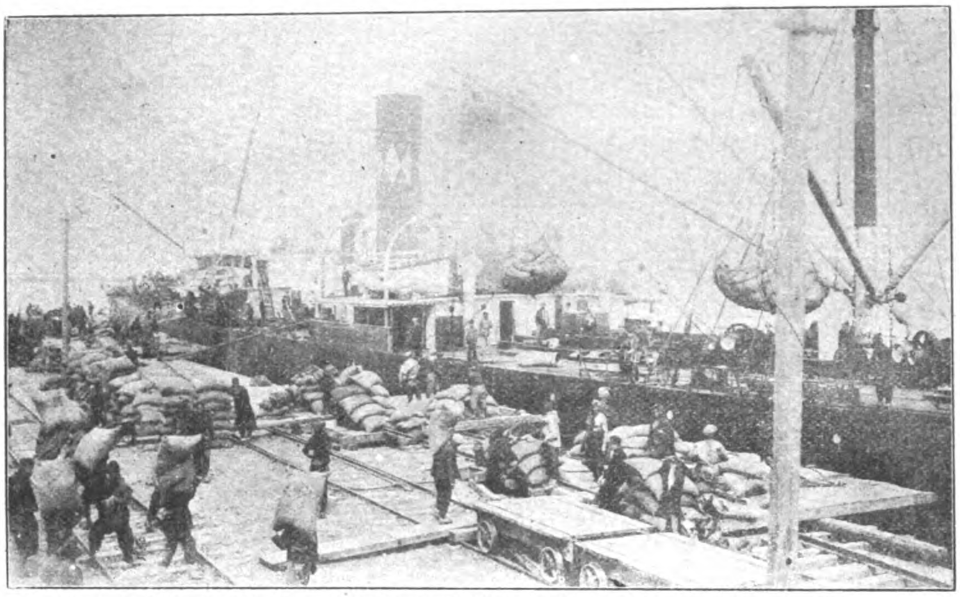

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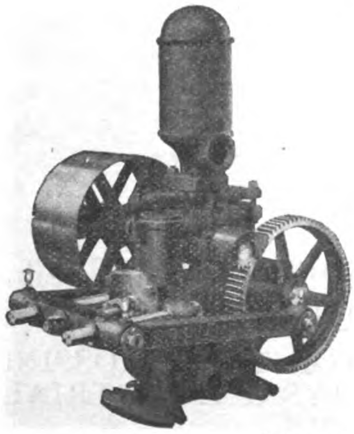

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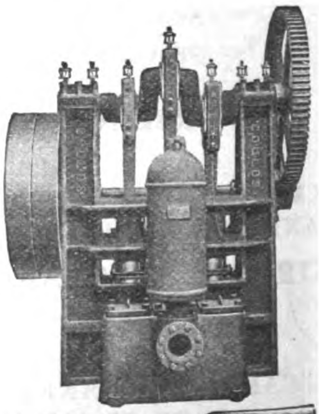

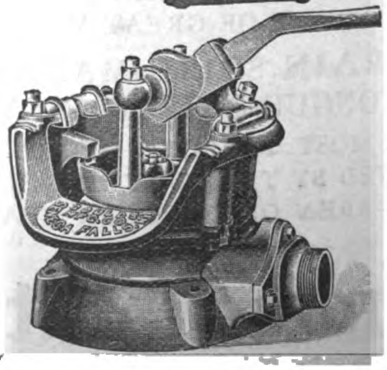

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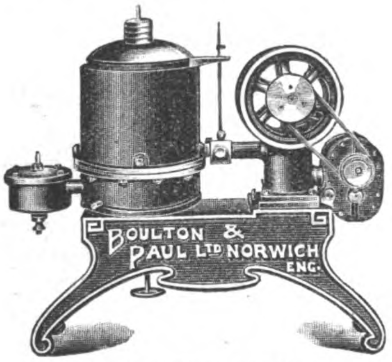

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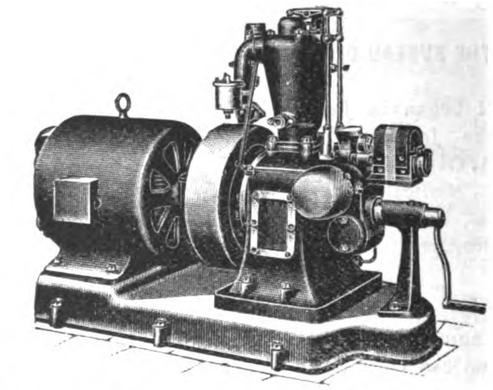

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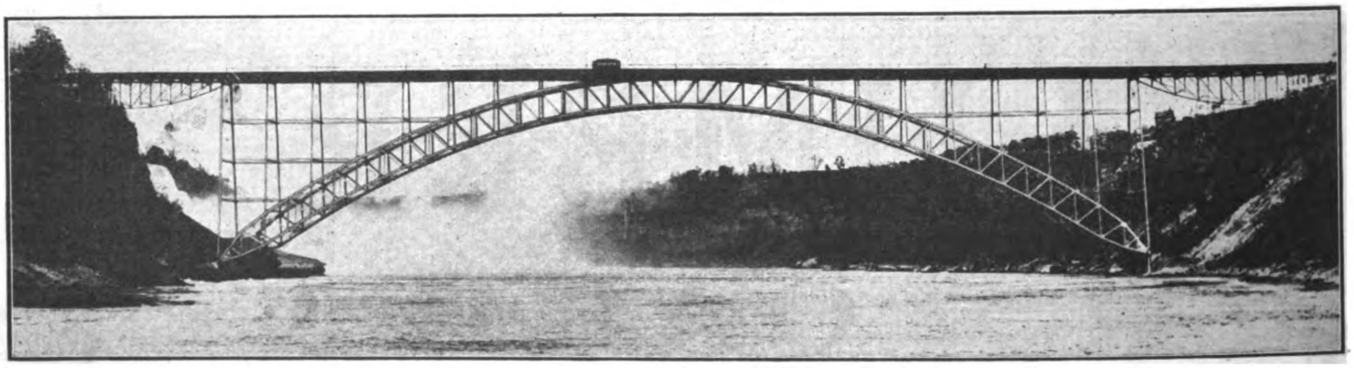

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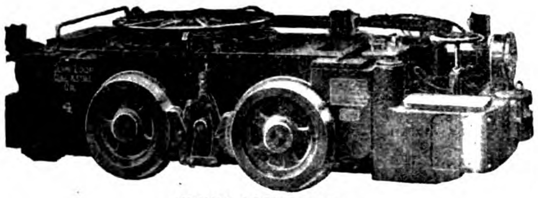

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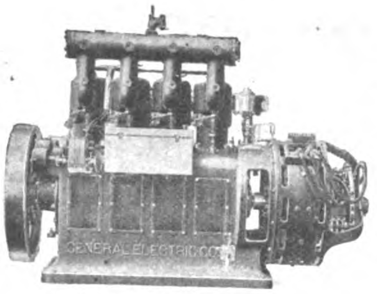

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Where gasolene is preferable to steam as a fuel, this sturdy outfit will provide a reliable source of power. It was designed to meet the rigid specifications of the U. S. Government. It has four cylinders, insuring electric light without flicker. Engine and generator are mounted on the same shaft, eliminating the noise, dirt and danger of belting. Four sizes 3, 5, 10 and 25 kw.

CURTIS STEAM TURBINE GENERATOR—10,000 KW.

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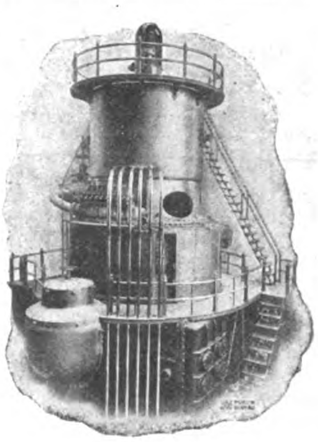

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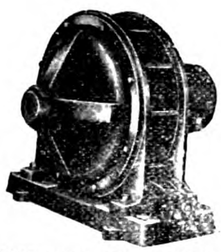
Made constant or variable speed, open, partial or totally enclosed frame, 1-20 to 800 horsepower and open frame up to 5000 horsepower and over with stiff shafts and amply large self-lubricating bearings. Guaranteed to stand 100% overload momentarily and to give maximum continuity of service in dust and dirt laden atmosphere.



ALTERNATING CURRENT MOTOR

Made constant or variable speed with or without commutator, open, partial or totally enclosed frame, 1-30 to 6000 horsepower and over with stiff shafts and ample self-lubricating bearings. Guaranteed to stand 100% overload momentarily and to give maximum continuity of service in dust and dirt laden explosive atmospheres, as well as elsewhere.

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Representative products are pictured on this page. Further information about any of these or other products will be gladly furnished.

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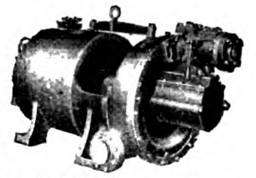

CURTIS STEAM TURBINE GENERATOR—35 KW

This small, compact generator is extensively used to furnish electricity for both light and power in mills, factories, office buildings, etc. It is economical in steam consumption, operates without noise or vibration and requires little attention.

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Wherever G-E Transformers are used in power houses, safety of operation is assured without sacrifice of efficiency. All types are furnished: Air cooled, oil cooled, water cooled.

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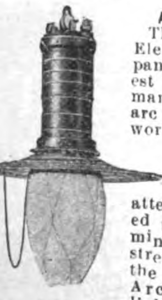
The most satisfactory illumination for residential and suburban districts, parks, and boulevards, where the foliage interferes with the distribution of the light, is provided by a system of small units, spaced closely together and usually operated in series



ARC LAMPS

The General Electric Company is the largest and leading manufacturer of arc lamps in the world. All standard types are manufactured but special attention is called to the Luminous Arc for street lighting, the Intensified Arc for store lighting and the Flame Arc for all large and high interiors. The G-E Vertical Carbon Flame Lamp is the most powerful and efficient lighting unit on the market.

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Where electric power is transmitted at high voltage, G-E transformers change the voltage to that needed by the consumer with perfect safety and with little loss. The sturdy construction of the transformer gives it an exceptionally long life.

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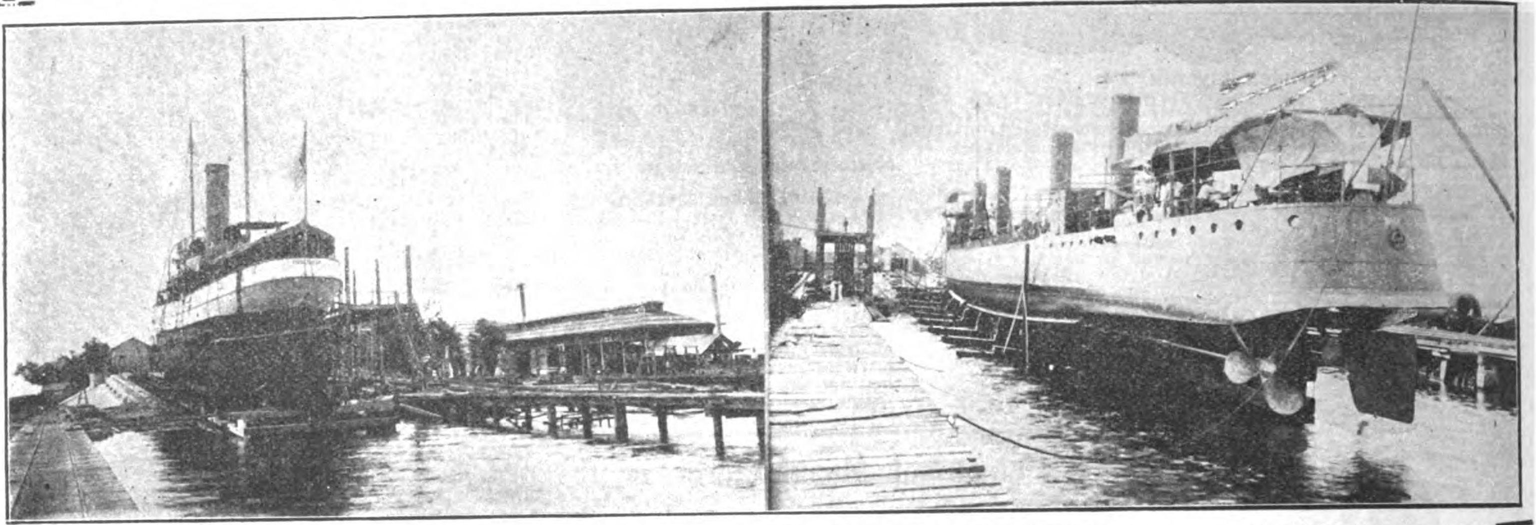

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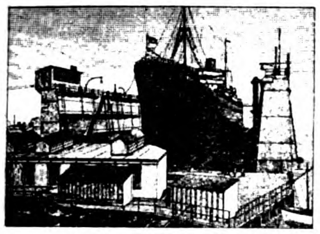

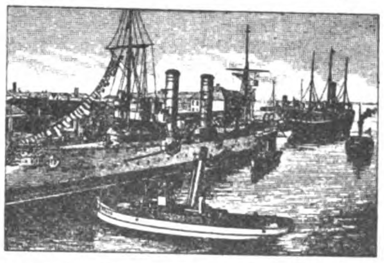

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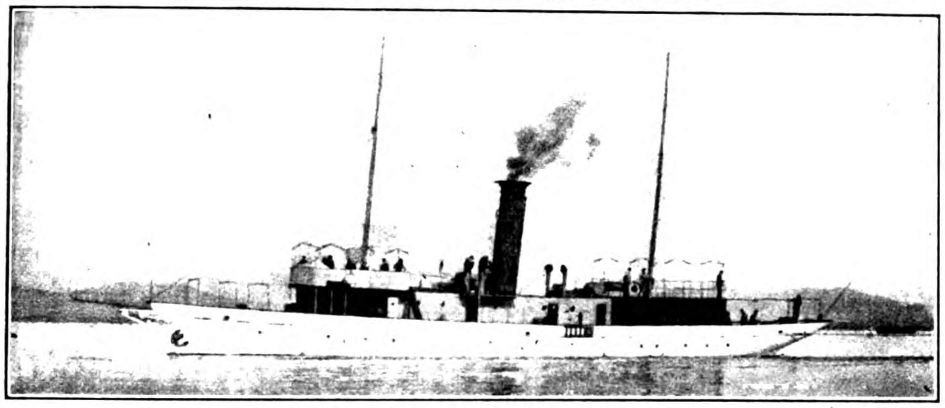

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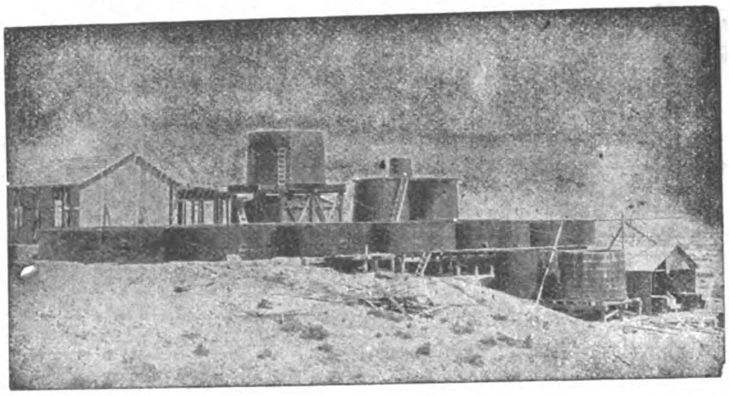

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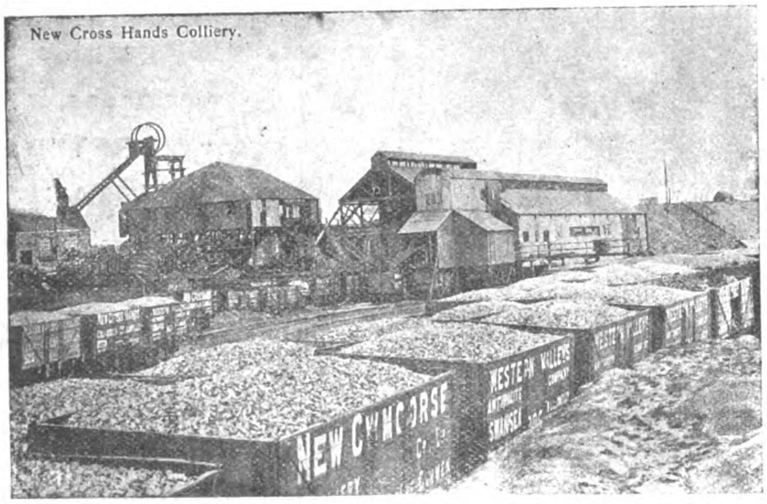

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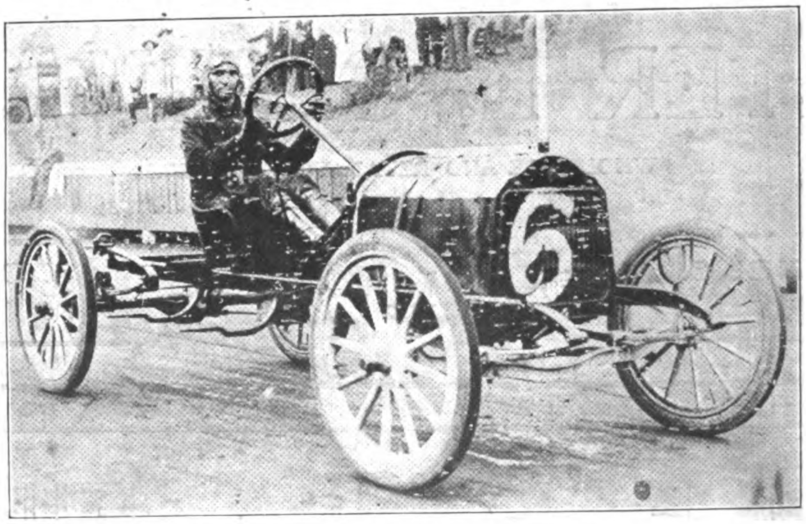

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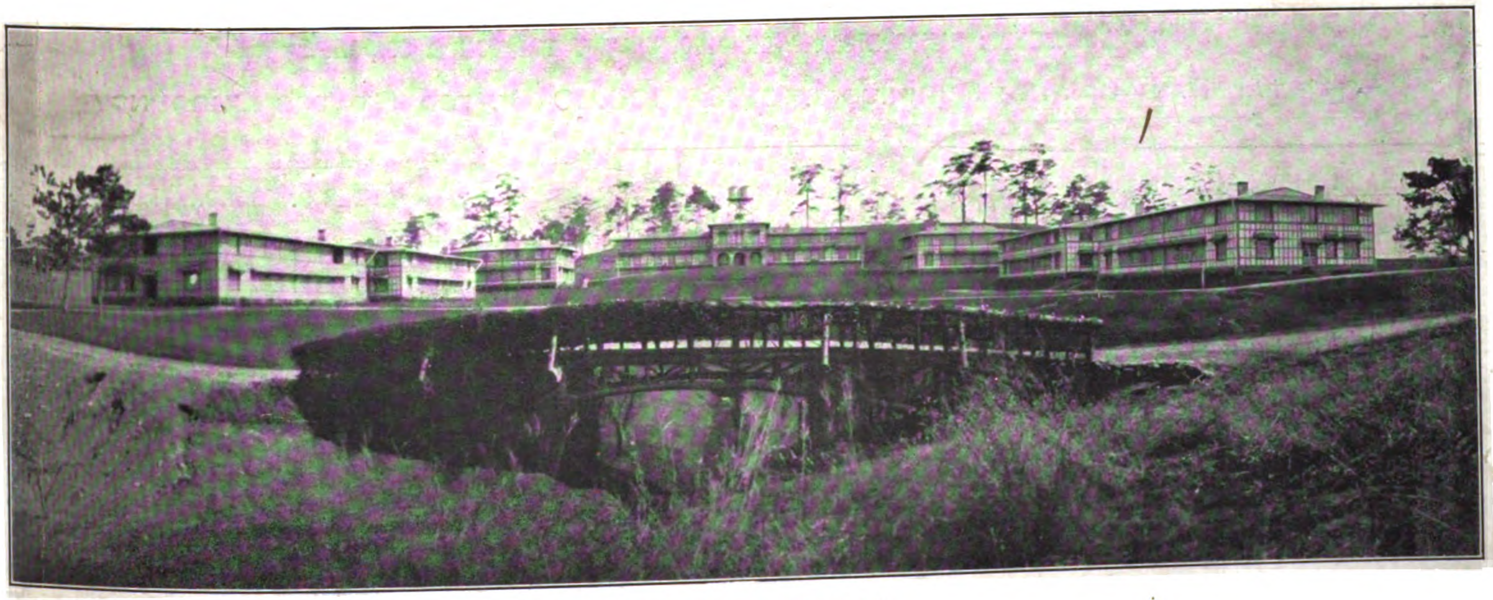

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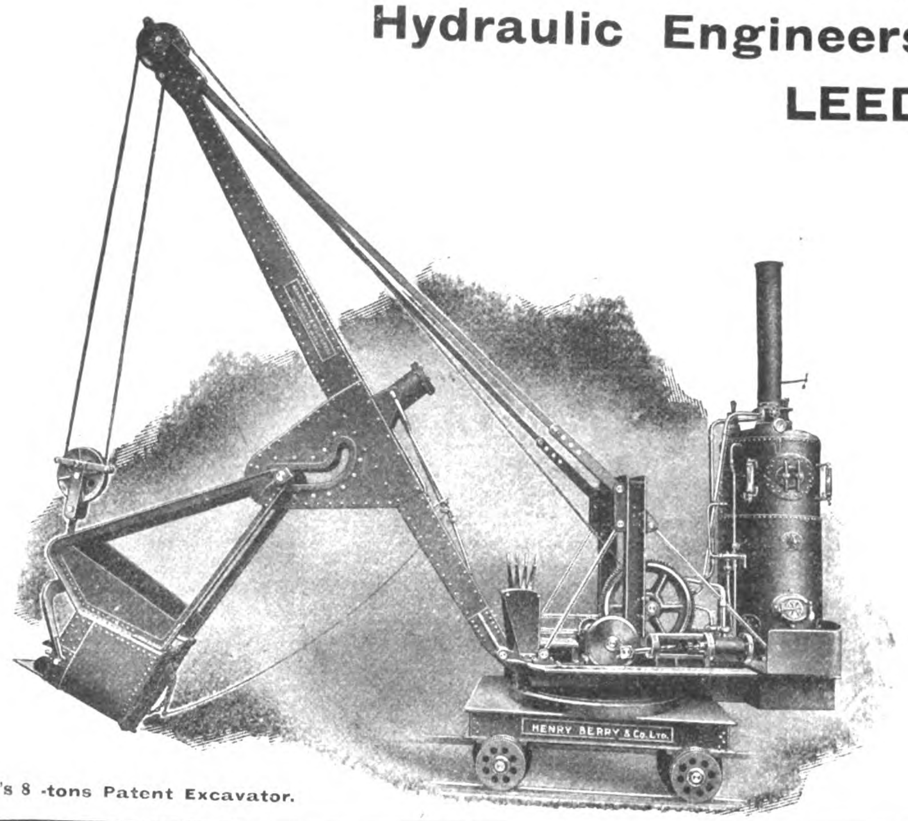

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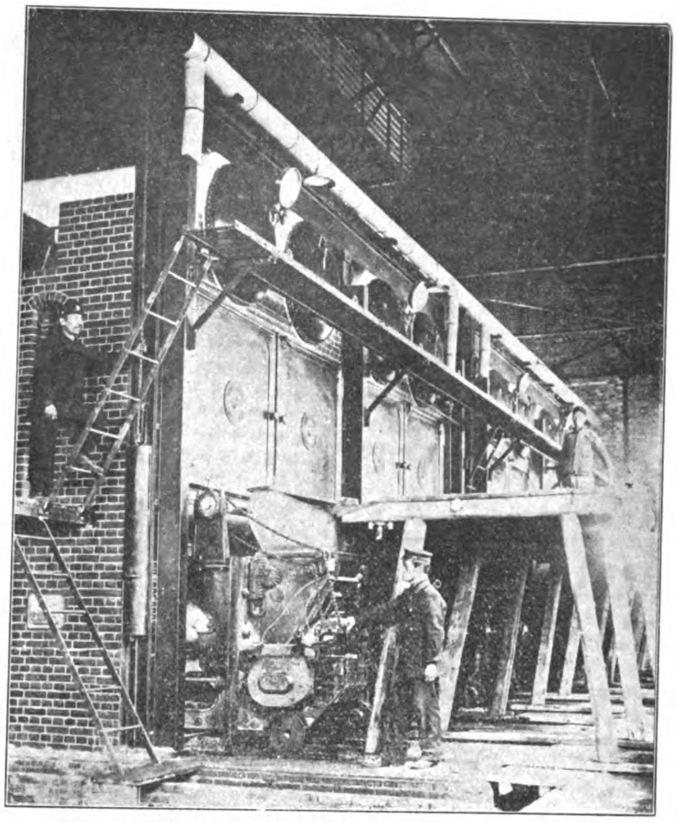

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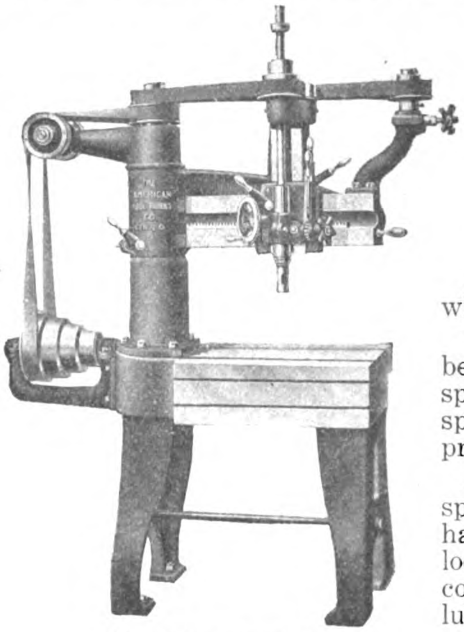
6 spindle speeds 300 to 900 revolutions per minute, suited to high speed—drills up to ¾-inch diameter.

Has no equal for rapid drilling and tapping.

For belt and motor drive.

We do an Enormous Export Business.



2 ft., 3 ft. and 4 ft. Arms

Combines the High Productive Capacity of the Radial with the Unquestionable Efficiency of the Sensitive.

There are absolutely no driving gears in this drill, it being driven by a 2″ double belt running at a high rate of speed, thus transmitting an abundance of power and speed direct to the spindle. The spindle belt is kept at proper tension by turning the star knob shown at the top.

All the driving and idler pulleys are equipped with our special ball bearings, which consist of a double set of hardened and ground ball races and cones, one set being located at each end of the pulley journals. They are so constructed as to be dust proof and form a retainer for the lubricant which needs to be renewed only at long intervals.

This drill will increase your output.

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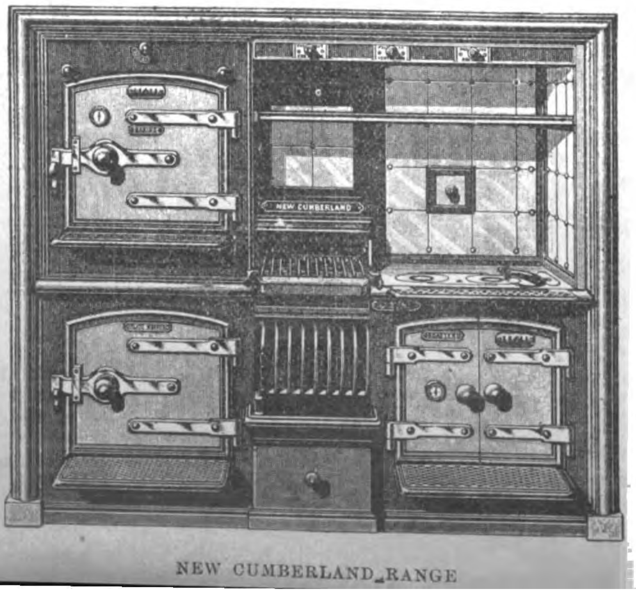

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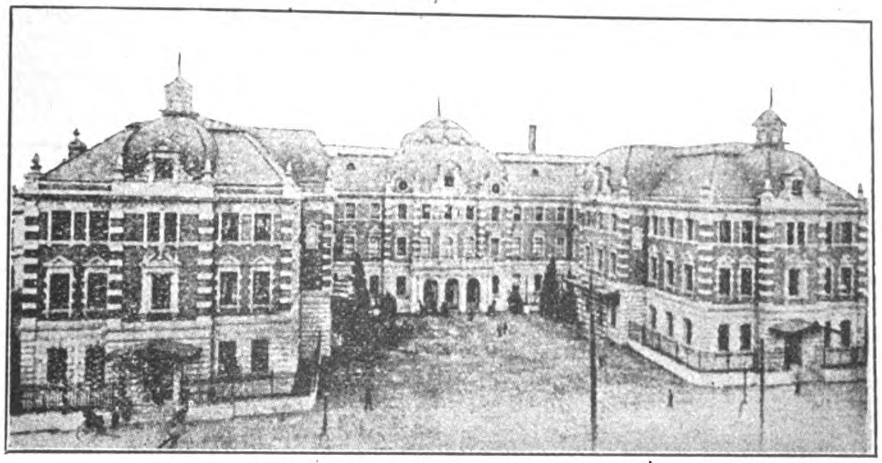

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Containing the offices of the Mitsui Family Council, The Mitsui Mining Co., The Mitsui Bank, and The Mitsui Bussan Kaisha

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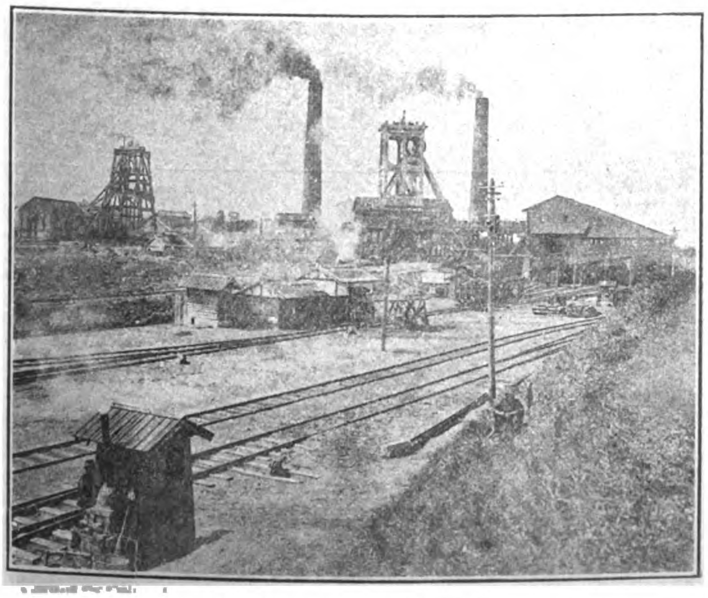
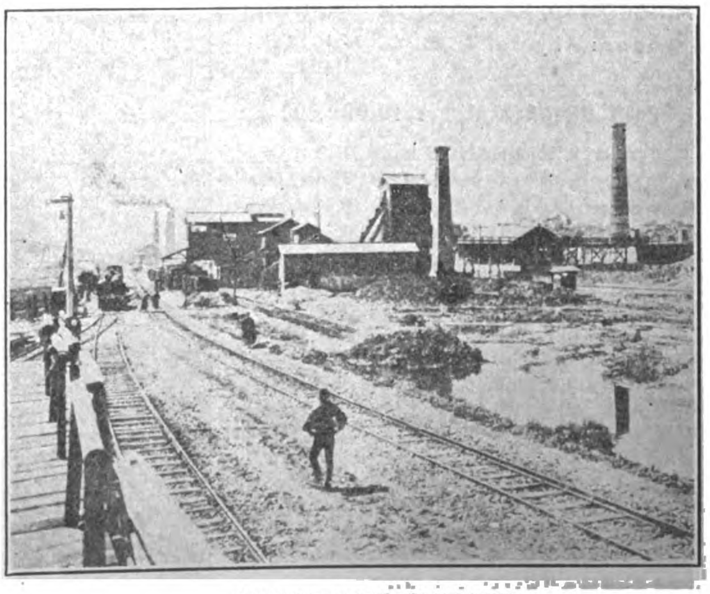


MIYANOHARA PIT, MIIKE MINE



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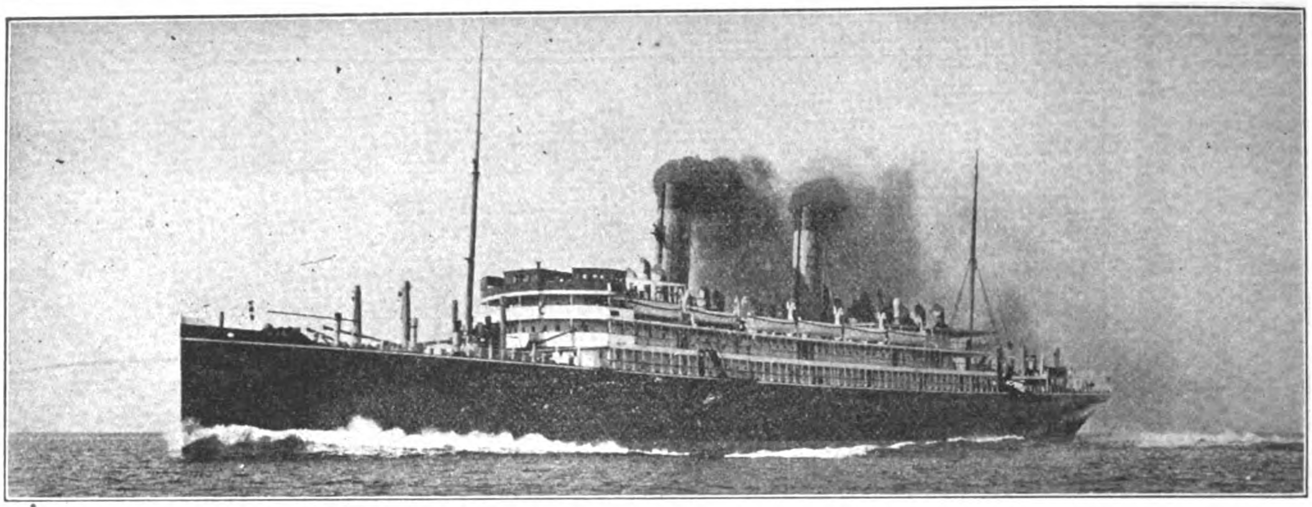

S. S. "CHIYO-MARU"

TRANS-PACIFIC TURBINE DRIVEN PASSENGER STEAMER "CHIYO-MARU" FOR T. K. K.—Built and engined by the Mitsu Bishi Dockyard and Engine Works, Nagasaki, November 1908.—Length (overall), 570 feet 0"; Breadth, moulded, 63 feet 0"; Depth (shelter deck), 46 feet 6"; Gross tonnage, 13,426 tons; Displacement, 18,725 tons; Engines, Parsons' Three Shaft Arrangement; Boilers, Single Ended Scotch Boilers (13); I. H. P., 19,591; Speed, 21 knots. (This photo was taken on her full speed trials the 13th October, 1908.)

MITSU BISHI DOCKYARDS & ENGINE WORKS, NAGASAKI

DOCK NO. 1.

EXTREME LENGTH	523	FT.
LENGTH ON BLOCKS	513	,,
WIDTH OF ENTRANCE ON TOP	88	,,
,, ,, ,, ,, BOTTOM	77	,,
WATER ON BLOCKS AT SPRING TIDE	26½	,,

DOCK NO. 2.

EXTREME LENGTH	371	FT.
LENGTH ON BLOCKS	360	,,
WIDTH OF ENTRANCE ON TOP	66	,,
,, ,, ,, ,, BOTTOM	53	,,
WATER ON BLOCKS AT SPRING TIDE	22	,,

DOCK NO. 3.

EXTREME LENGTH	722	FT.
LENGTH ON BLOCKS	714	,,
WIDTH OF ENTRANCE, TOP	99½	,,
,, ,, ,, BOTTOM	88½	,,
WATER ON BLOCKS AT SPRING TIDE	34½	,,

THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST,

WITH SPECIAL FACILITIES FOR HANDLING THE HEAVIEST CASTINGS AND THE REPAIRING OR BUILDING OF SHIPS, ENGINES AND BOILERS, ALSO ELECTRICAL WORK.

LARGE STOCK OF MATERIAL, AND FITTINGS ALWAYS ON HAND

THE POWERFUL SALVAGE STEAMER "OURA-MARU" (712 TONS, 700 I. H. P.) EQUIPPED WITH NECESSARY PUMPS AND GEAR, IS ALWAYS READY AT SHORT NOTICE.

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Length	380 ft.
Width	50 ft.
Depth over Sill	20 ft.

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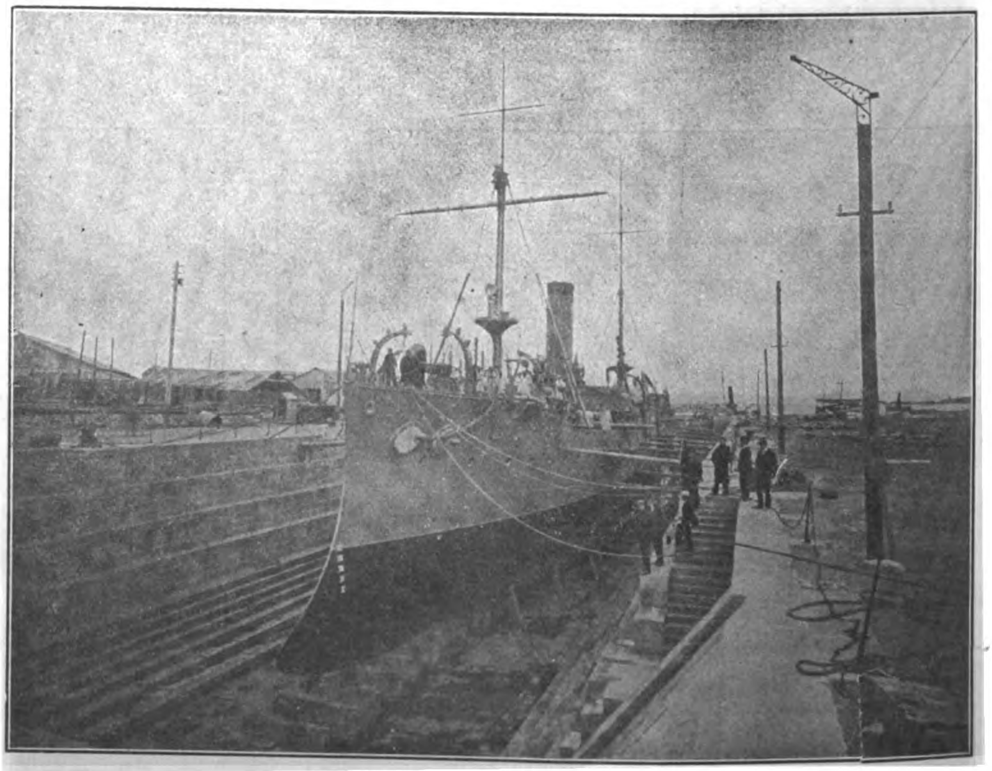

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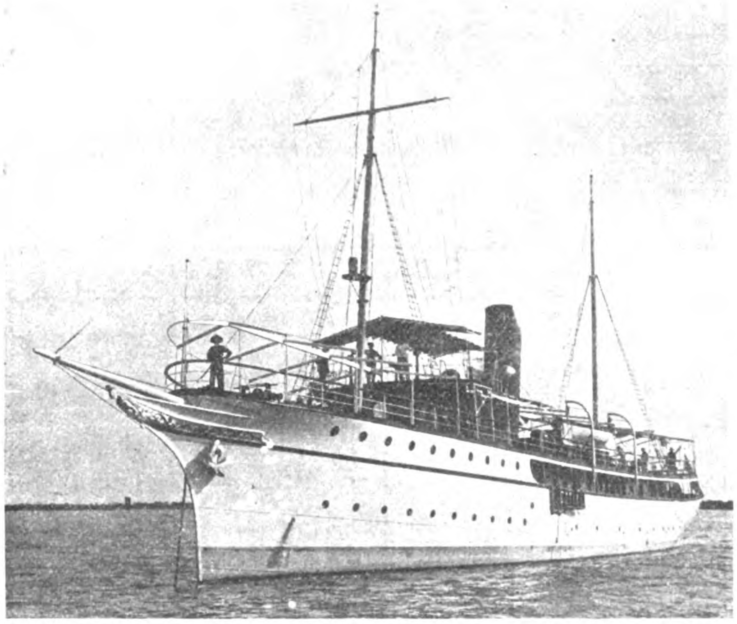

Yacht of H. I. H. Prince Hsui, Built by the Kiangnan Dock & Engineering Works.

KIANGNAN DOCK

Length over all, 385′; length on blocks, 575′; water on sill, 19′; dock entrance, top 70′, bottom, 60′.

The dock accommodates the largest coasting steamers and is equipped with complete modern facilities for handling work thoroughly and promptly.

The new machine and boiler shops, and the foundry and shipbuilding plant are equal to any this side of Suez.

Patent slipway for small steamers and launches. Complete boat and launch building shops.

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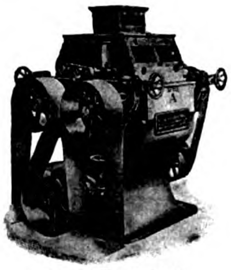
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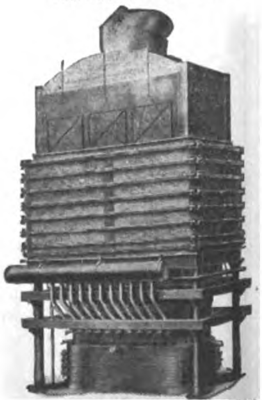
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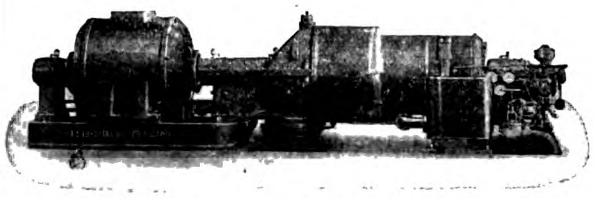
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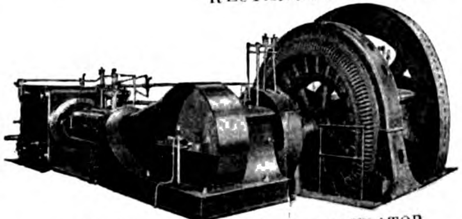
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Engineers, Boilermakers, Repairers

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DRY DOCK 787 FT. × 88 FT. DEPTH 34½ FT.

SLIPWAYS
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NO. 2 993½ FT.
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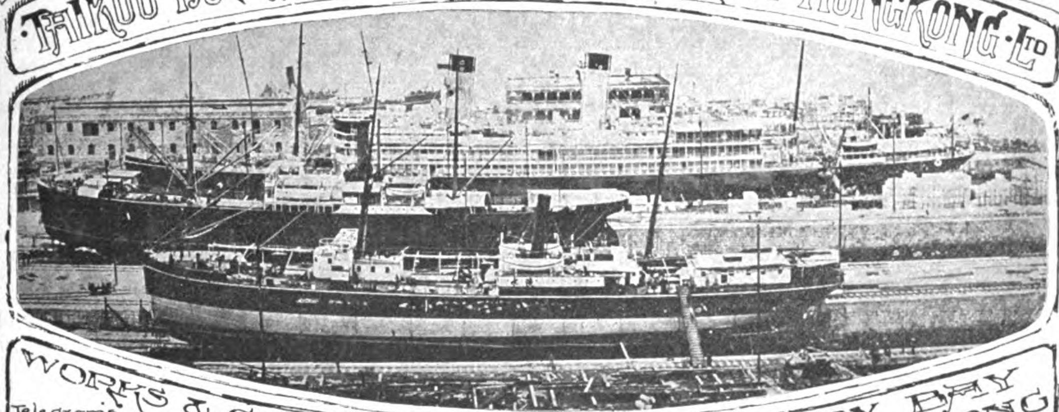

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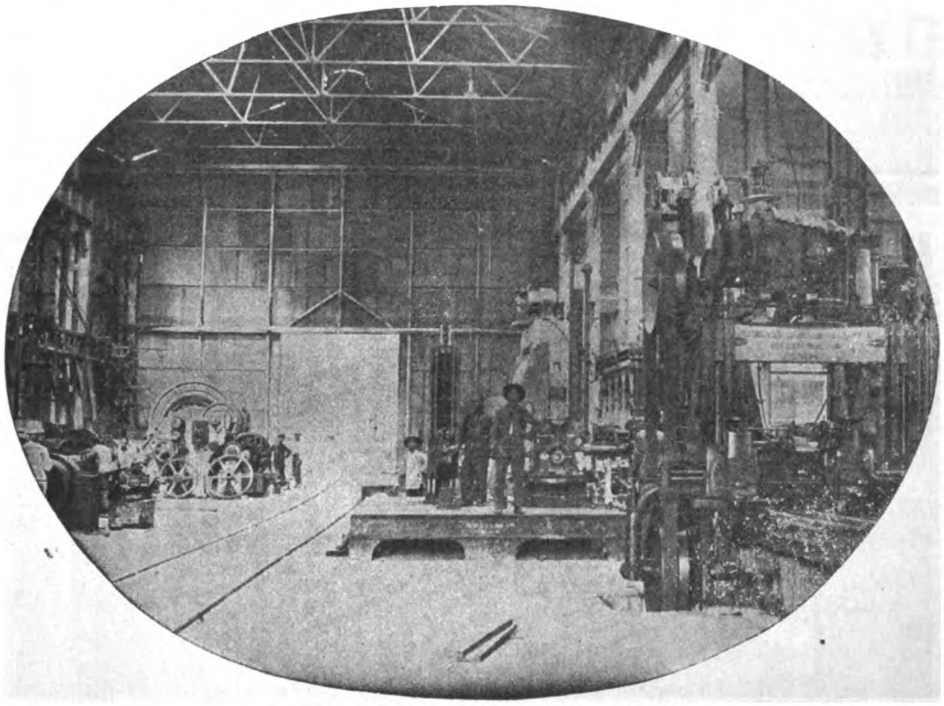

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THE POWER FOR THE ESTABLISHMENT is generated by Gas Producers, on the Mond System, supplying 4 Cockerill Gas Engines of 3,000 collective horse power, driving Electrical Generators, and is transmitted throughout the Works by means of Electrical Motors.

AN ELECTRIC DERRICK CRANE capable of lifting weights up to 100 tons, is erected on the Sea Wall, and 14 Electric Overhead Travelling Cranes ranging from 5 tons to 100 tons, are fitted throughout the Workshops.

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THE DOCK PUMPS consist of 2 sets of Centrifugal, Electrically driven, pumps, together capable of emptying the Dock with 35 feet of water on the Sill in 2¾ hours.

THE MACHINERY in the Engine Works is laid out for dealing with the heaviest classes of Engines.

THE SLIPWAY CARRIAGES are of the latest pattern by Morton of Leith, and the Winding Gear consists of large electrically driven winches operating massive wire cables.

TENDERS SUBMITTED AND ESTIMATES GIVEN FOR BUILDING AND REPAIRING ALL CLASSES OF VESSELS; ALSO FOR EVERY DESCRIPTION OF ENGINE AND BOILER, MECHANICAL, ELECTRICAL AND CONSTRUCTIONAL WORK

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Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians.

All classes of CONSTRUCTIONAL and GENERAL ENGINEERING WORK undertaken, also LOCOMOTIVES, RAILWAY ROLLING STOCK and PLANT, BRIDGES, etc.

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AUXILIARY MACHINERY for MARINE and LAND Purposes.

LAND and MARINE BOILERS of all sizes and classes.

GALVANIZING by the Electrical process.

IRON and BRASS CASTINGS of all descriptions.

FORGINGS in IRON and STEEL for SHIPS, ENGINES, and LAND WORK, large and small.

We make a specialty of HIGH SPEED MOTOR BOATS for PASSENGER and CARGO Traffic.

ALL CLASSES of COCKS, VALVES and FITTINGS in IRON and BRASS supplied.

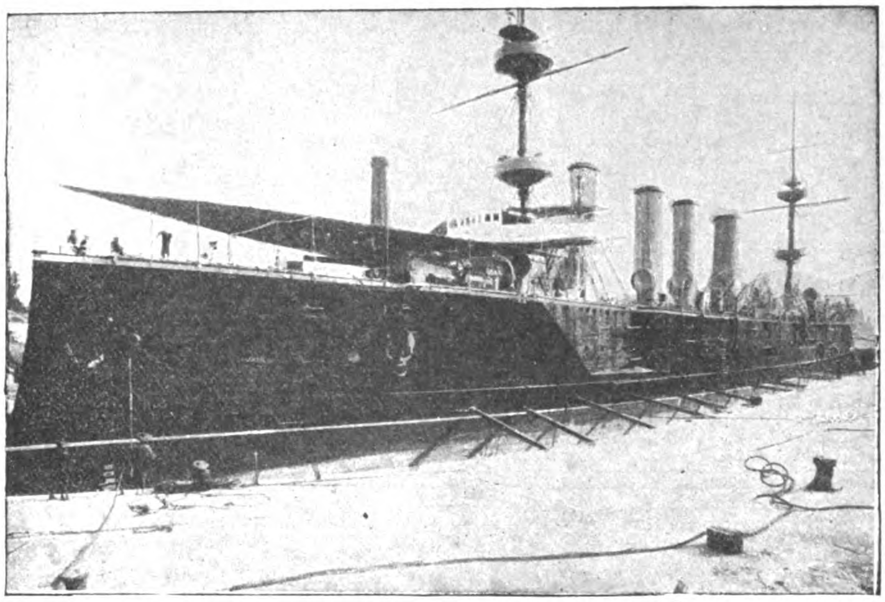
BOLTS, NUTS and RIVETS MANUFACTURED at SHORT NOTICE.

FINISHED NUTS in BRASS and IRON.

A LARGE STOCK of STEEL and IRON PLATES, BARS and ANGLES, always in hand.

The Company possesses SIX GRANITE DOCKS and TWO PATENT SLIPWAYS and these are equipped for EXPEDITIOUS WORK. Our plant is of the most modern type throughout.

Ship Owners and Captains are assured that DOCKING and REPAIRS are carried out PROMPTLY and at MODERATE CHARGES.



H. M. S. POWFRFUL IN NO. 1 DOCK, KOWLOON

The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	*Length on Keel Blocks*	*Entrance Breadth*	*Depth Over Sill at Ordinary Spring Tides*	*Rise of Tide*	
				Springs	*Neaps*
KOWLOON	*Feet*	*Feet*	*Feet*	*Feet*	*Feet*
No. 1 Dock, Kowloon.........	700	86 ft. top / 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon.	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon.	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon...	240	60′	14′	7′ 6″	—
Patent Slip, No. 2, Kowloon...	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock...........	466	85′ 6″	20′	7′ 6′	—
ABERDEEN					
Hope Dock	430	84′	23′	7′ 6″	—
Lamont Dock................	333	64′	16′	7′ 6″	—

Please Address Enquiries to the Chief Manager, R. M. DYER, B. Sc., M. I. N. A., Kowloon Dock, Hongkong.

Telephone No. 13 K. Head Office, Kowloon.

Town Office, Queen's Buildings Telephone No. 20, Hongkong

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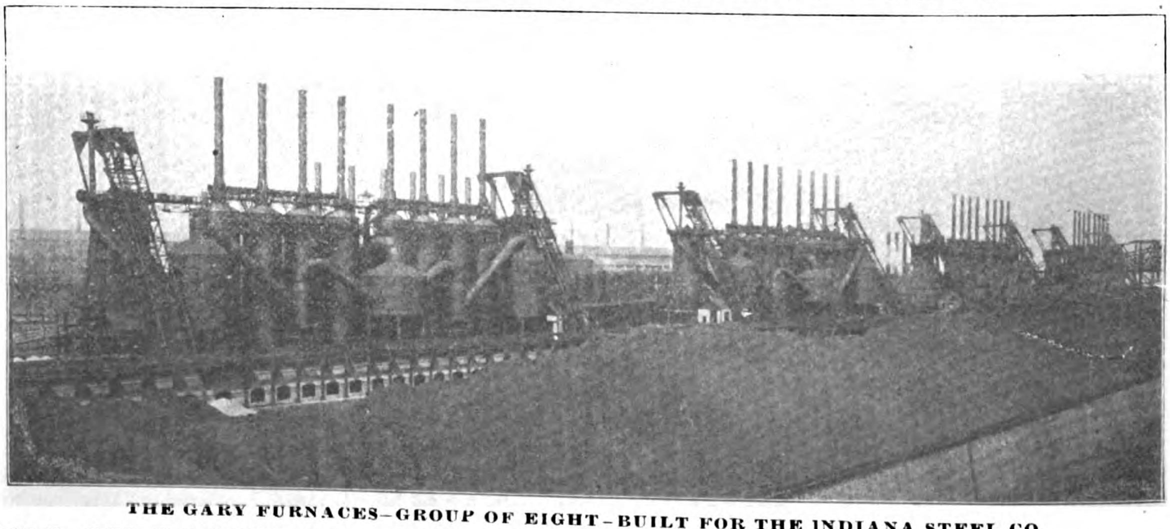

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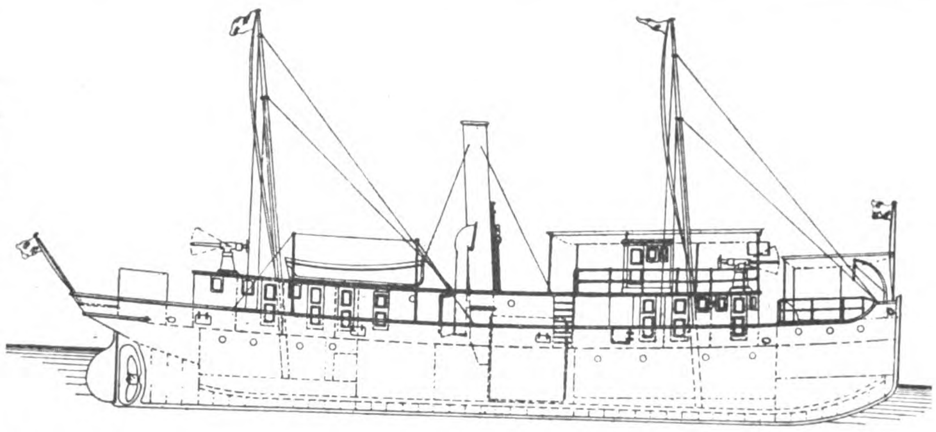

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COAST AND RIVER STEAMERS, TUGBOATS, LAUNCHES, LIGHTERS, PONTOONS, SHALLOW DRAFT SIDE OR STERN WHEEL STEAMERS. ENQUIRIES SOLICITED. PLANS, SPECIFICATIONS AND ESTIMATES FURNISHED. ALL CLASSES OF ENGINEERING WORK UNDERTAKEN

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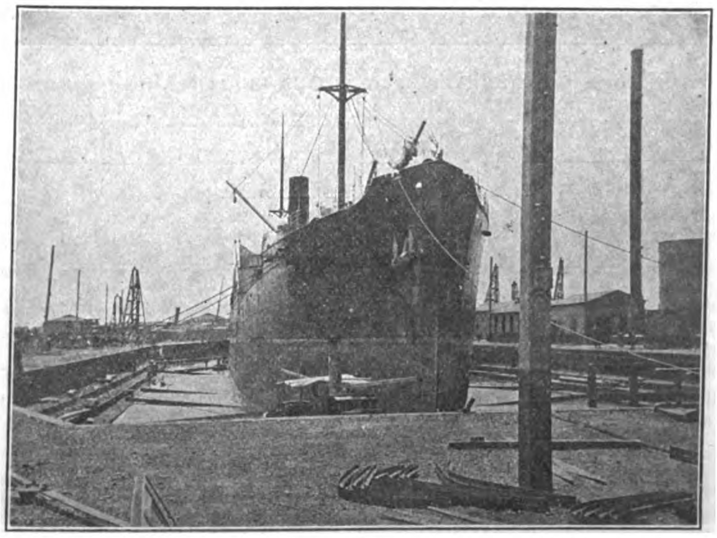
THE DOCK, WORKS AND OFFICE ARE LOCATED ON THE SHANGHAI SIDE OF THE RIVER, 15 MINUTES BY ELECTRIC TRAM FROM HEART OF THE CITY

THE WORKS ARE EQUIPPED WITH THE MOST MODERN MACHINERY, CAPABLE OF HANDLING THE LARGEST MARINE ENGINEERING WORK



VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK

LENGTH ON BLOCKS 455′0″
„ OVERALL - 469′0″
WIDTH, ENTRANCE 74′0″
„ SILL - - 64′0″
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21′0″
DEPTH ON 3′0″ BLOCKS (H. W. O. S. TIDES) 19′0″
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
WORKSHOPS LOCATED AT HEAD OF DOCK

OFFICE, DOCK & WORKS, 37 YANGTSZEPOO ROAD, SHANGHAI

TELEGRAPHIC ADDRESS: "SPEEDY." CODE: A.B.C., 5TH EDITION — TELEPHONE 703. — MANILA AGENT, F. L. STRONG

THE SHANGHAI DOCK AND ENGINEERING CO., LTD.

DOCK OWNERS — ENGINEERS — SHIP BUILDERS — FOUNDERS

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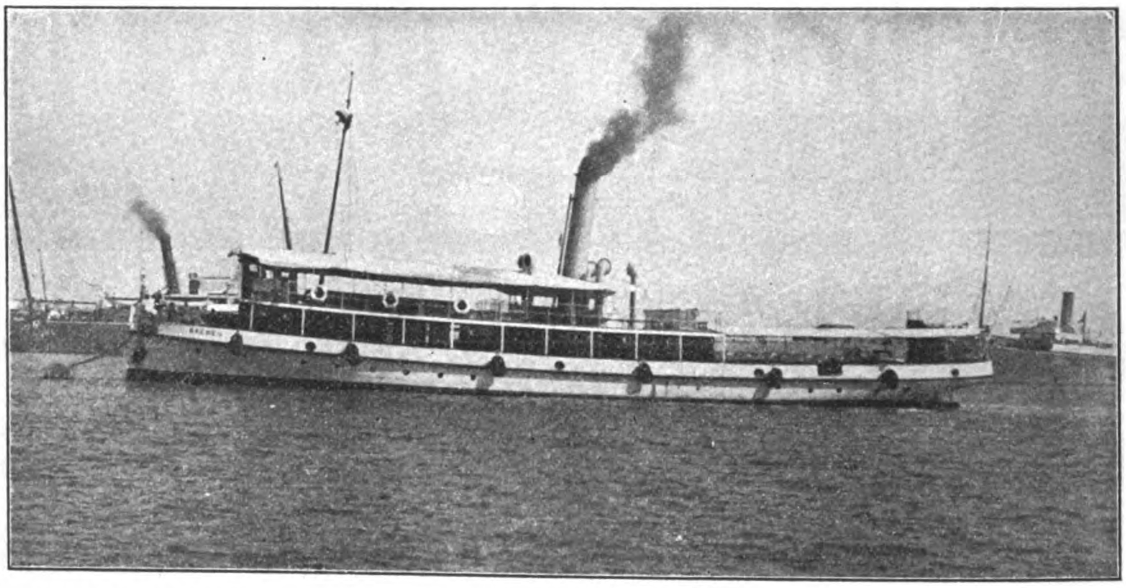

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The Docks are five in number, ranging in length from 360 feet to 560 feet, and breadth of entrance from 57 feet to 82 feet, with the depth of water on the sill from 16 feet to 24 feet.

The Dock charges are very moderate.

The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops are provided with the latest improvements in tools, traveling cranes of 70 tons' capacity, hydraulic and pneumatic machinery.

Lit up by Electric light with railway lines through workshops and yards.

Powerful salvage appliances can be supplied at short notice. Enquiries immediately attended to.

Estimates given for all classes of work; Coast Steamers, Side and Stern-Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools, Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and engineering accessories generally.

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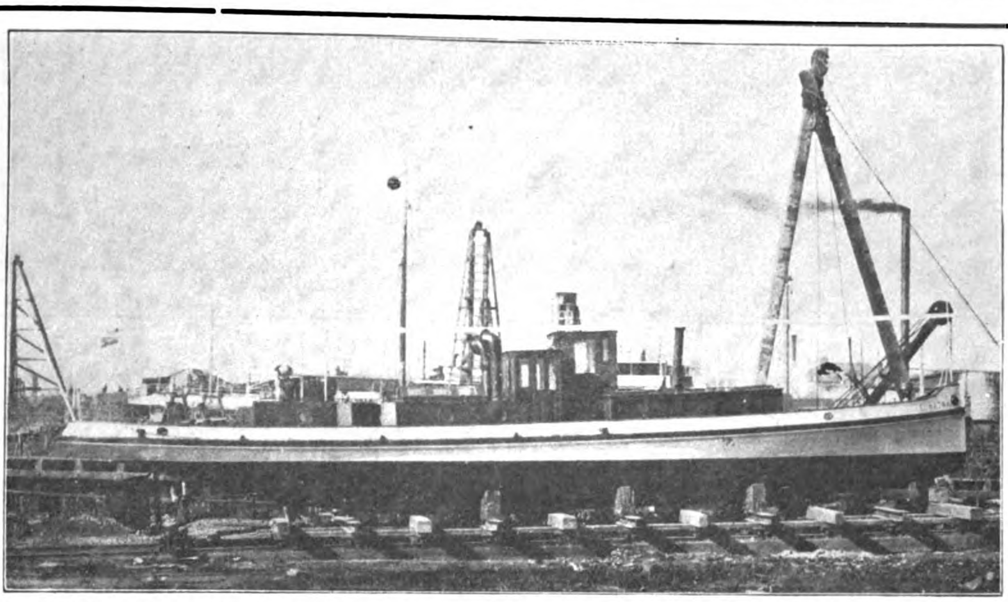

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ESTIMATES given for every description of Engineering and Constructional work and repairs, including supplying and installing of HOT WATER and STEAM HEATING in all its branches and HOT and COLD WATER SUPPLIES.

THE WORKS are electrically driven, and are equipped throughout with up-to-date machinery and labour saving devices, including an HYDRAULIC PLANT, and appliances to undertake constructing or repairing SHIPS, ENGINES, BOILERS, etc.

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RAILWAY COACHES AND GOODS WAGONS ASSEMBLED—STRUCTURAL STEEL WORK ERECTED

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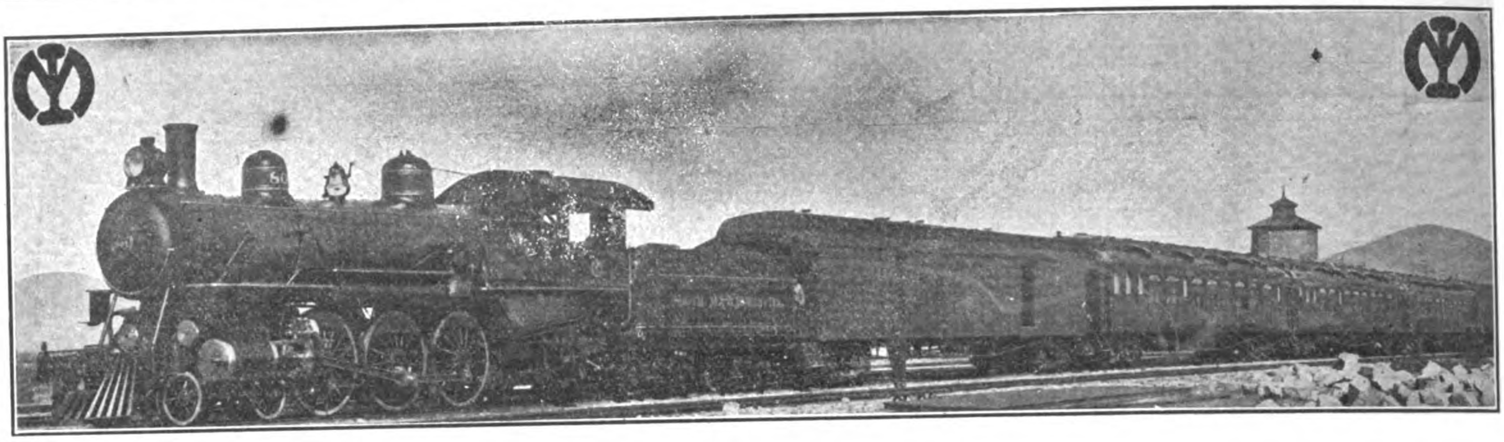

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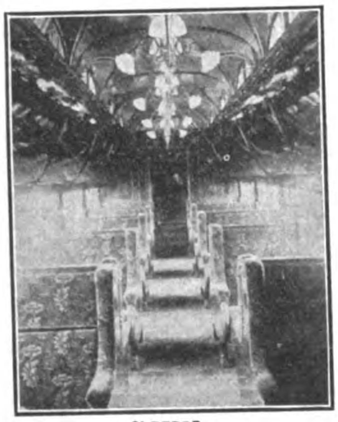

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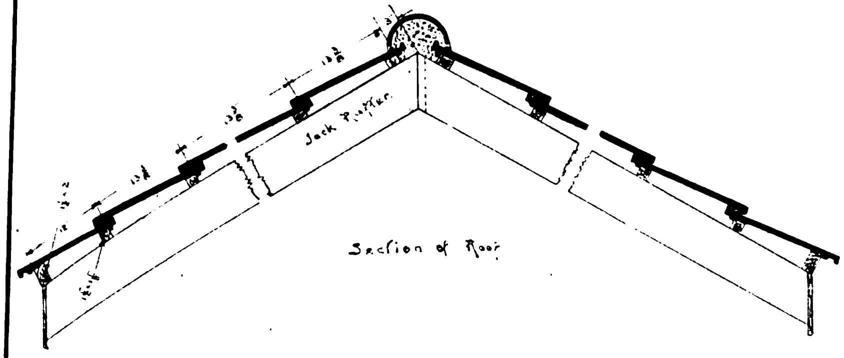

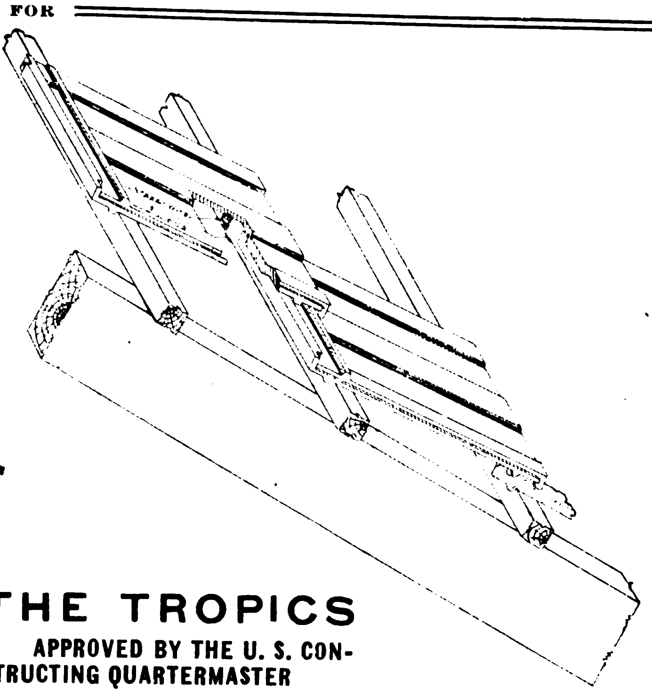

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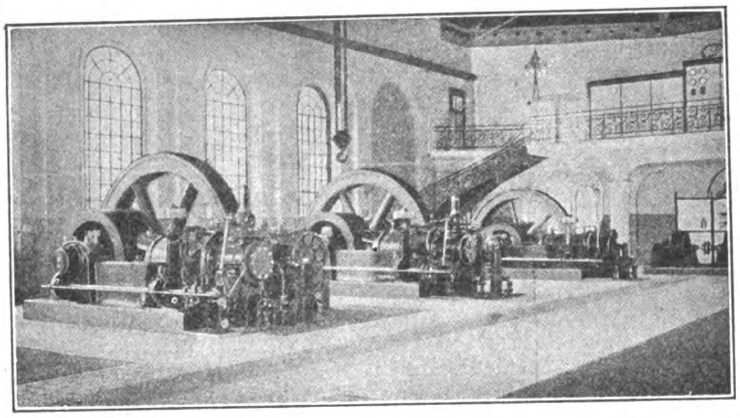

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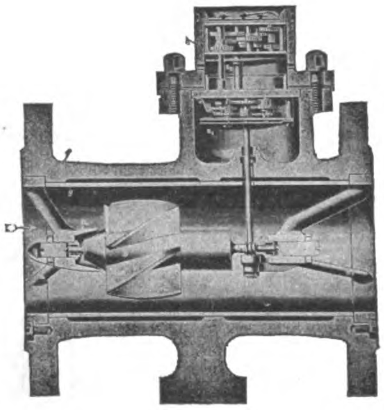

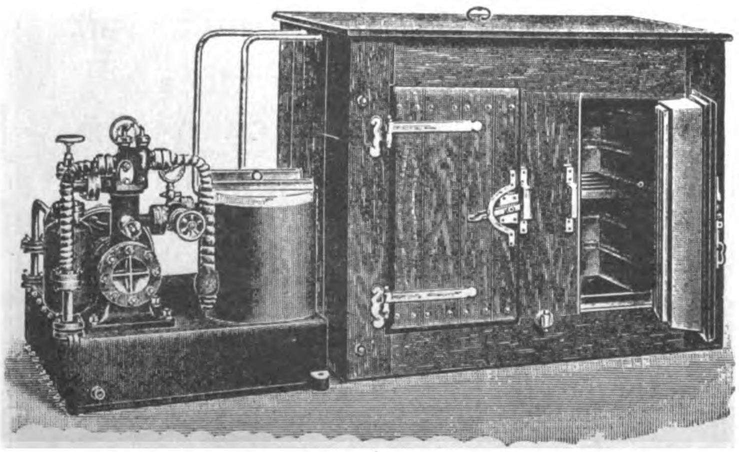

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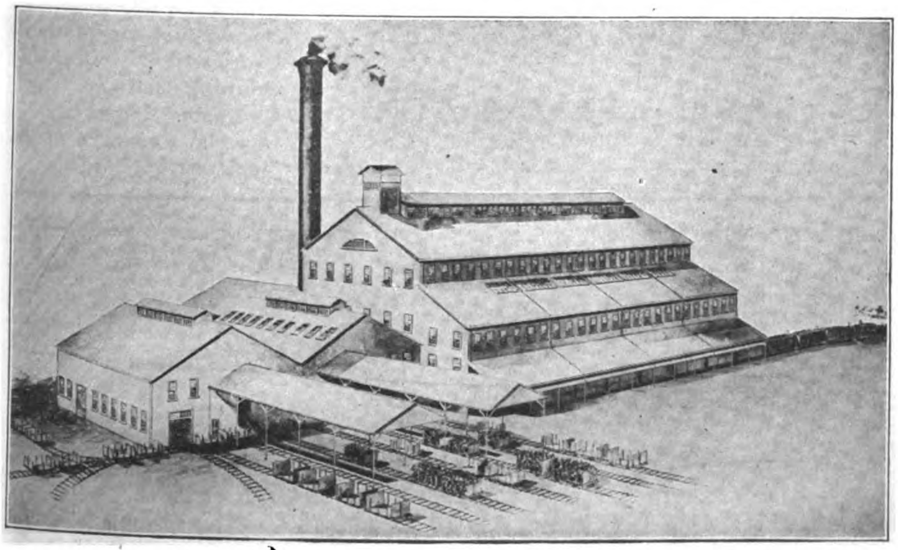

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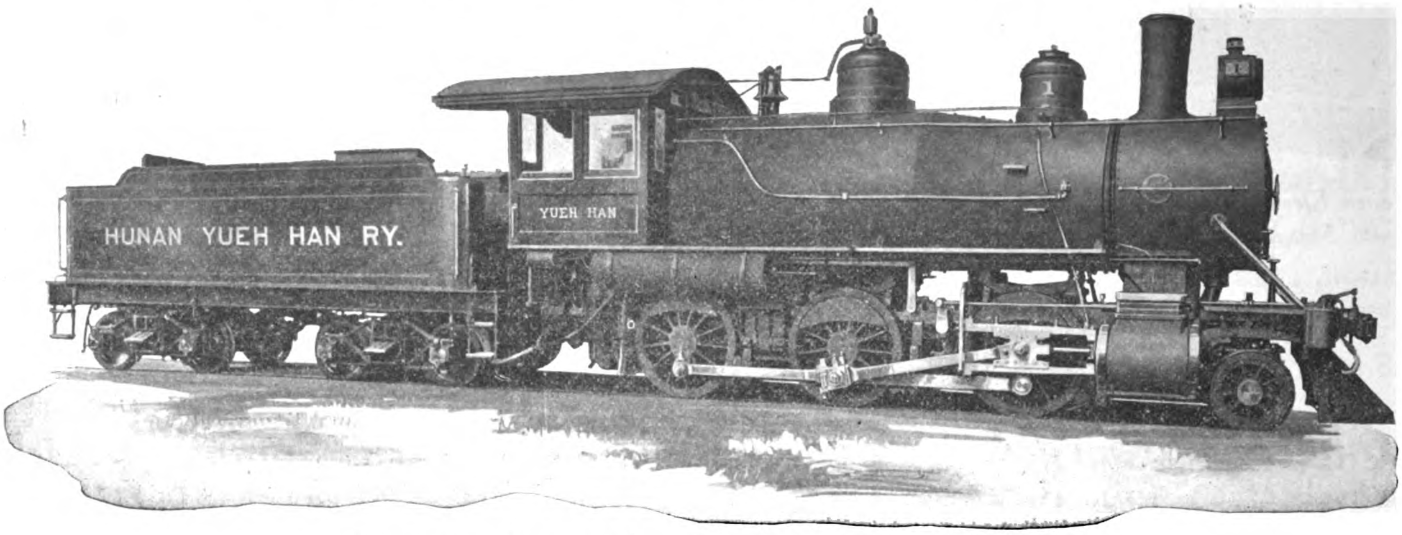

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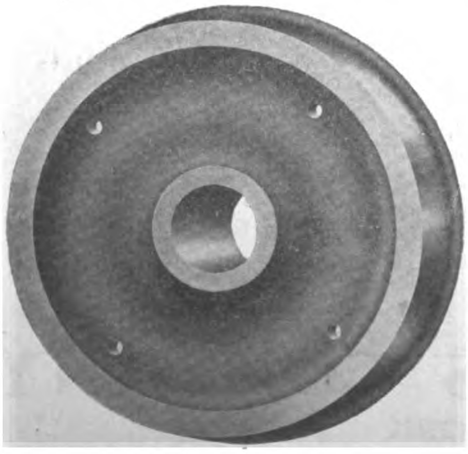

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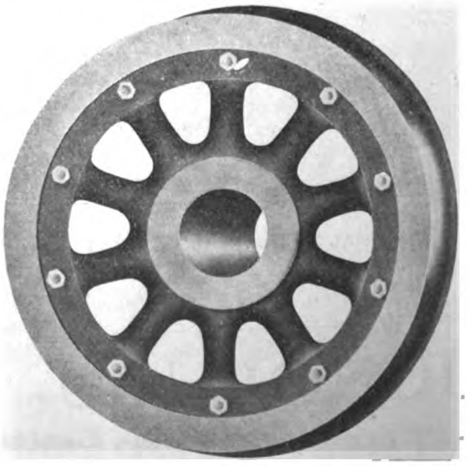

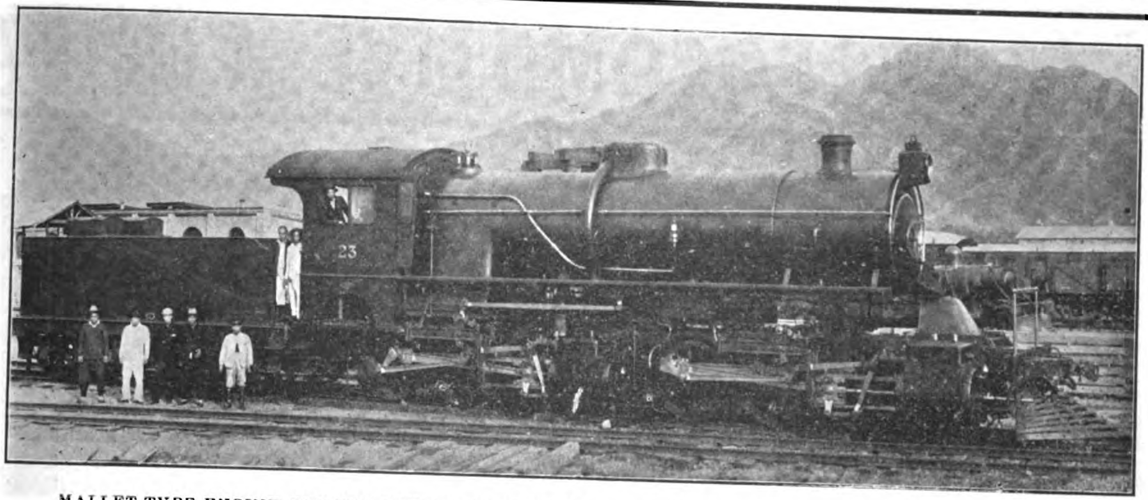

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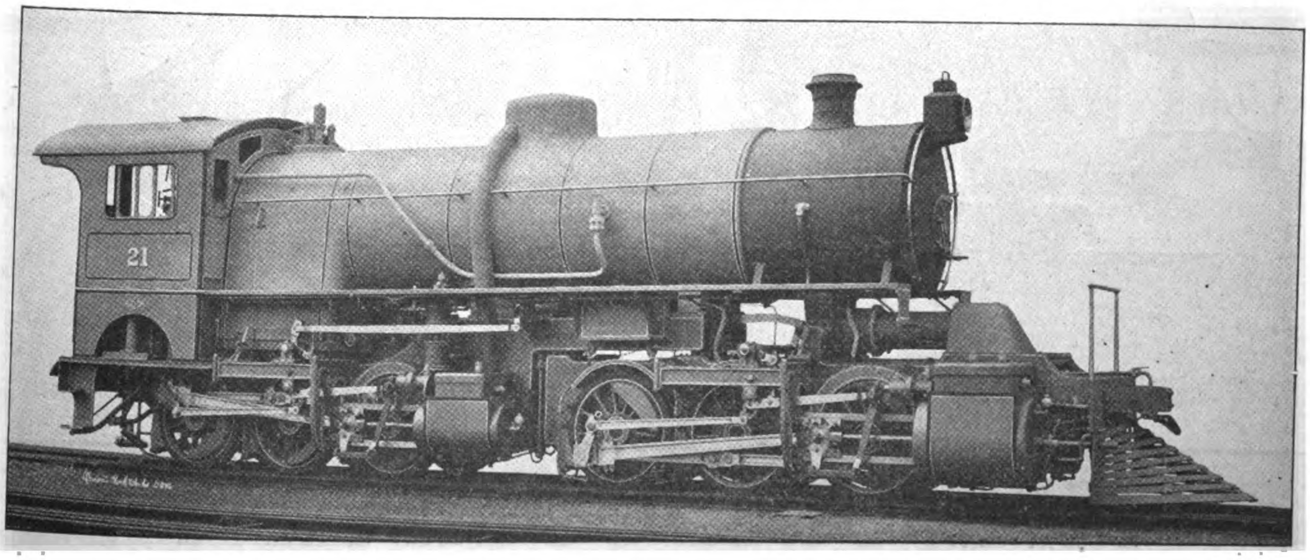

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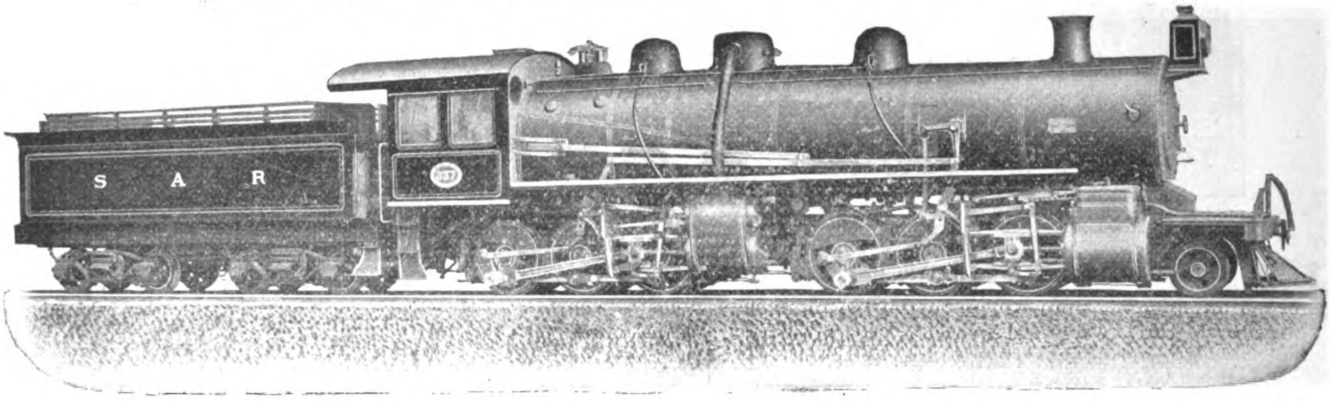
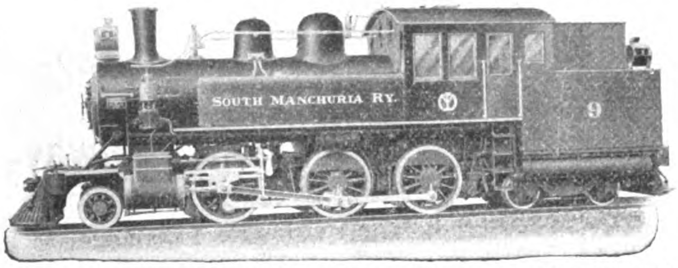
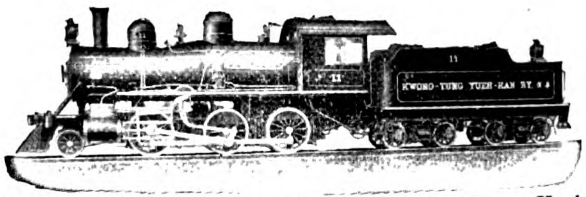


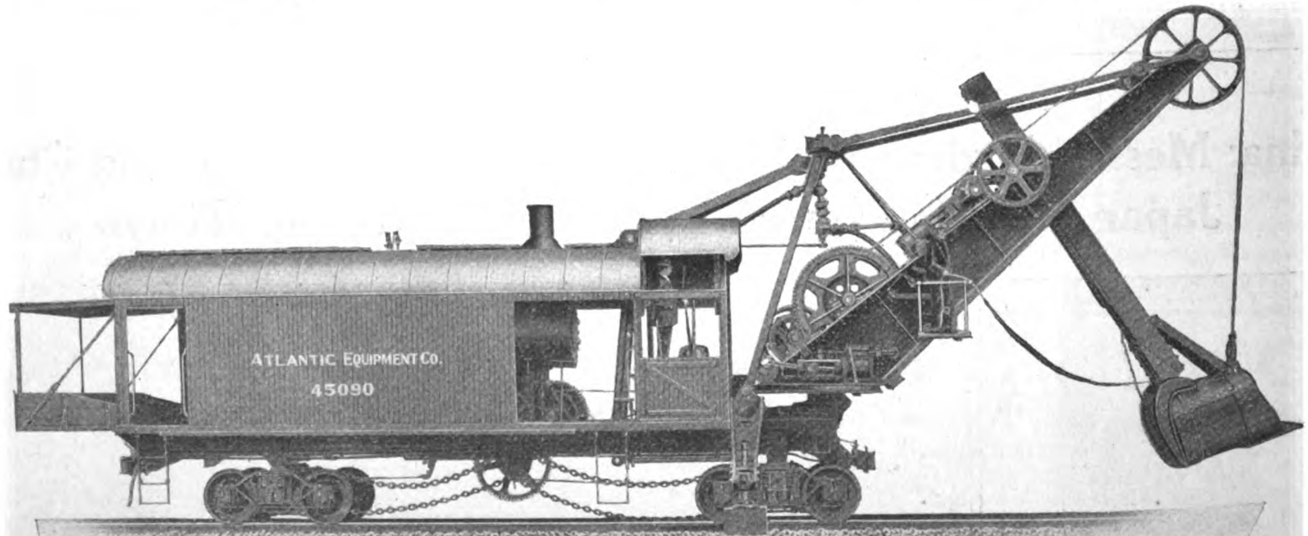
Articulated compound locomotive built for South African Government Railways to operate heavy trains on roads with steep grades and sharp curves.



Six coupled, double end locomotive built for South Manchuria Railway.



Mogul type locomotive built for Kwong-Tung Yueh Han Railway.



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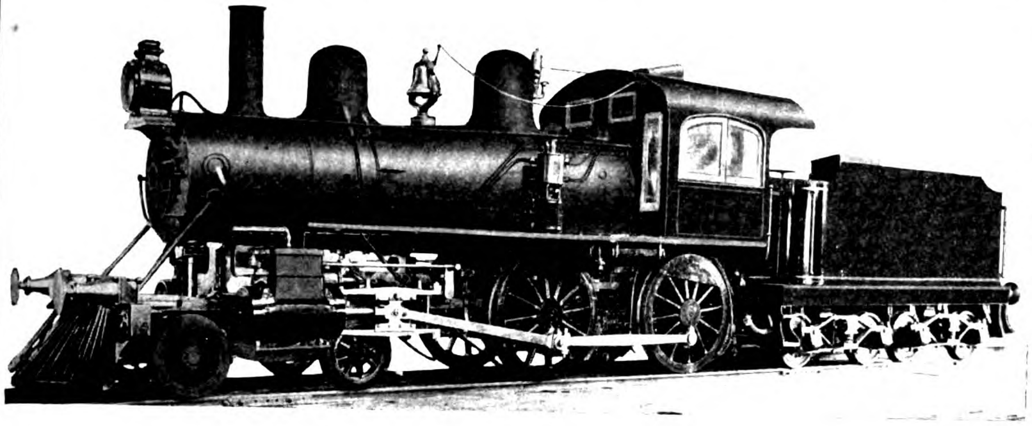

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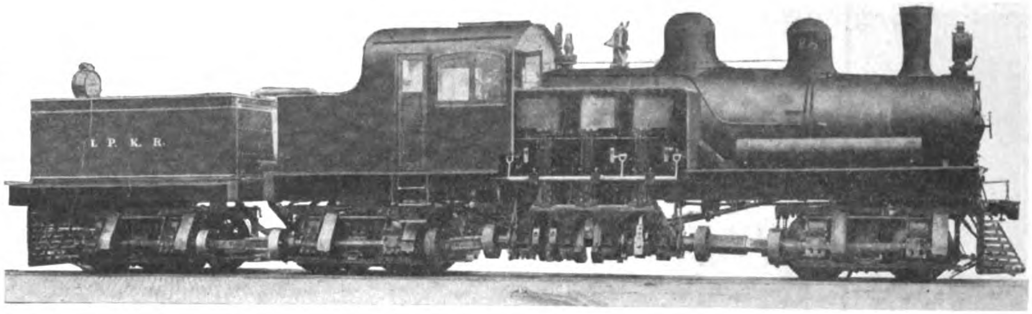

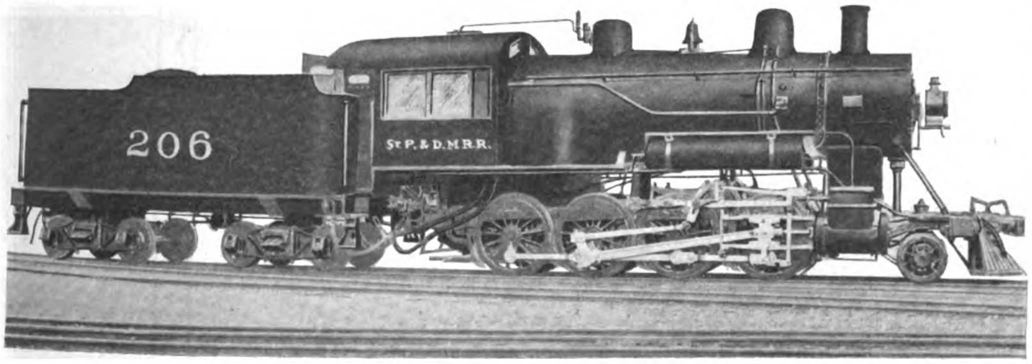

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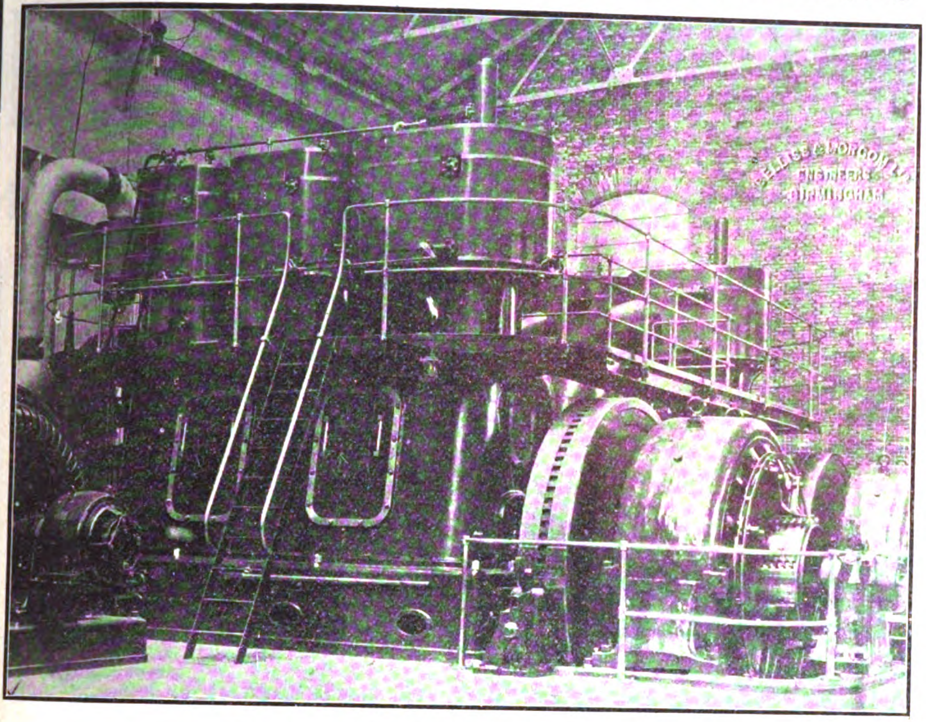

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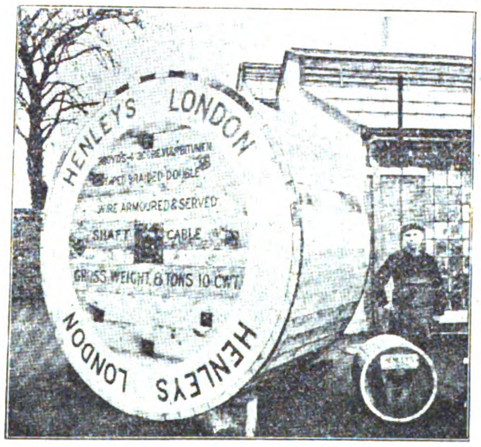

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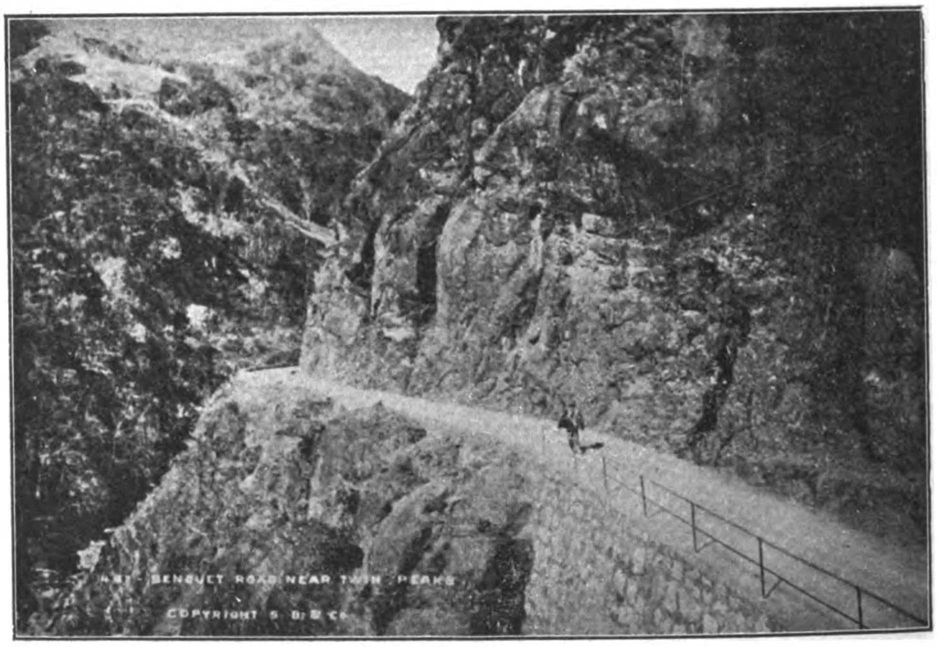

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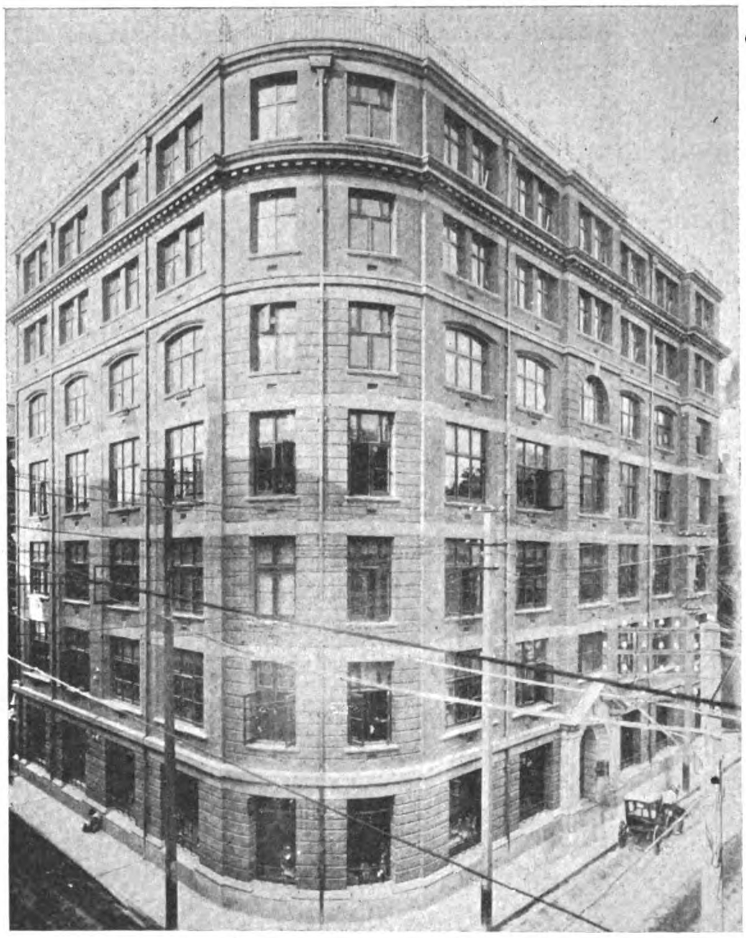

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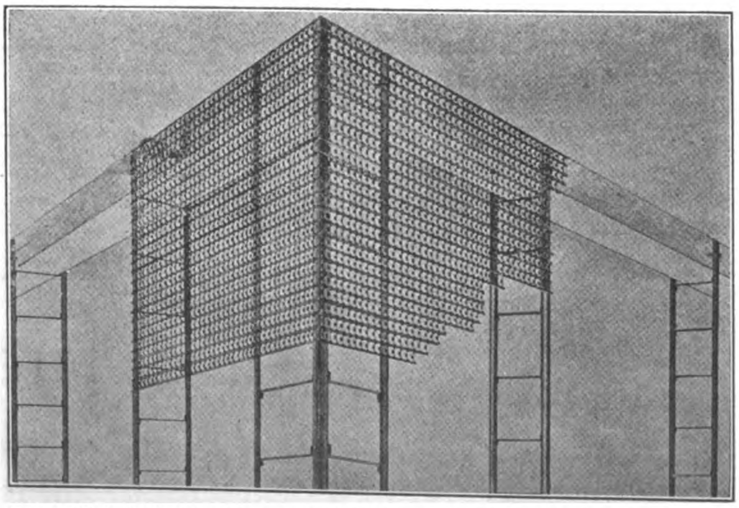

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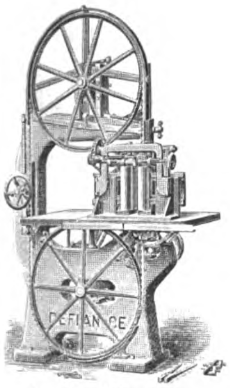

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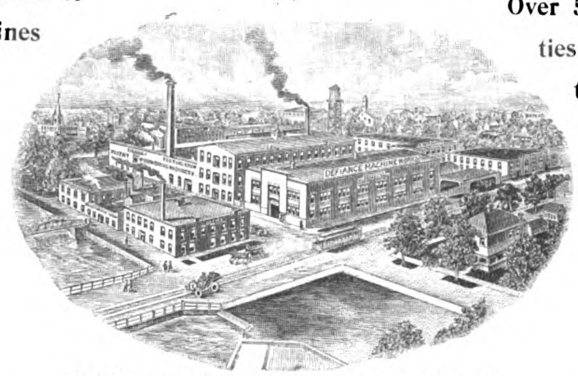

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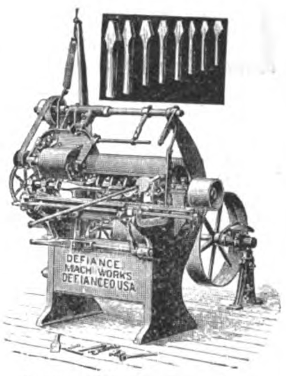

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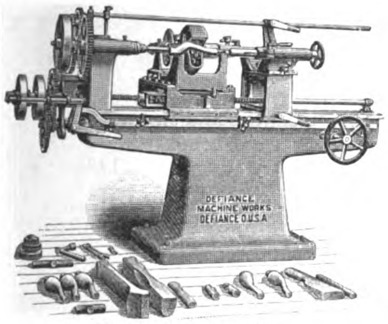

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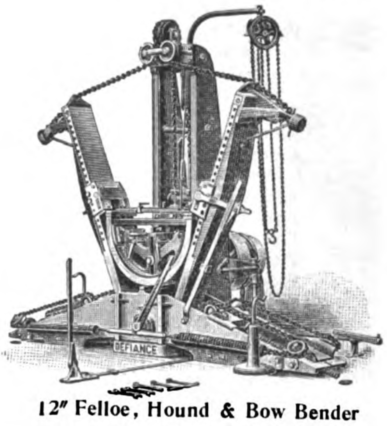

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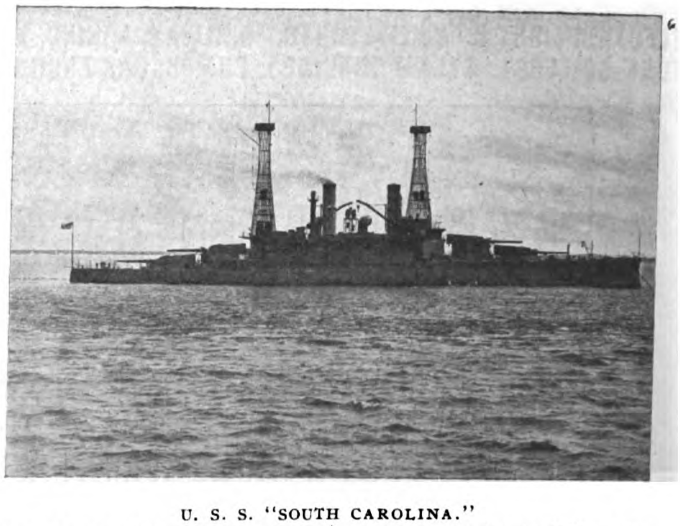

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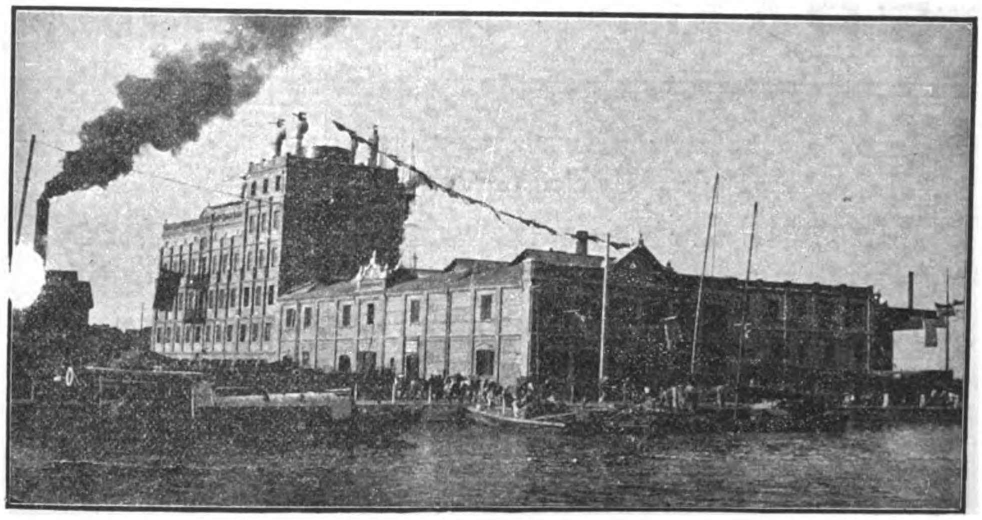

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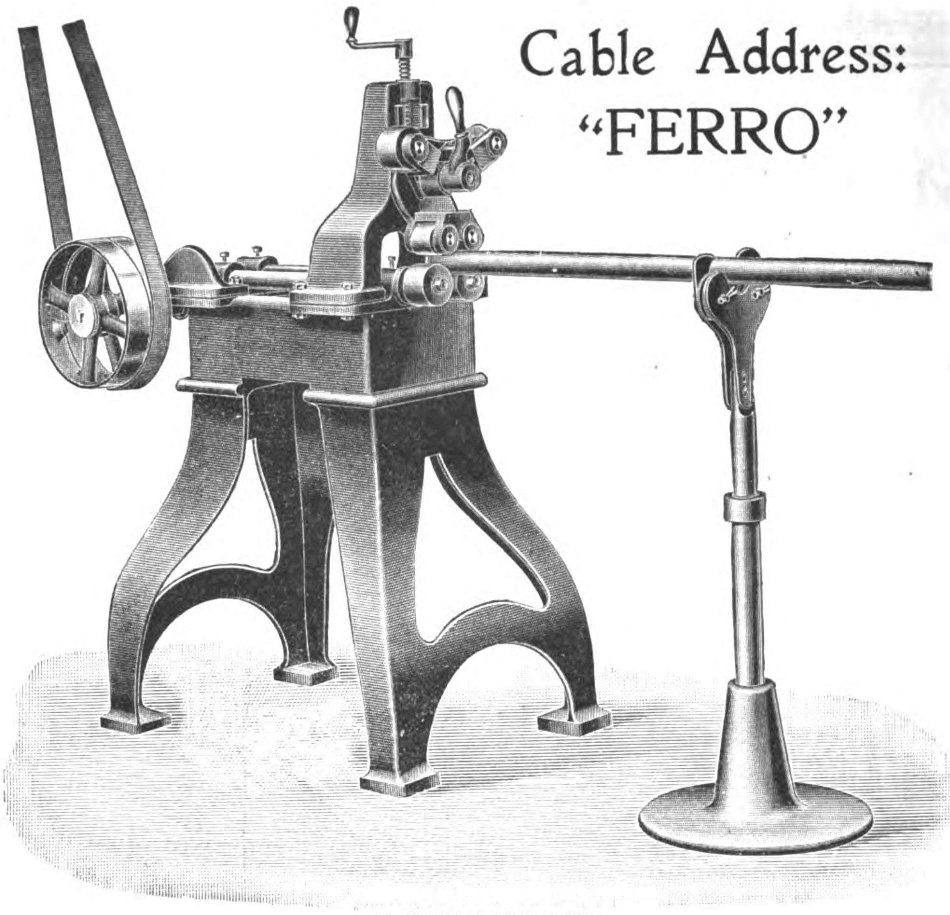

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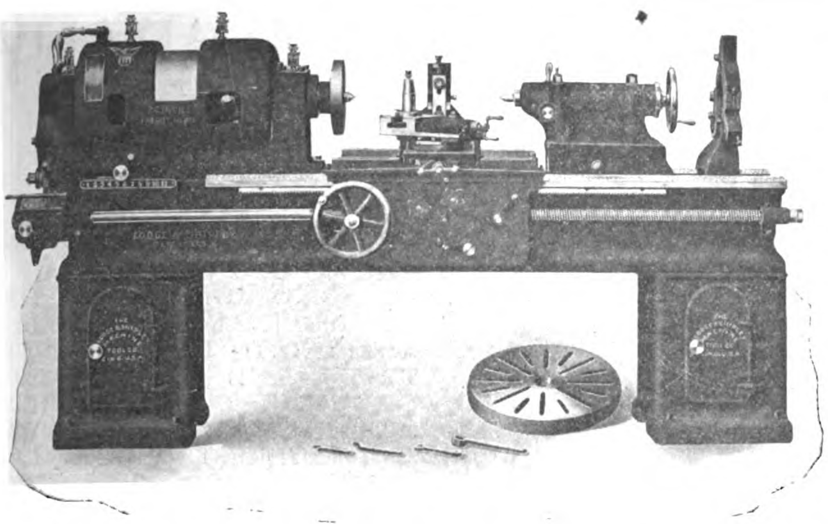

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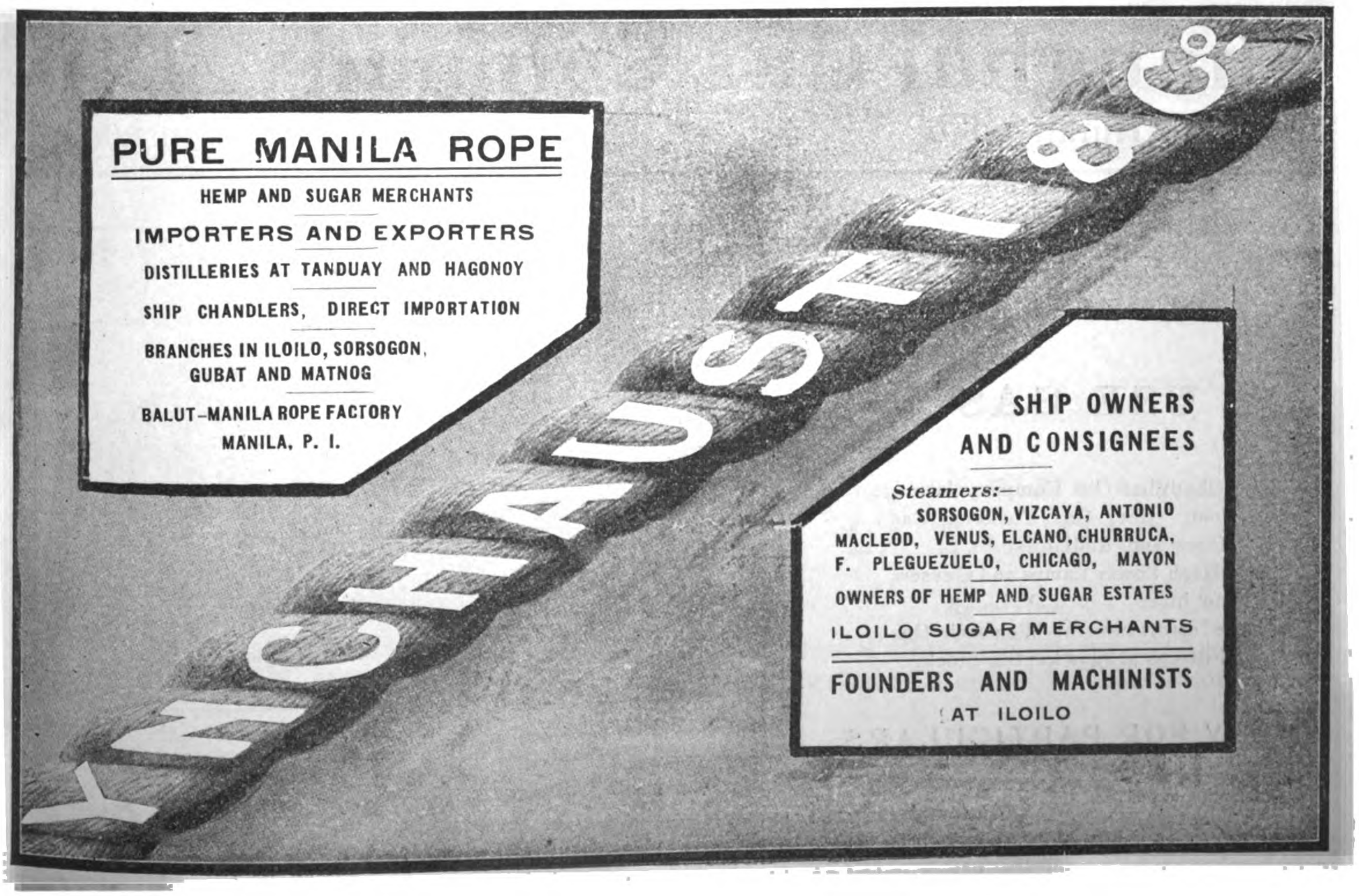

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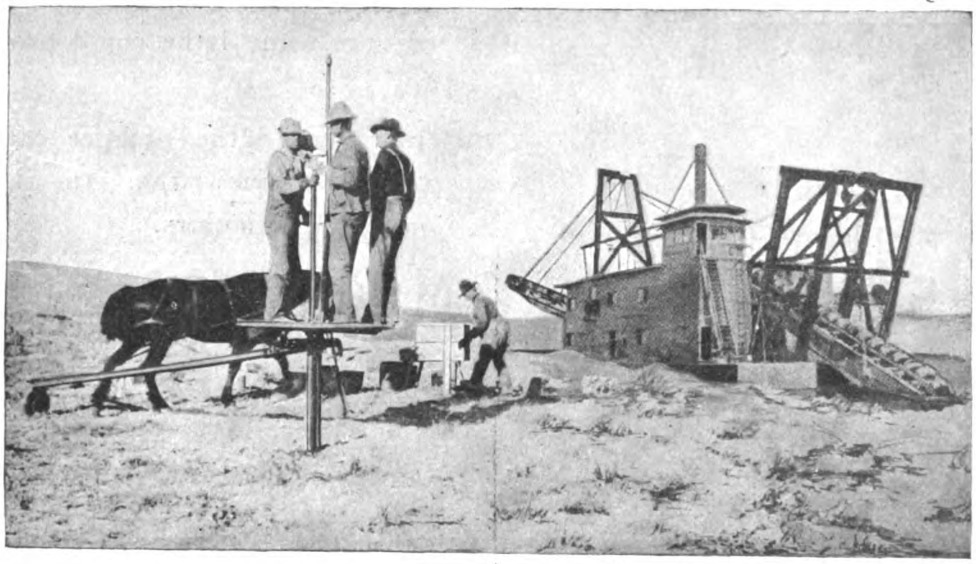

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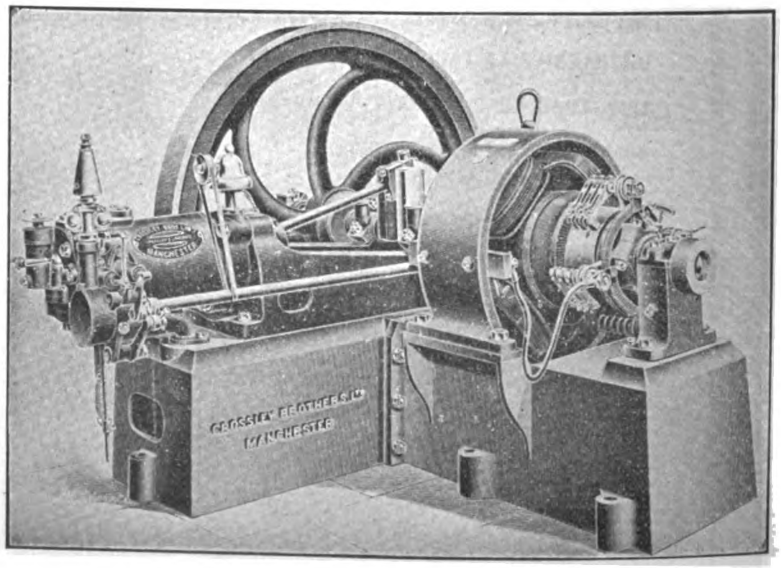

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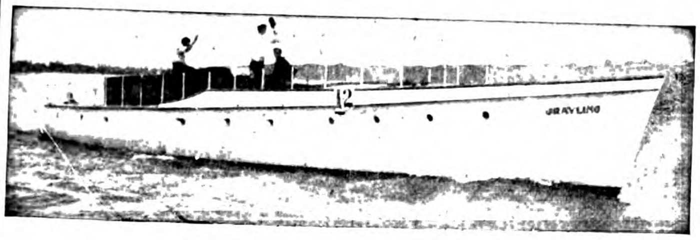

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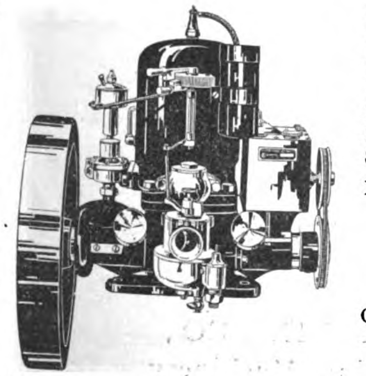

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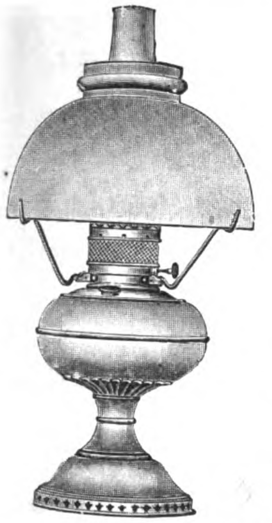

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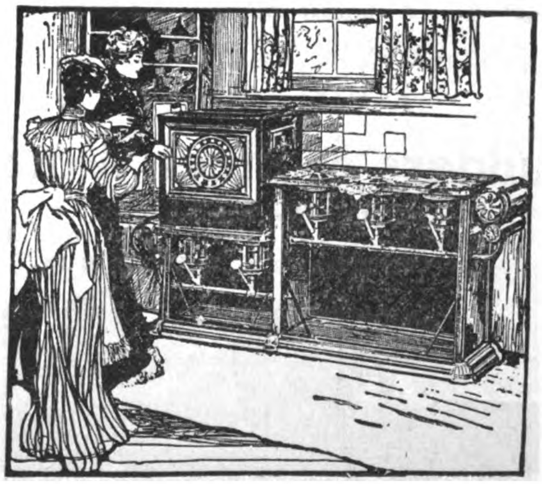

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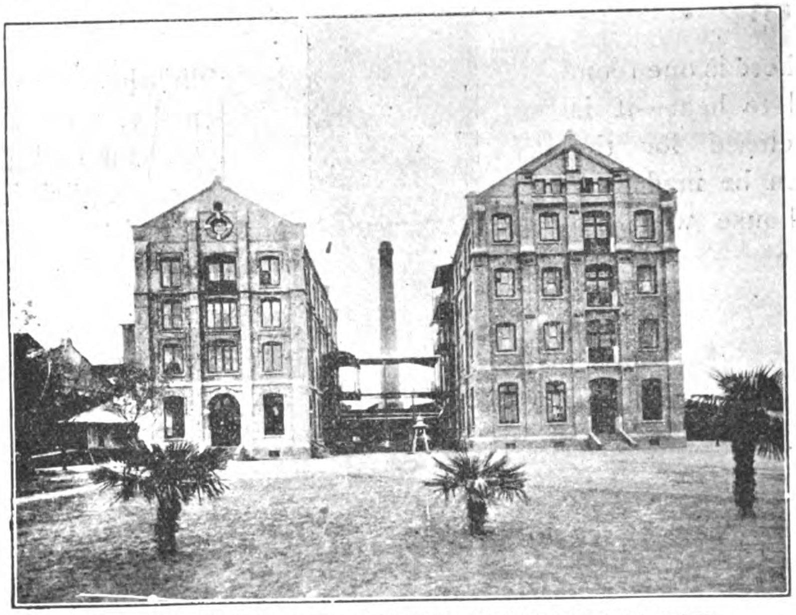

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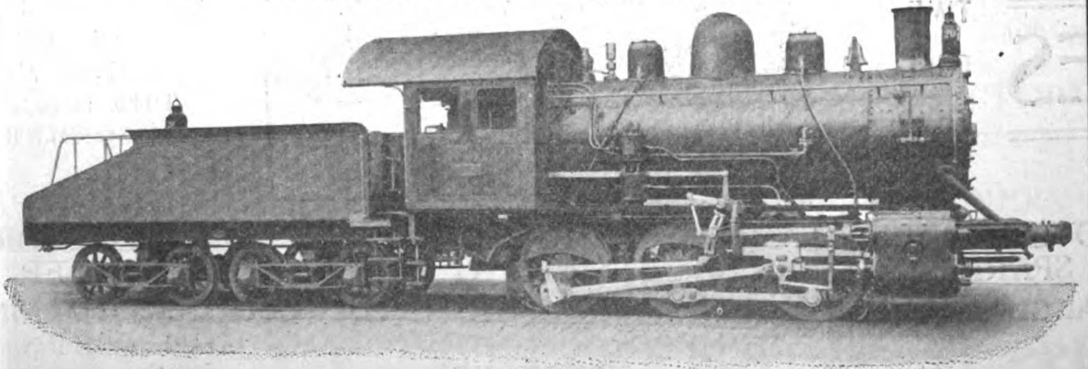

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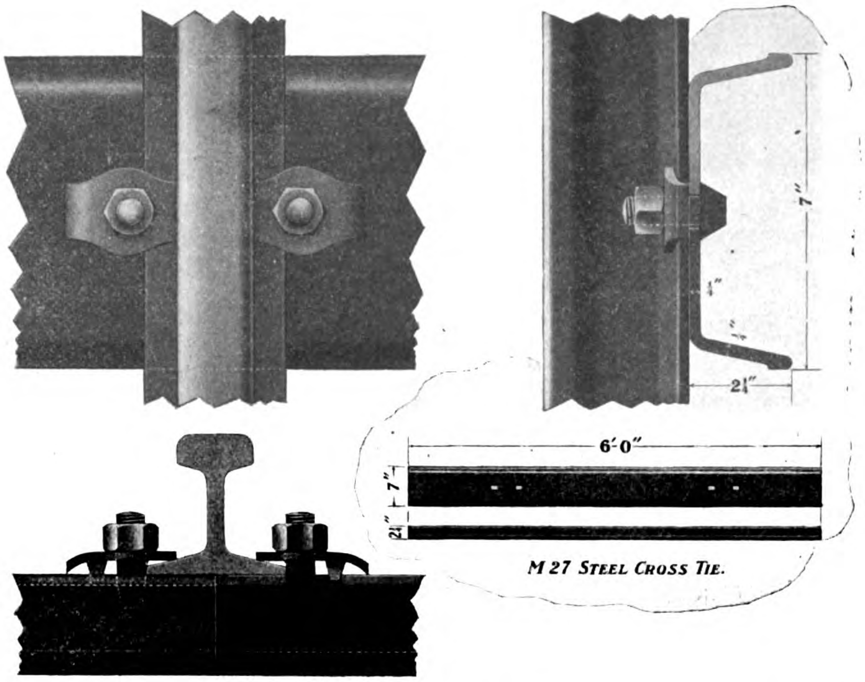

PHOTOGRAPH SHOWING PERFECT CONDITION OF M-21 TIE PLACED IN ASH TRACK AT HOMESTEAD STEEL WORKS IN 1905. HOT CINDERS FROM LOCOMOTIVES HAVE DROPPED ON THESE FOR THREE YEARS

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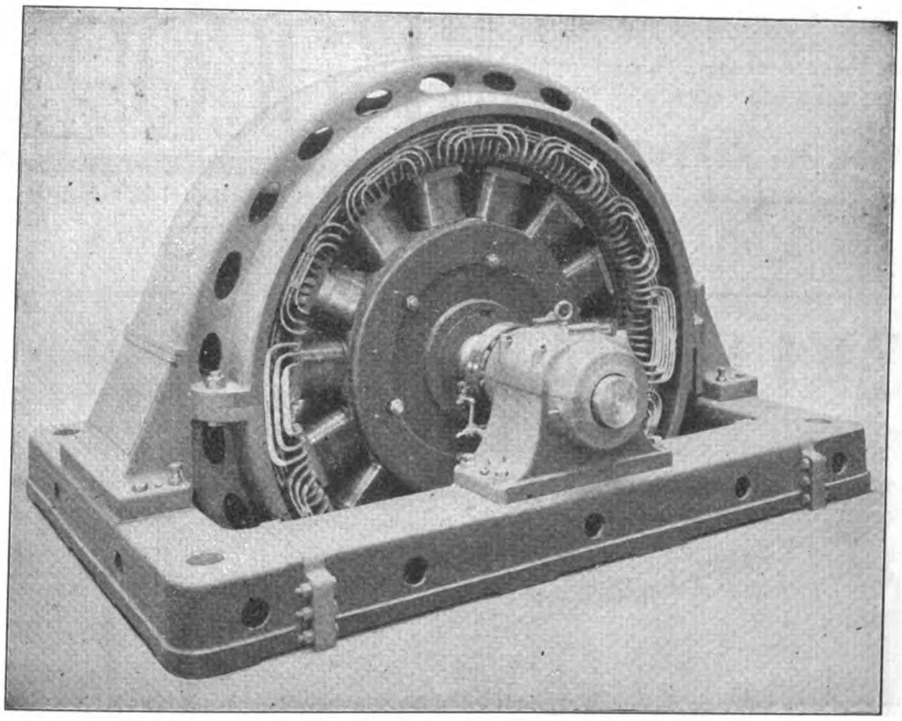

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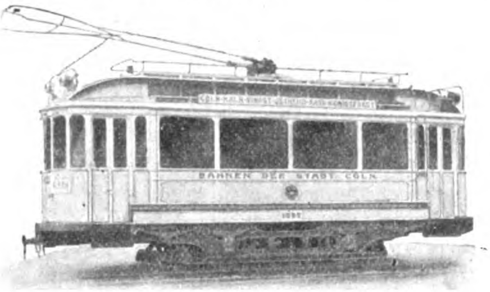

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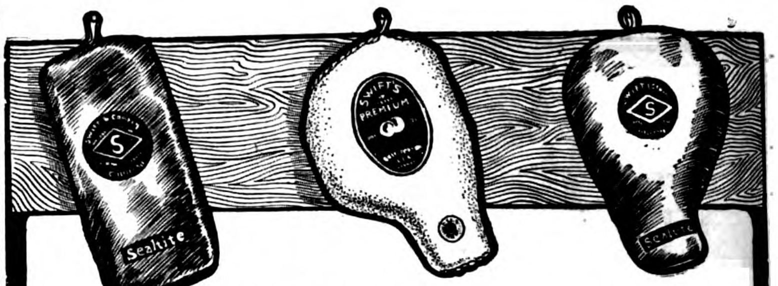

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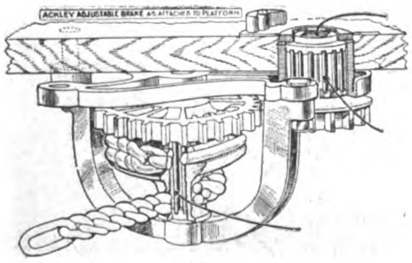

FIG. I

FIG. 3

The ACKLEY ADJUSTABLE is the only gear brake that can be attached to the platform at any angle, owing to the adjustable yoke.

It requires no machine fitted bearings on the staff—(Fig. 2) simply square the staff in blacksmith shop for loose fit—reducing cost of labor to less than one-fourth required to fit any other geared brake staff.

All movable parts revolve on roller bearings (B, C, Figs. 1 and 3), eliminating friction, thereby giving ease of action in applying brake shoes and releasing.

Three different gear ratios, 12×36, 14×34 and 18×30, all interchangeable in same frame, can be obtained with different sized winding drums, as desired, to take up required amount of slack chain, according to type or weight of car.

It is the only gear brake which has no staff bearing in the frame. The journaling of the pinion (Fig. 4), in the frame (Fig. 3 at D), independently of the staff (Fig. 2), places the gears at a fixed position, preventing BINDING, which occurs to gear brakes having staff bearings in frame. (See THE OLD—Figs. 5 and 6, G and I.)

Here is the conclusion: It is EASY AND INEXPENSIVE TO INSTALL; POWERFUL, YET EASILY APPLIED; RELEASES QUICKLY; NO BINDING OF STAFF OR GEARS; ADAPTED TO ANY AND SUITABLE FOR ALL KINDS OF CARS.

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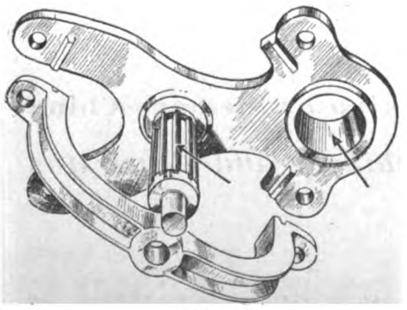

FIG. 2

FIG. 4

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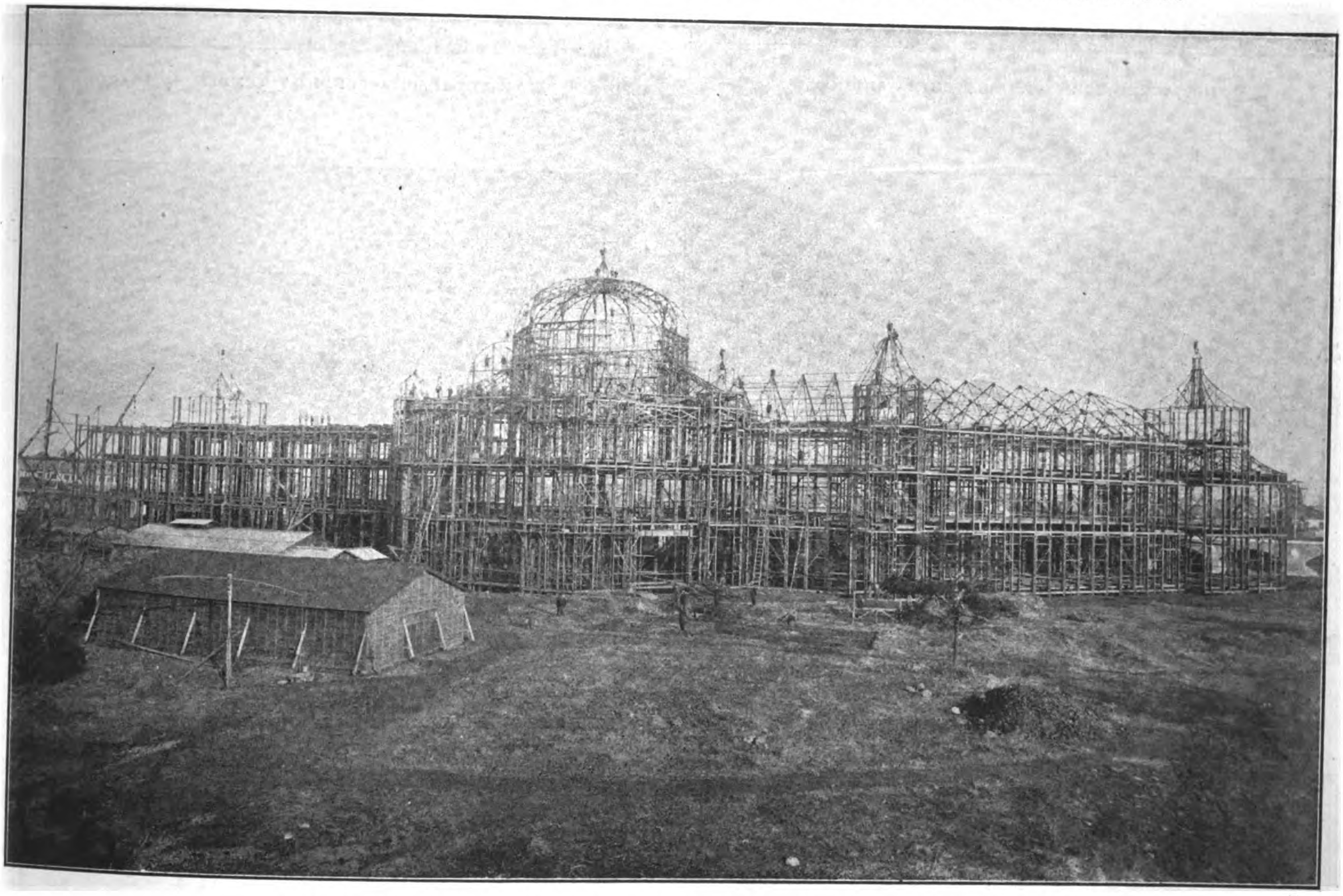
THE FAR EASTERN REVIEW

COMMERCE • ENGINEERING • FINANCE

VOL. VIII. MANILA, P. I., SHANGHAI, AND YOKOHAMA, JUNE, 1911 No. 1.

THE ISLAND EMPIRE OF THE PACIFIC AND HER RAILWAYS

JAPAN, A CENTRE IN INTERNATIONAL COMMUNICATION



GRAND CENTRAL RAILWAY STATION AT TOKIO.—STEEL FRAMEWORK, FEBRUARY, 1911

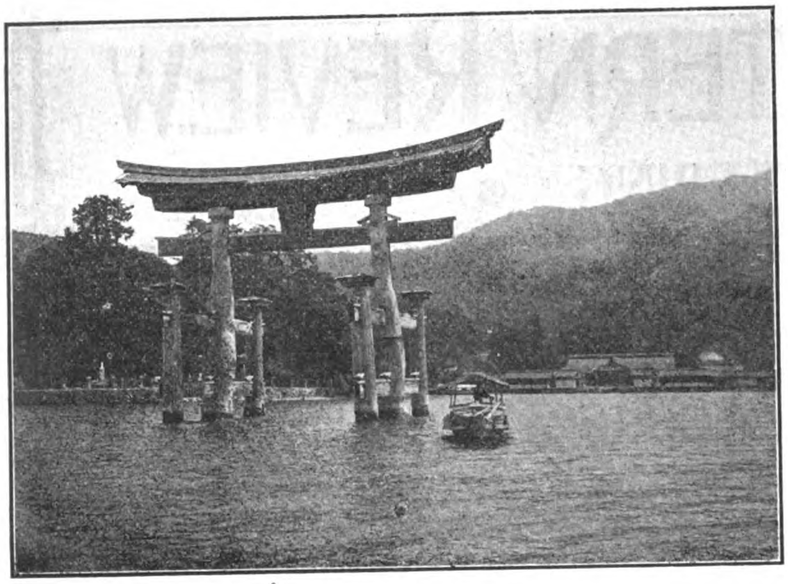
Since Japan is situated in the Northeastern part of Asia, directly opposite the United States of America across the Pacific in the East, and with the Maritime Province of Russia beyond the Japan Sea on the Northeast, and Hongkong and Shanghai in the South, the two centres of Chinese foreign commerce; all mail ships sailing to and from South America, the United States and Canada, with Hongkong as their port of call and their starting point, make it a rule to stop at Kobe and Yokohama, and also all steamship lines extending from the Far East to India, Australia and Europe start from either Kobe or Yokohama.

Japan is excellently situated in the eastern center of world travel, and is to the Pacific what Great Britain is to the Atlantic—the focus towards which trade and tourist routes converge, to again diverge as widely. Here travelers from America and Australia to China or India and other lands of the Orient, or those journeying further Westward to Europe or travelers on their way from Europe all find it pleasant and convenient to break the monotony of the sea voyage by a visit to Japan which thus becomes, as it were, the aesthetic refreshment room for those undertaking international journeys, supplying all the needs of lovers of the fascinating and picturesque, and it is the Imperial Government Railways that render it possible to visit the many picturesque spots which have become far famed for their antiquities, art and history; the passenger is carried through marvellous and wonderful characteristic scenery, and is enabled to observe the chief points of interest in the leading cities of Japan, with unusually convenient points of departure from the following noted places, viz., Tsuruga for Vladivostok and the Trans-Siberian Route; Kobe, Shimonoseki, Nagasaki, etc., for the China Coast or long sea route to Europe; Yokohama, Kobe, etc., for Canada, the United States and Australia. It is, therefore, most convenient for tourists from either Europe or America to come first to Japan and here to plant their journeys in all directions.

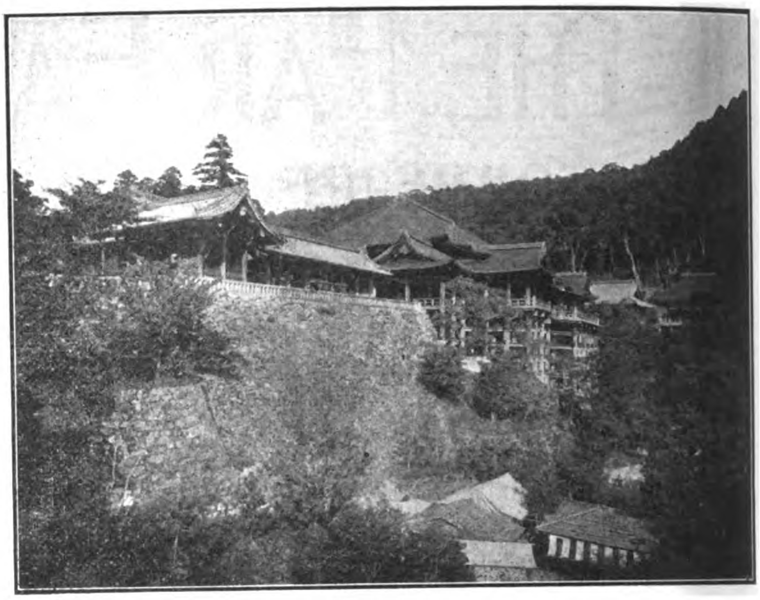
TRAVELING ROUTES BETWEEN JAPAN AND WESTERN EUROPE

Japan, the eastern focus of world-travel and England, the western centre of international communication, and connected by three principal travelling routes, viz., via Suez, via America, and via Siberia.

On the Suez route there are in service the English P. & O. Steam Navigation Company, Nippon Yusen Kaisha, French Messageries Maritimes, German Lloyd Steamship Company, Austrian Lloyd Steamship Company, etc. After crossing Europe, those wishing to journey by one of these lines will embark

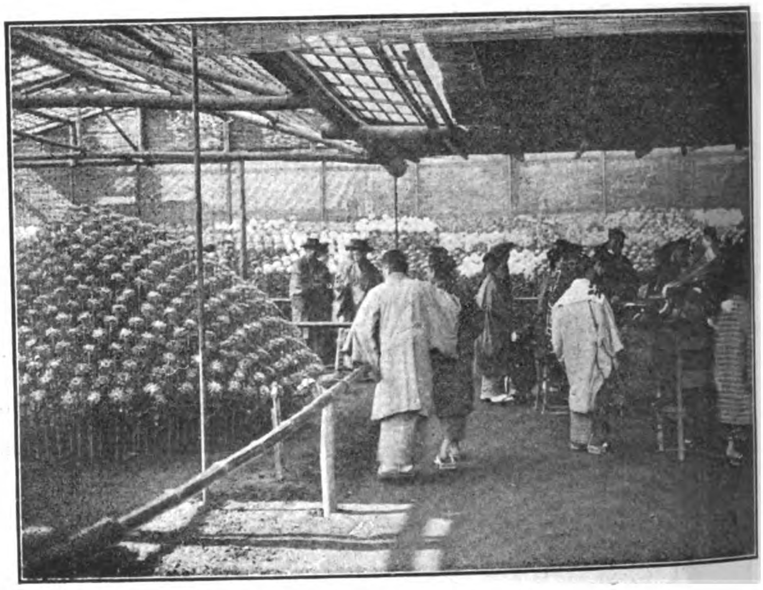


THE SACRED TORII AT ITSUKUSHIMA SHRINE

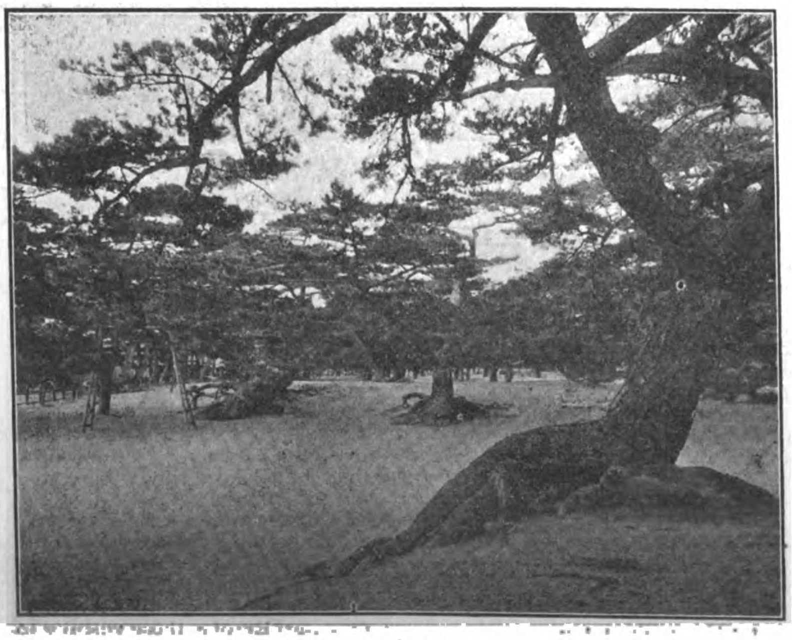


KIYOMIDZU, A BUDDHIST TEMPLE, IN KYOTO

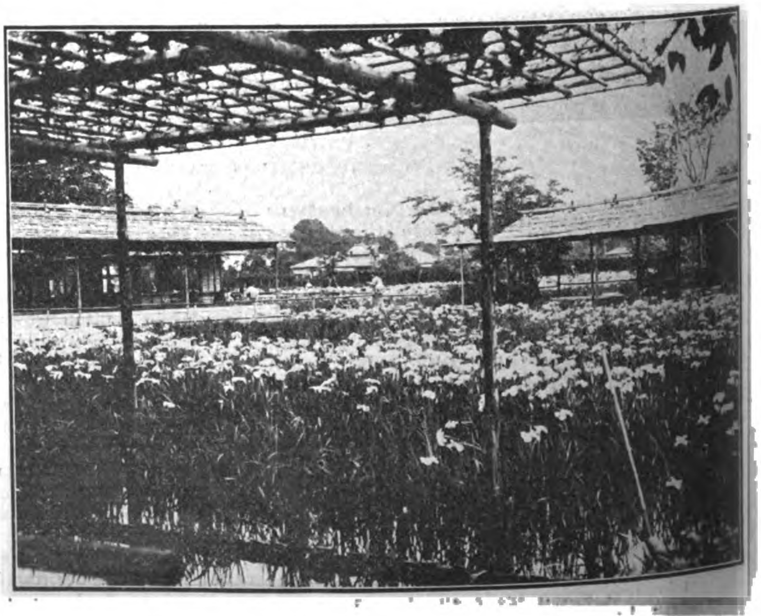
DOTOMBORI, AN AMUSEMENT QUARTER IN OSAKA



A CHRYSANTHEMUM GARDEN

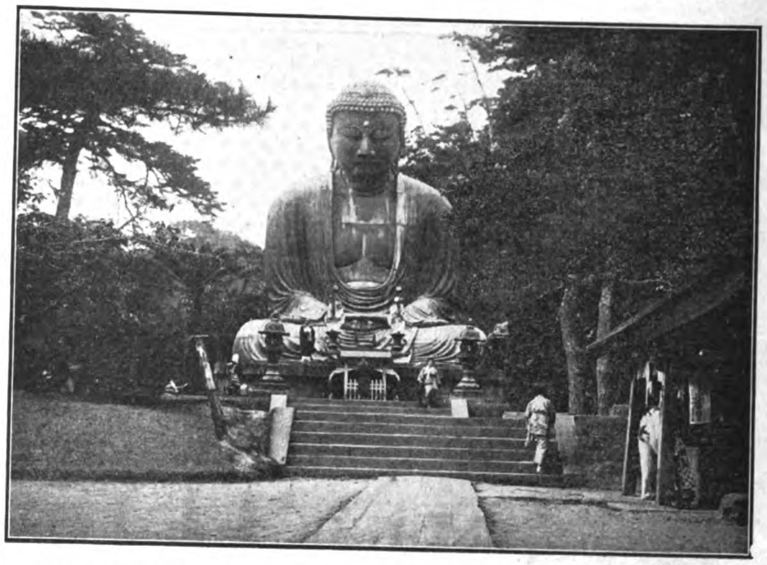


MAIKO PARK



AN IRIS GARDEN NEAR TOKYO

RAPIDS ON THE KUMA RIVER, KYUSHU



DAIBUTSU, THE HUGE BRONZE IMAGE OF BUDDHA, AT KAMAKURA

at Brindisi, Marseilles, Naples, or Trieste, and will reach Tokyo in five or six weeks after their departure from London with a difference of a few days only according to the steamer.

Those following the American route will cross the Atlantic to the United States or Canada by quick liners such as the Cunard, the White Star, American Steamship Company, French Trans-Atlantic, Canadian Pacific Mail, German Lloyd, or Hamburg American lines; and after traveling by one of the Trans-continental railway lines to the Pacific coast, will voyage across the Pacific to Japan by any of the following steamship lines; Nippon Yusen Kaisha, Toyo Kisen Kaisha, Osaka Shosen Kaisha, Pacific Mail, Canadian Pacific, or Great Northern Steamship Company. By the shortest route which lies in this direction, the journey from the capital of the Island Empire of the Atlantic to the capital of the Island Empire of the Pacific, can be accomplished in less than four weeks.

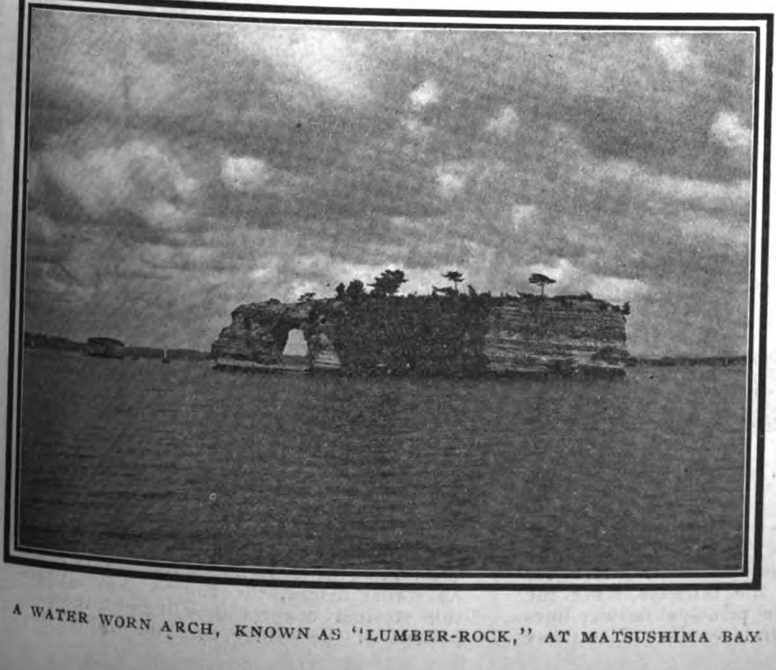
Lastly there is the Trans-Siberian route, which has been drawn to the attention of the world, as the shortest of all the routes between Western Europe and Eastern Asia, and is destined to be the principal highway in this quarter of world-travel. By this route, the time required for the journey between London and Tokyo, and between Berlin and Tokyo has been shortened to 16 and 15 days respectively. As the whole length of this route, more than 8,000 miles, is covered by rail except at the English Channel and a 40 hours' voyage of about 480 miles between Vladivostok and Tsuruga, it is, from point of safety and regularity, beyond comparison with other routes.

The public, traveling from London to Tokyo by the Trans-Siberian route, must not forget the existence of a short cut turning to the right at Harbin, on the Chinese Eastern Railway. This line branches off at Harbin, toward the South, and runs down to Changchun, where the famous express trains of the South Manchuria Railway wait to carry passengers to Dairen. The steamers of the Japanese Osaka Shosen Kaisha, which connect with this express at Dairen, voyage across to Shimonoseki, the western threshold of Japan, and from this point travelers may make the journey to Tokyo, a distance of 700 miles, in two days and nights, enjoying on the way the picturesque scenery of the Seto Inland Sea, from the carriage windows, stopping at Kobe, the greatest open port in West Japan; Osaka, the entre of industry; and Kyoto, a place of historic interest.

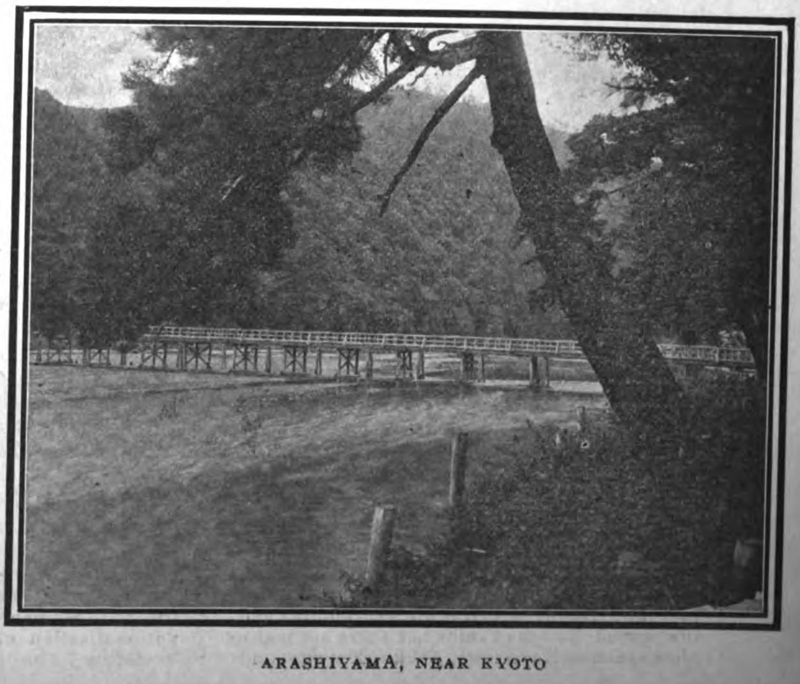
When the reconstruction of the light railway line of 189 miles from Mukden to Antung is completed, and the long bridge over the Yalu River is finished, the Korean Railway line extending over 585 miles from Shingishu to Fusan, and the connecting service of superb steamers under the control of the Imperial Government Railways between Fusan and Shimonoseki, will make it possible to accomplish the trip from Mukden to Tokyo, via Shingishu, Fusan and Shimonoseki, in 16 hours or so. Moreover, in case quicker steamers be placed on the service between Fusan and Shimonoseki, the voyage of 120 miles will be covered in a very few hours. It will be, therefore, most convenient for travelers between Western Europe and Eastern Asia to follow this route via Fusan, which will consequently become the most important route of world-travel.

NATURAL FEATURES AND CLIMATE OF JAPAN

In regard to the climate and natural features of the country, we call attention to the fact that, with Hondo as the centre island, Japan stretches itself northward to Hokkaido, Kabafuto (Saghalin) and still further to Chishima (Kurile Islands) which is very near the frigid zone, and southward to Shikoku, Kyusyu, Ryukyu (Loo-choo) Islands and further to Taiwan (Formosa) which lies in the torrid zone. Consequently we have great variety of climate from cold, temperate, to a gradual change into a tropical zone; charmed at all points with marvelous beauty of natural scenery. These islands are generally mountainous and volcanic. In the middle of Hondo two great mountain ranges meet, one extending from Kabafuto and the other from Taiwan originating in China, and forming a watershed which divides Hondo

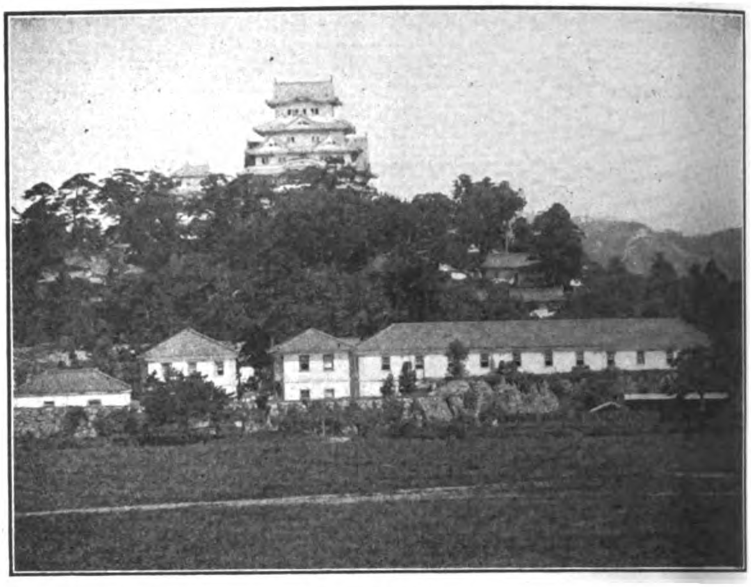


A WATER WORN ARCH, KNOWN AS "LUMBER-ROCK," AT MATSUSHIMA BAY



ARASHIYAMA, NEAR KYOTO

SAKURAJIMA, AN ISLAND IN FRONT OF KAGOSHIMA CITY, KYUSHU



FEUDAL CASTLE AT HIMEJI

into South Japan and North Japan. At this junction of mountain ranges many lofty mountains tower high among the clouds and the highest of them all is Mount Fuji, known so well the world over for its beauty of outline. The most celebrated active volcanoes are Nasudake, Bantaizan, and Asamayama in Hondo; Noboribetsudake in Hokkaido; and Kirishimayama and Asozan in Kyushu.

Owing to the existence of volcanoes, there are many places where carburetted or sulphurous hot springs are to be found which are excellent health resorts throughout the year. The most famous of these are Hakone, Arima, Atami, and Ikao.

The climate of Japan is generally mild and healthy but the best seasons are April and May in the spring, and October and November in the autumn. In spring the cherry blossoms beautify the landscape and other flowers of various kinds vie with each other in loveliness. Autumn brings forth the famous chrysanthemums and maples. From the end of January until the beginning of March, the weather is cold except in Atami, Dogo, and other hot spring resorts; in the northeastern district snow often falls several feet deep, but in the region southward from the middle of Hondo, it is warm even in the middle of winter, making traveling and a other summer resorts which lie scattered throughout the country where the climate is enjoyable and pleasant.

Towards the close of spring, the winds are high; June is usually a wet season known as "Baiu"; and September is also at times rainy. The air is very dry in December. Therefore, the best season to visit Japan is spring and autumn.

With regard to the city of Tokyo, the capital of Japan, it stands on a large plain known from ancient times as Musashino, facing the bay of Tokyo, which gives it refreshing winds at all times of the year. It is pierced with canals and on account of its gradual rising ground has a great and natural drainage which empties into the sea. There are several popular resorts located in the neighbourhood of the capital such as Kamakura, Oiso, Odawara, Atami, Hakone, etc., where in a few hours people can escape from the bustle and heat of the metropolis during the winter and summer months.

THE SYSTEM OF THE GOVERNMENT RAILWAYS OF JAPAN

The total length of railway lines in Japan is now more than 5,000 miles and the extension of the railway system has contributed not a little to the social and material prog- lines under the Government control is as follows:—

A trunk line which starts from Aomori in the extreme north of Hondo and which is connected with Hokkaido by three beautiful steamers named Tamuramaru, Hirafumaru, and Umegakamaru, leads to Tokyo via Sendai along the eastern coast, and from Tokyo another trunk line extends to Shimonoseki southward, the southern extremity of Hondo, passing the principal cities, such as Yokohama, Nagoya, Kyoto, Osaka, Kobe, Okayama, Hiroshima, etc. The total mileage of these trunk lines from Aomori to Shimonoseki is 1200 miles and many branch lines issue from them in various directions, forming a network of railway lines. Shimonoseki, and Moji in Kyushu, are on either side of a channel of water and are connected by steam-launches. The trunk line of Kyushu begins at Moji and proceeds by way of Kokura and Hakata running to Tosu where it divides into two directions, and terminating at Nagasaki in the west, and the other at Kagoshima in the southern extremity of Kyushu.

Between Shimonoseki and Fusan, there are four large and magnificent steamships, called Tsushimamaru, Ikimaru, Egesanmaru and Satsumamaru, which give a service of twice

LAKE ASHI AT HAKONE

sojourn there during the winter months one of intense delight and of value to the health, especially to those of delicate constitutions. July and August are the hottest months and the season for heavy rains but there are many places such as Karuizawa, Nikko, Hakone, and ress of Japan. The development of the railways will be the sole aim of the authorities who have used all their efforts for the improvement of the railways, since the nationalization of the principal railway lines in Japan. The general system of railway per day, connecting with the Korean Railway which is managed by the same administration as the Government Railways of Japan. As stated before, the Korean Railway and this steamer connection will, with the completion of the bridge over the Yalu River

form an important travelling route between Japan and Europe.

The trunk line in Hokkaido which starts from Hakodate opposite to Aomori in Hondo, runs northward via Otaru and Sapporo and turning to the east, has a branch line at Iwamizawa, which reaches Muroran on the south. The main line proceeds to Kushiro along the Pacific coast.

PLACES OF INTEREST ALONG THE GOVERNMENT RAILWAYS

Yokohama will interest travellers with its busy harbour and active trade. Its development since it was first opened to foreign trade in 1856 is marvelous. It was at that time a poor fishing village of scarcely one hundred cottages but it is now the largest and most prosperous trading port in the Orient.

Traveling to the north by a railway line of 18 miles travelers reach Shimbashi Station in Tokyo, the capital city of Japan with a population of about 2 million. This line was the leader of the whole system of railways in Japan, and was opened for traffic in 1872.

As Tokyo is the place of the Imperial residence and the seat of the Japanese Government, travelers will find it full of interest to study the essence of the modern civilization of Jap n, and to observe some of the splendor of the by-gone days of the Tokugawa era by visiting the many and most interesting shrines, temples and buildings of ancient generations, with other relics of the past.

Starting a fresh journey northward from Uyeno, another station in Tokyo, by a trunk line and changing carriages at Utsunomiya, 65 miles from Uyeno, travelers reach Nikko, a place noted for its unique combination of natural beauty and wonderful art, after a ride of 25 miles.

A day extra at Nikko will enable visitors to take a trip to Kegon waterfalls and Lake Chuzenji.

Matsushima bay with its hundreds of pine-clad islets, in which nature seems to have exhausted her wonderful arts of creation, can be reached by a further journey of 150 miles northward from Utsunomiya via Fukushima and Sendai.

This trunk line leads to Aomori, where it meets another trunk line running along the coast of the Japan Sea. The latter line, though it has not so many beautiful spots as the former, which skirts the Pacific Coast, passes through districts famous for mines, forests and hot springs, a country that waits development in the future.

It would not be without interest to extend the trip to Hokkaido or Ezo-ga shima, as the island was cal ed in the past, crossing the Tsugaru strait from Aomori. It was only a score of years ago that Hokkaido was first brought under cultivation and it is still thinly populated, but its mountains, rivers and lakes bear continental features and abounds in natural products, such as coal, timber, agricultural and marine products. Hokkaido is, indeed, a store house of treasures, and opens up a large field for development and enterprise.

It is on this island that the Japan Steel Works, undertaken jointly by English and Japanese capitalists, have been established.

Those travelers who take interest in the study of anthropology, will have an opportunity to observe the life, manners and customs of the Ainos, the survivors of the primitive age.

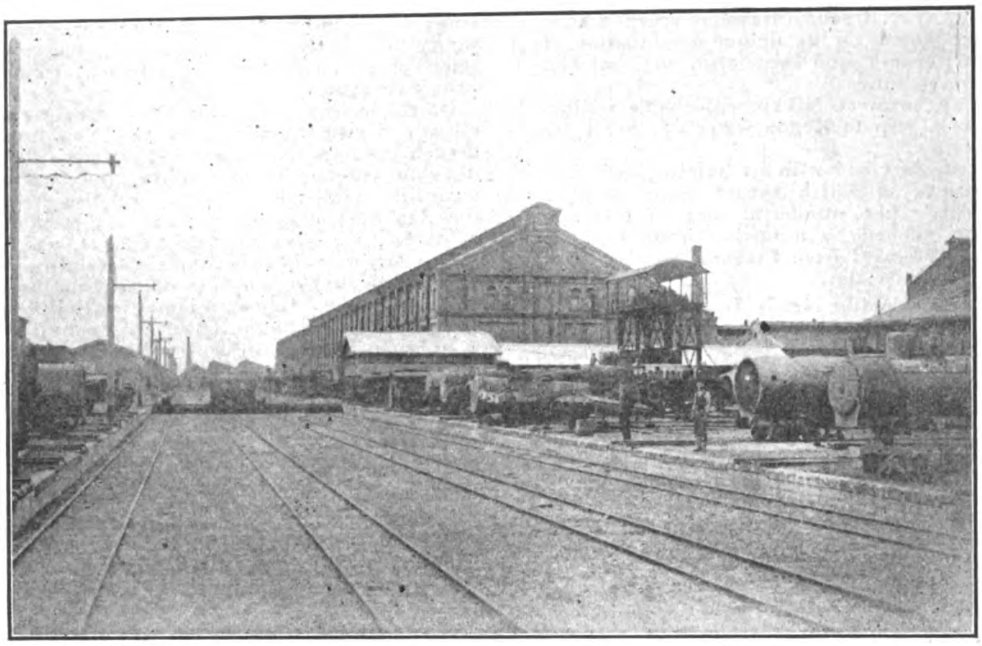
On the westward trip from Yokohama travelers can visit Kamakura on the Yokosuka branch and have a chance to reflect upon the days of yore by looking at the huge bronze statue of Buddha; Kenchoji, a large temple of the Zen Sect of Buddhism; and the remains of ancient times at Hachiman Shrine, which have many historic associations Travelers may spend half a day on the fairy islet of Enoshima and resume their westward journey at Fujisama which is reached by an electric railway from Enoshima. To the west of Fujisawa is Oiso, a famous sea-bathing place in summer.

Further westward the train stops at a station called Kodzu, thence to Yumoto, at the foot of the Hakone mountains, the Switzerland of Japan, is reached by an electric railway of 7 miles. From Yumoto rickshaws or palanquins will carry visitors up the mountainous pass. Hot springs gush out everywhere in the mountain valleys and visitors will be made to fancy as if they were in a fairy land. On the top of the mountain there is a lake named Ashi in which Mt. Fuji is perfectly mirrored and presents a most beautiful sight.

Atami, a hot spring resort and an unrivalled resting place, has a spring-like climate throughout the year; it is 16 miles southward from Odawara, about 3 miles west of Kodzu, and is reached by a light railway from Odawara.

At Gotemba, on the trunk line which goes

YOMEIMEN (GREAT GATE) AT NIKKO TEMPLE



OMIYA WORKS OF THE IMPERIAL JAPANESE RAILWAYS EXTERIOR

round the steep pass of Hakone, Fujisan, the sacred mount soaring up into the azure sky with the outline similar to that of a fan hung upside down, is seen. This mountain, an extinct volcano of 12370 ft. in height, has been revered from olden times as the guardian of the country; its conical summit is covered with snow all the year round. The base extends a distance of 20 miles and presents a grand aspect of the continent. Thousands of people ascend the mountain from the beginning of July to the end of August. Foreign visitors cannot be said to have seen the true beauty of Japan, unless they have witnessed the rising sun from the top of Mt. Fuji. Travelers to this locality can leave the train at Gotemba Sano, or Otsuki on the Central Eastern Line.

Mio-no-matsubara, a sandy promontory clad with pine trees, two and a half miles from Oukitsu, affords an excellent place to view Mt. Fuji across the bay.

Shidzuoka is noted as being the former residence of the Tokugawa Shoguns. Its chief products are tea and lacquer-ware.

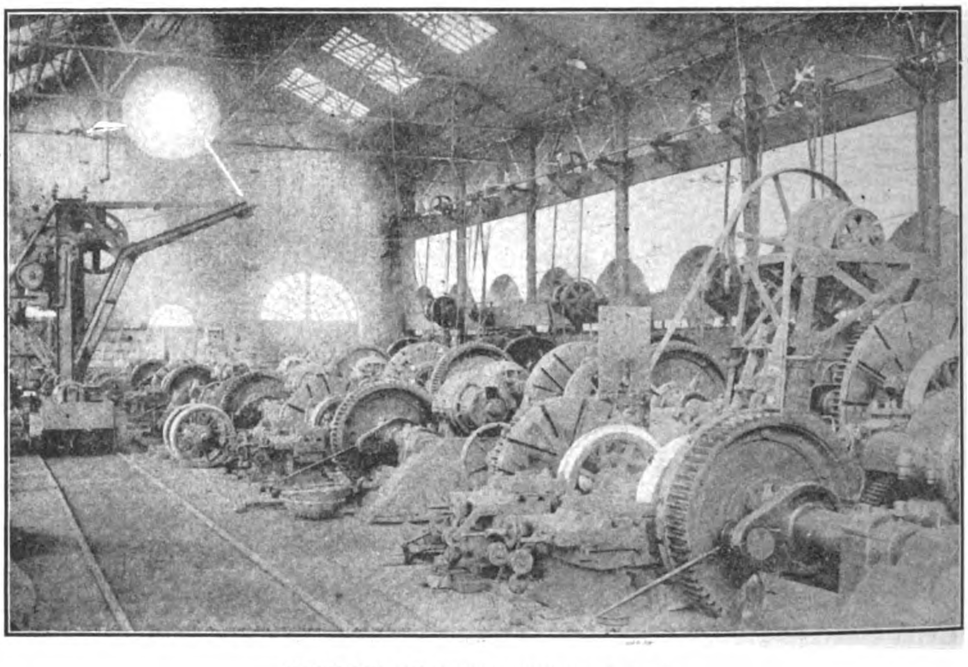
After Shidzuoka, the railway runs through a charming hilly country, crossing the great rivers, Oi and Tenryu, thence to Hamamatsu. Just beyond Hamamatsu the line reaches the beach of Hamana which was at one time a lake, but now forms a lagoon open to the ocean, as the land was washed away by an earthquake. There is in the lagoon, a small island called Bentenjima, a place noted for sea-bathing; in the summer season, a temporary station is opened for the convenience of visitors.

At a distance of 233 miles from Tokyo, stands the city of Nagoya, which after Tokyo is the most flourishing city on the Pacific coast and is celebrated for its feudal castle, which was built in 1610 and distinguished from other castles by a pair of gold dolphines on the top of the five storied donjon.

A line branching off at Nagoya leads to Yamada where there are two grand shrines dedicated to Japanese ancestors, who are worshiped by the entire nation from the Emperor down to the humblest man, and there is an endless succession of pilgrims to these shrines year in and year out.

From Kameyama this line branches through beautiful valleys to Nara.

The trunk line turns to the west at Gifu a place noted for cormorant fishing, and reaches Maibara where the Hokuriku line branches off for Tsuruga, an important commercial habour on the Japan Sea, which, connecting with Vladivostok across the Japan Sea, forms a gateway to Japan for the Russia-Japan through traffic. The Hokuriku line runs through a district named Hokurikudo, productive of rice and minerals and its further end is still under construction.

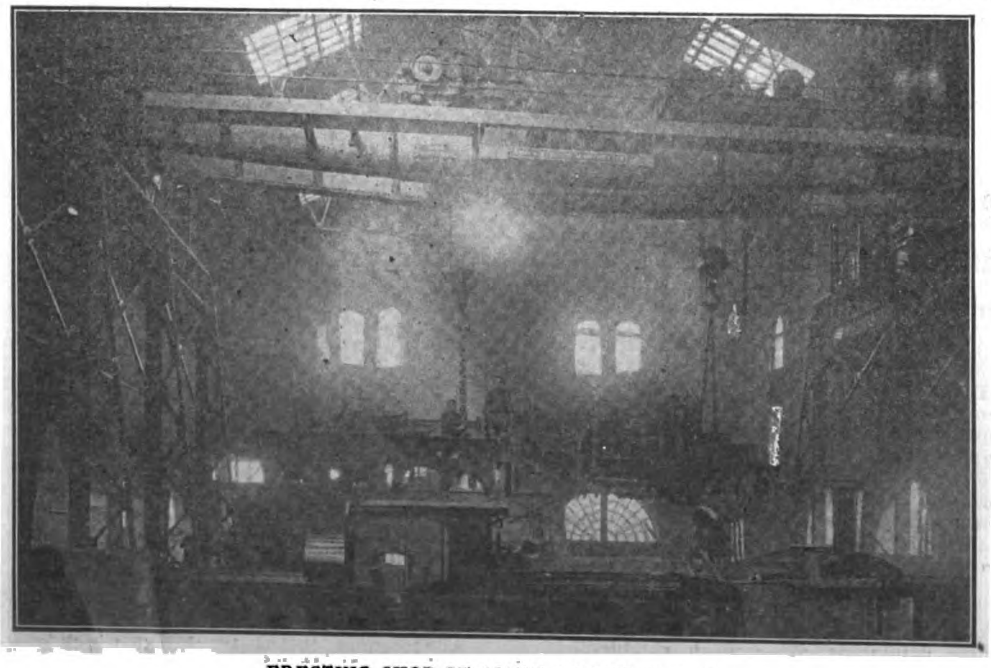


INTERIOR OF OMIYA WORKS, I. J. R.

Travelling further westward from Maibara by the trunk line which skirts Lake Biwa, the largest lake in Japan, Kyoto is reached in a few hours.

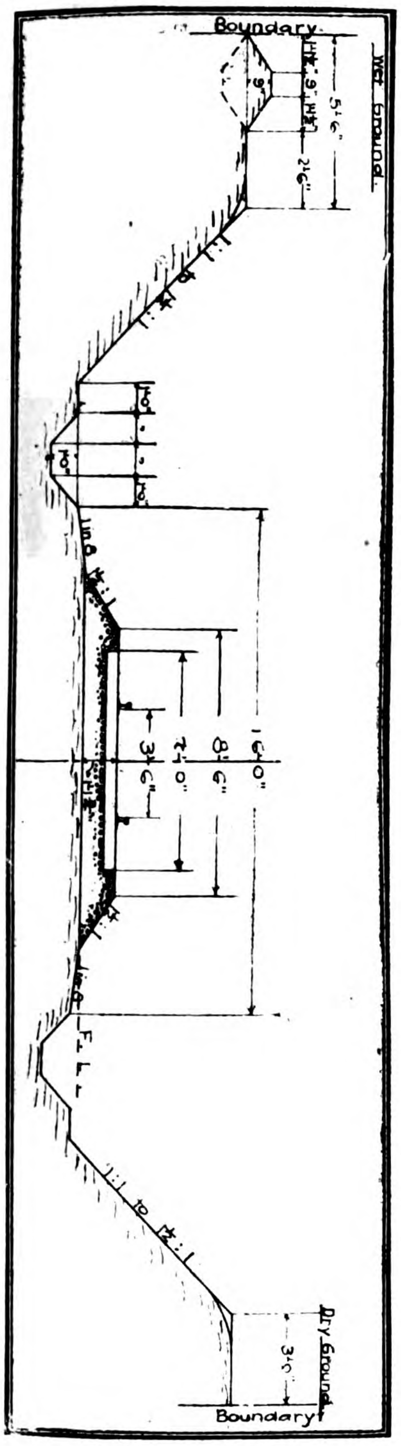
Kyoto was the capital of the Empire from the 8th century until the Restoration and there is still to be seen there the beautiful old Palace of the Emperor. This city is most beautifully situated, its magnificent cinnabar temple buildings which are seen among the gay flowers and the foliage of trees, afford visitors a glimpse of ancient Japan. The exquisite works of art to be found in Kyoto are the pride of Japan, and are not excelled in any other part of the world.

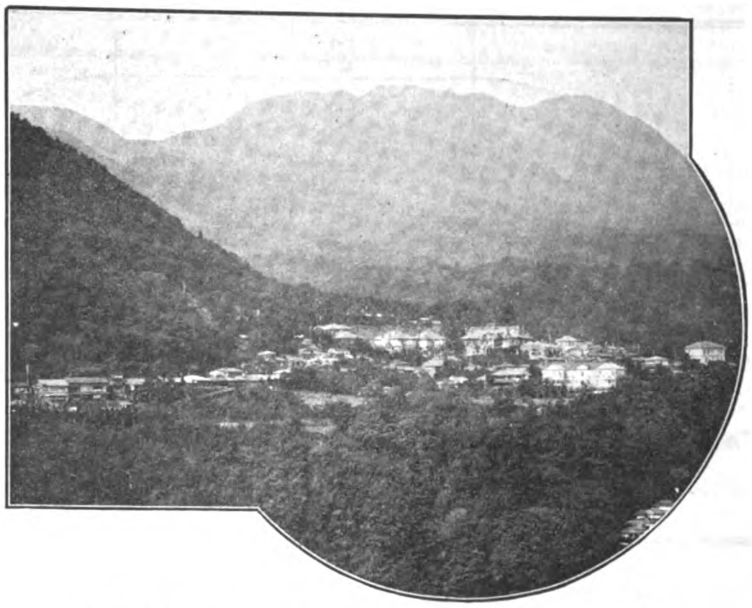
Nara, 26 miles southward from Kyoto, was the capital of Japan in the 8th century. Shrines and temples are found here and there among the cedar woods at the foot of green hills. Here is also seen the Todaiji, a famous Buddhist temple in which is enshrined a colossal statue of Buddha. The herd of tame deer—so well known in this locality—will be greatly enjoyed by all in the Kasuga Park, a park of poetry and romance and of exquisite beauty in its isolation from the busy world.



ERECTING SHOP OF OMIYA WORKS, I. J. R.

CUTTING





MIYANOSHITA, AN IDEAL HOT SPRING RESORT, HAKONE

The railway lines from Kyoto and Nara meet at Osaka, which is the Manchester of Japan and is the most flourishing industrial city in the Far East.

Ama-no-hashidate is famous for its scenery which is so characteristically Japanese. It is a long narrow strip of land covered with green pine trees running far into the sea, and can easily be reached by a steam-launch from Maidzuru at the end of a line branching off near Osaka.

From Kyoto the trunk line continues to Osaka and then to Kobe, the largest open port in West Japan.

Leaving Kobe travelers may enjoy the scenery of the Seto Inland Sea noted for its mild climate and picturesque islands. Okayama where there is a typical Japanese landscape garden called Korakuen; Onomichi, which reminds travelers of the scenery of Southern Europe; and Hiroshima, the largest city in the district west of Kobe,—are the important places on the trunk line.

Trains on the trunk line stop at Miyajima. Miyajima islet on which is Itsukusima Shrine, is half a mile off the shore. At high tide, the sacred lanterns of the Shrine are partly covered with water and the reflection of the lights on the water forms a beautiful sight.

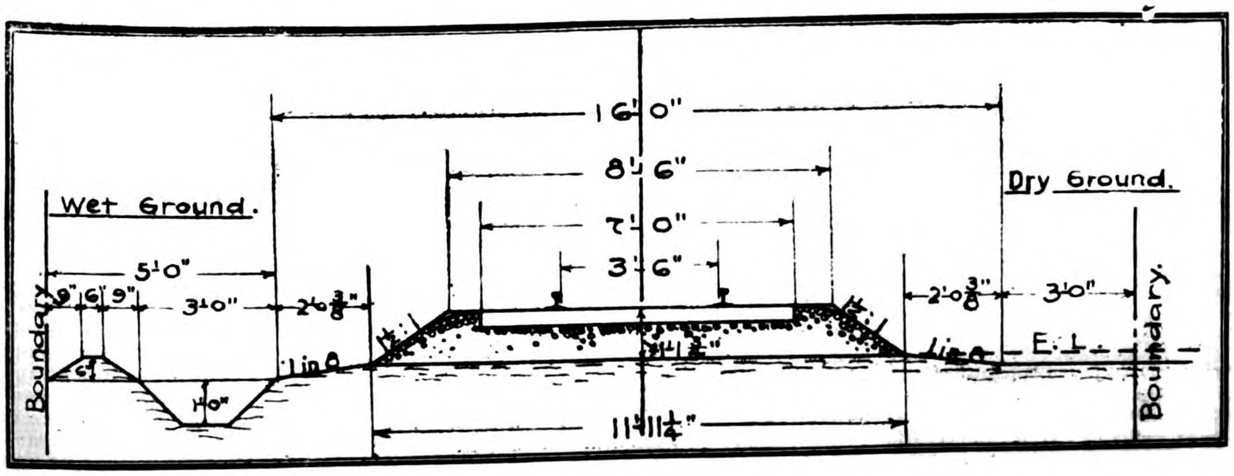
The trunk line terminates at Shimonoseki, 350 miles away from Osaka, where it is connected with the lines of Korea and Kyushu by the above mentioned steamers or steam-launches.

Kyushu holds an important position as the chief locality in the Far East for the production of coal. The total output of coal in Kyushu is 10,000,000 tons per annum, most of which is exported from Moji, Karatsu and Nagasaki.

Moji, opposite to Shimonoseki and situated at the mouth of the Seto Inland sea, is visited by hundreds of boats and ships.

Travelers wishing to visit the valley of Yabakei, where Nature has carved strange figures of stone that lie in a beautiful stream, may travel there by a branch line turning at Kokura for Nakatsu. At Okura is the Edamitsu Iron Works under Government management, and it is at Kashii that the Empress Jingo equipped her warships when she was starting on her expedition to Korea in the 3rd century, and the Kashiijinja is the shrine dedicated to this Empress and the Emperor Ojin who was born of this Empress at the camp is enshrined at the Hakozaki Hachiman.

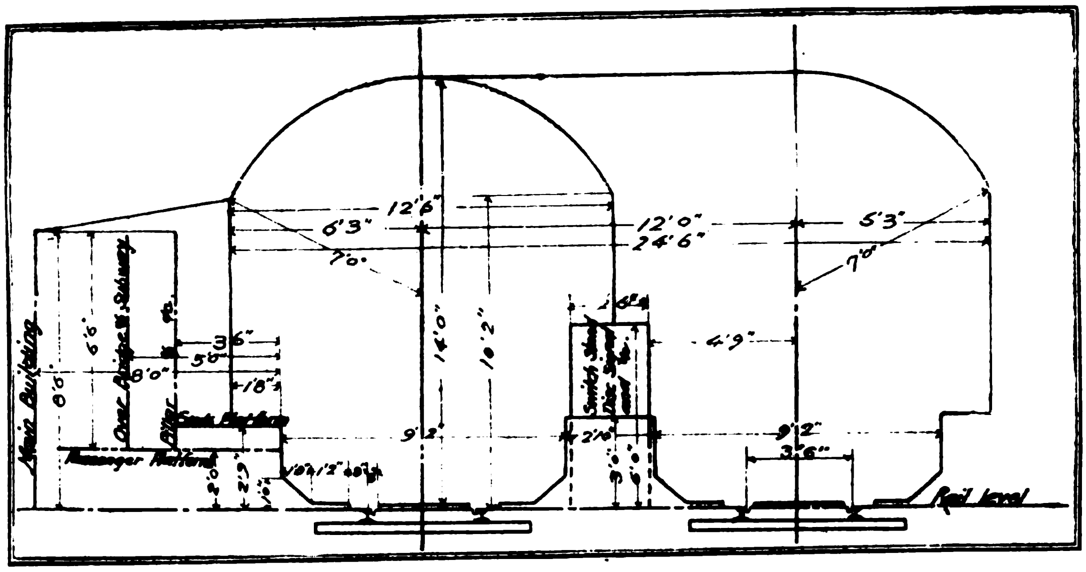
The trunk line stopping at these places, passes through Chiyono-matsubara, a fine grove of pine-trees and reaches Hakata, the place well known for the manufacture of textile. Tosu, 65 miles distant from Moji, is the junction where the Nagasaki line departs from the trunk line and the cities of Karatsu Imari and Arita lie on this branch or on its sub-branches. Saseho, which is at the terminus of a branch line turning off from Haiki junction, is one of the three



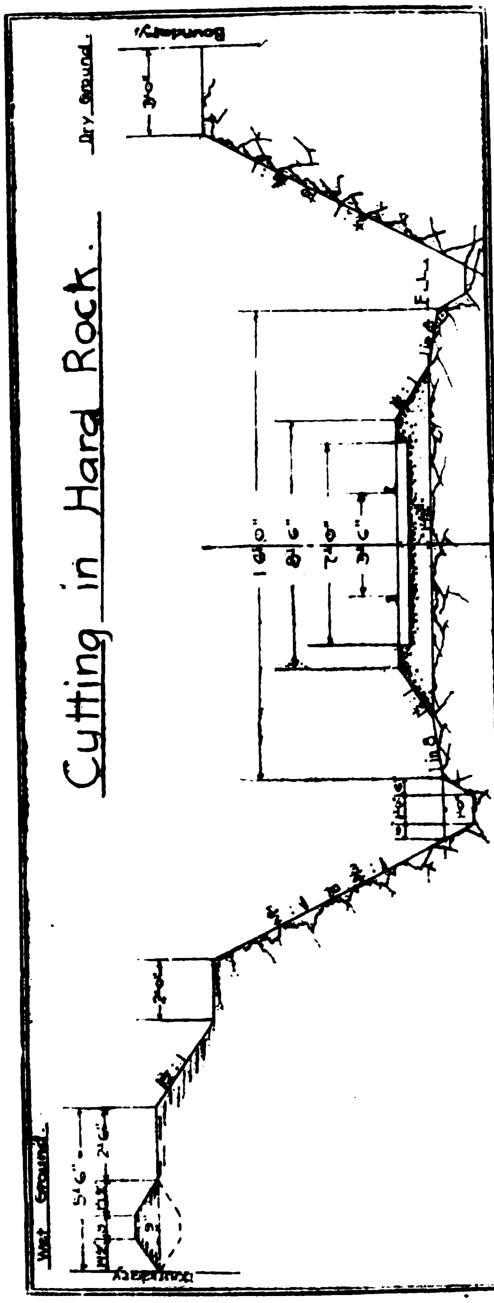
ORIGINAL GROUND

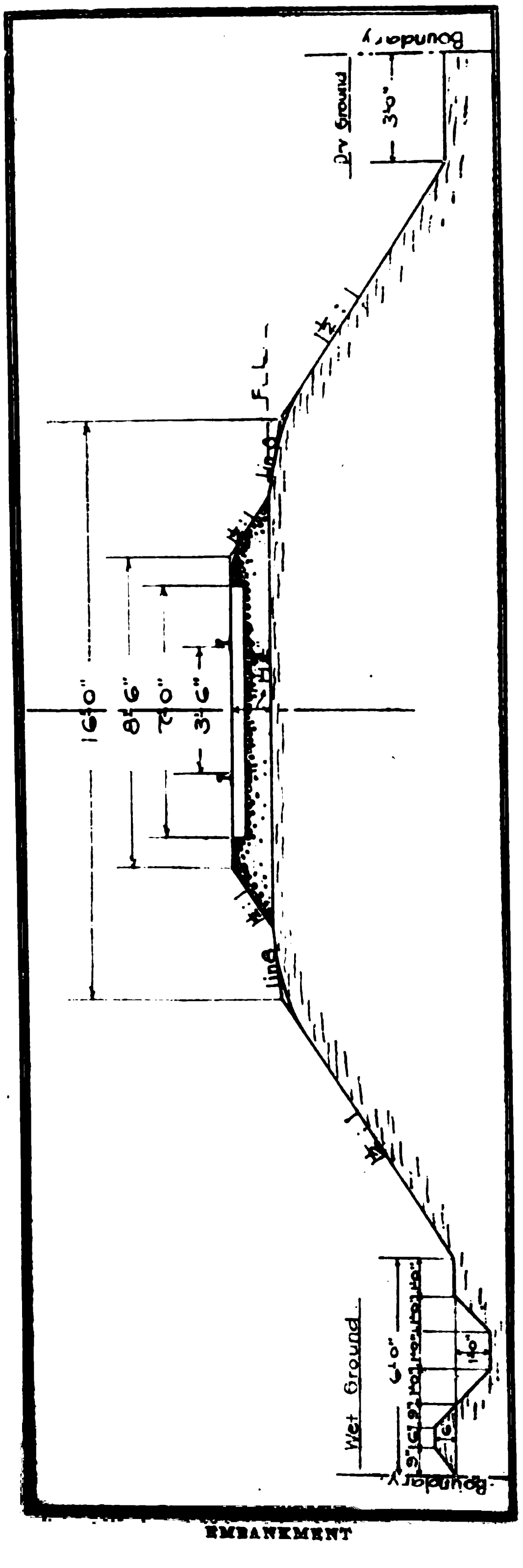
IMPERIAL JAPANESE GOVERNMENT RAILWAYS

Standard Cross Sections of Road Bed

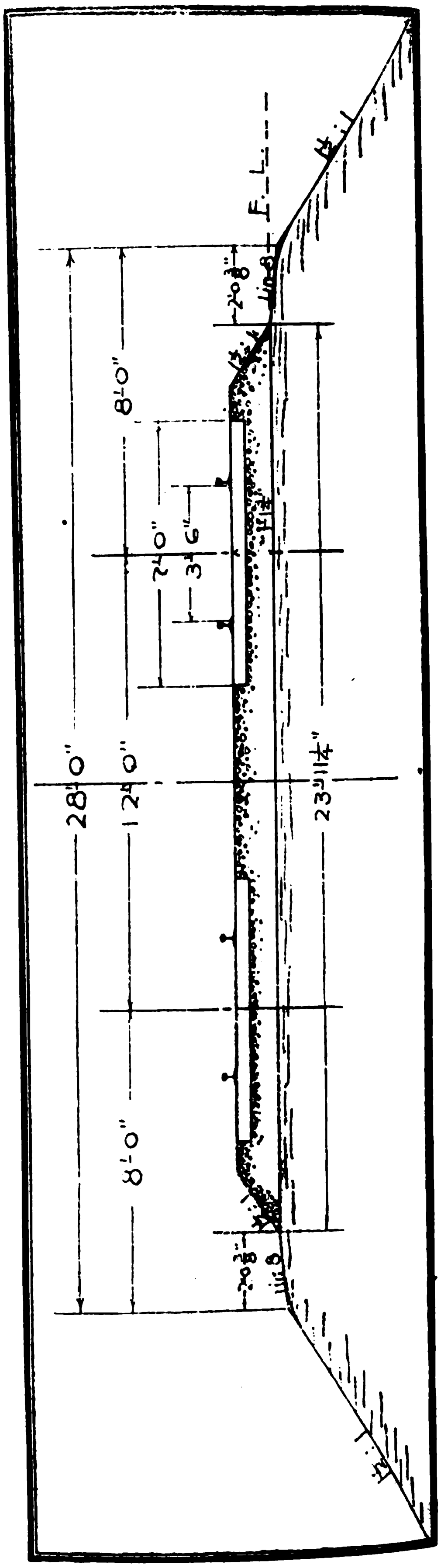


CONSTRUCTION GUAGE IN STATION YARDS





EMBANKMENT



DOUBLE TRACT

greatest naval ports of Japan, the other two being at Yokosuka and Kure. The coast along which the line proceeds from Haiki to Nagasaki has many fine views and is said to be the most beautiful spot in Kyushu.

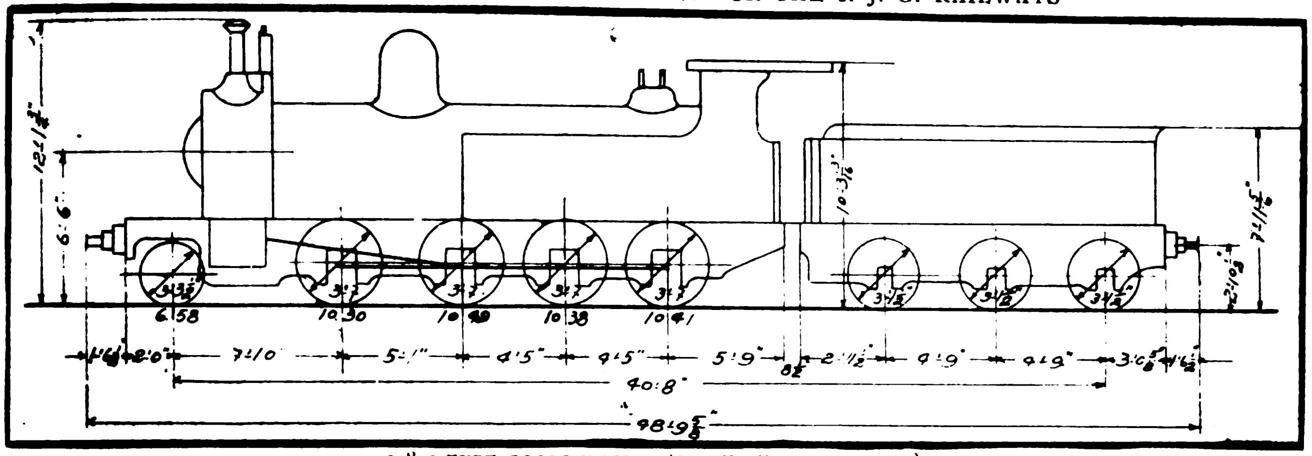
Nagasaki, 164 miles irom Moji, is the western terminus of the Kyushu liue. It is the open port which was first visited by foreign ships 530 years ago and the Mitsubishi Dock there is the oldest-established ship-building yard in Japan, and is the largest one in the Far East.

Michi-no-o and Unzendake, an inactive volcano, are both popu!a r hot spring resorts and are reached fron Nagasaki either by rickshaws or steam-launches.

Returning to Tosu where the Nagasaki line branches off from the trunk line, travelers reach Kumamoto after a southward journey of 56 miles by the trunk line from the junction.

The feudal castle at Kumamoto which was built by Kato Kiyomasa, a retainer of Toyotomi Hideyoshi, is the fort which the Imperial army held with desperate efforts for more than 50 days against the Satsuma Rebellion

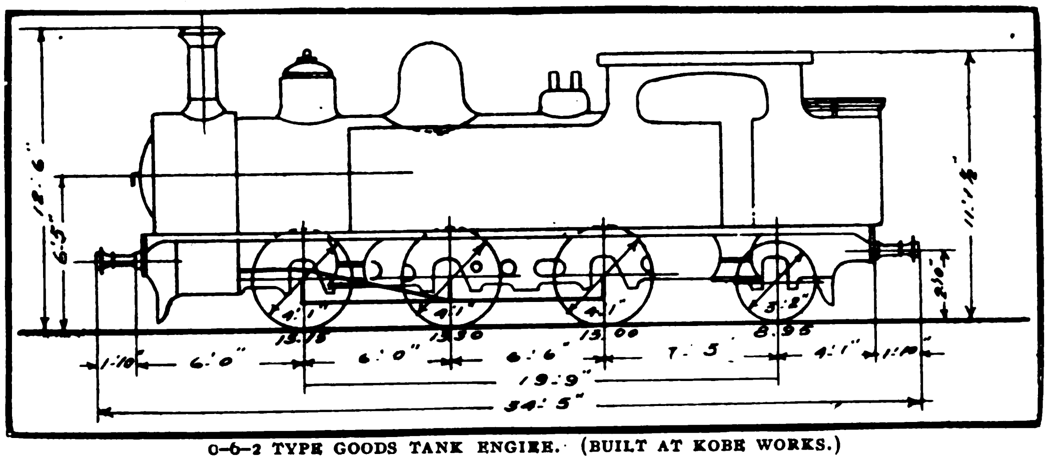
TYPES OF STANDARD LOCOMOTIVES FOR THE I. J. G. RAILWAYS



2-8-0 TYPE GOODS ENGINE (BUILT AT KOBE WORKS)

Diameter of Cylinder	18"	Weight on Coupled Wheels	41.58 tons.
Length of Stroke	22"		
Area of Heating Surface	1186.5 sq. ft.	TENDER	
Area of Fire Grate	183.5 sq. ft.	Capacity of Tank	2433 gallons.
Boiler Pressure	150 lbs.	Fuel carried	2.54 tons.
Weight of Engine in Working Order	48.16 tons.	Weight of Tender in Working Order	22.62 tons.

The above drawing shows one of the home-manufactured Heavy Goods Locomotive, which are used on the grade of 1 in 33 or of 1 in 30. This engine can haul 14 of four-wheeled wagons on the grade of 1 in 40, and 10 wagons on the grade of 1 in 30.

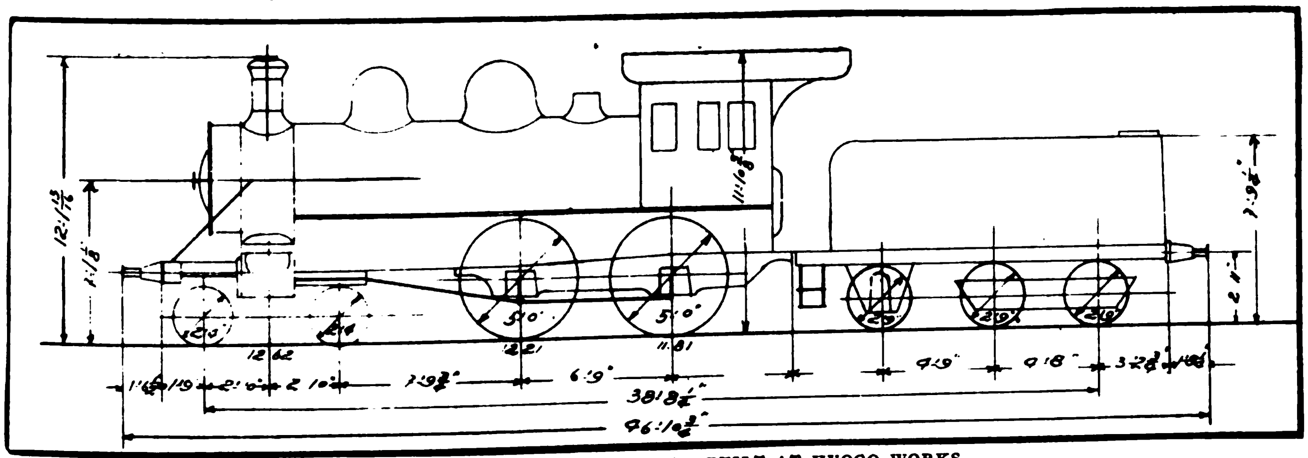


0-6-2 TYPE GOODS TANK ENGINE. (BUILT AT KOBE WORKS.)

Diameter of Cylinder	16"	Weight of Engine in Working Order	48.4 tons.
Length of Stroke	24"	Weight on Coupled Wheels	39.45 tons.
Area of Heating Surface	999.8 sq. ft.	Capacity of Tank	1716 gallons.
Area of Fire Grate	14.1 sq. ft.	Fuel carried	1.87 tons.
Boiler Pressure	160 lbs.		

The above drawing shows one of the home-manufactured Goods Locomotive, which are widely used at mountain sections.

This engine can haul 45 of four-wheeled wagons on level, and 13 wagons on the grade of 1 in 40.



4-4-0 TYPE PASSENGER ENGINE. BUILT AT HYOGO WORKS.

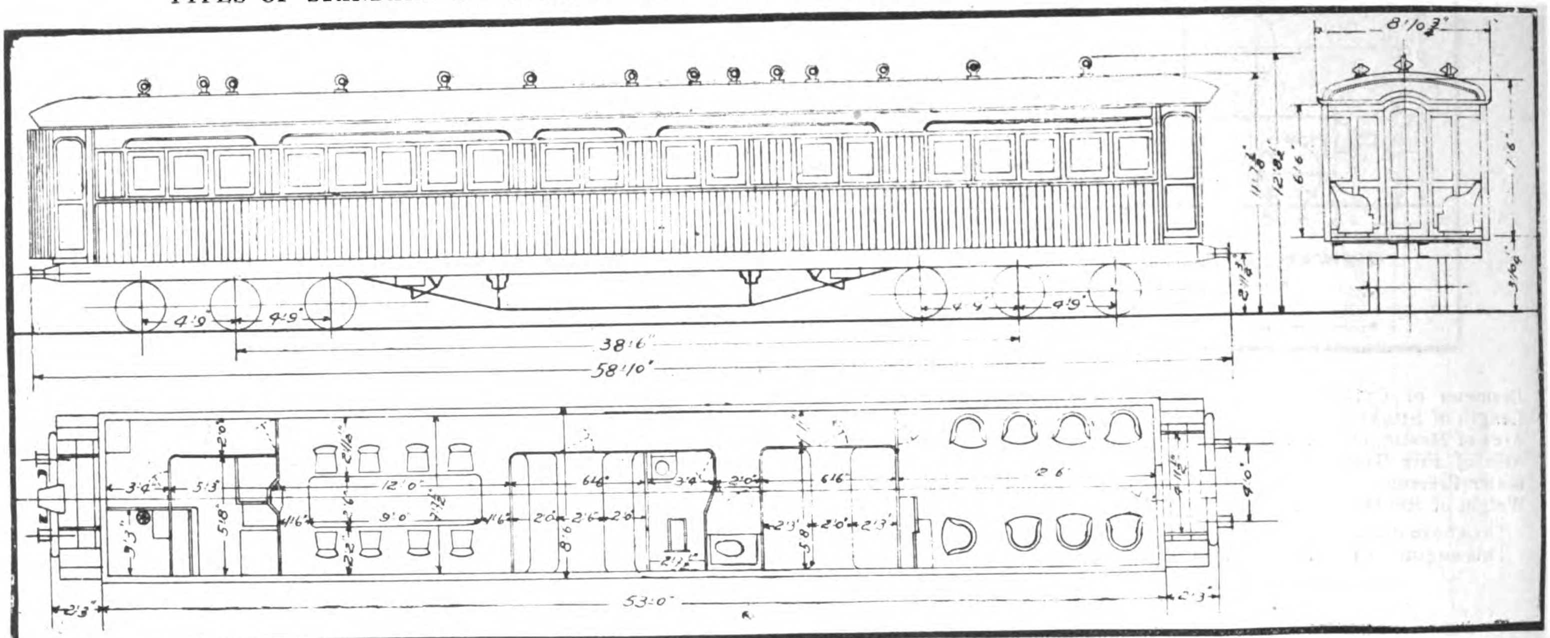
Diameter of Cylinder	16"	Weight on Coupled Wheels	24.02 tons.
Length of Stroke	24"	TENDER	
Area of Heating Surface	1051.2 sq. ft.	Capacity of Tank	1993 gallons.
Area of Fire Grate	15.7 sq. ft.	Fuel carried	2.8 tons.
Boiler Pressue	180 lbs.	Weight of Tender in Working Order	2329 tons.
Weight of Engine in Working Order	36.64 tons.		

The above drawing shows one of the home-manufactured Passenger Locomotives, which are used for level sections. This engine can haul 36 of four-wheeled carriages or 14 of bogie carriages running at a rate of about 40 miles per hour.

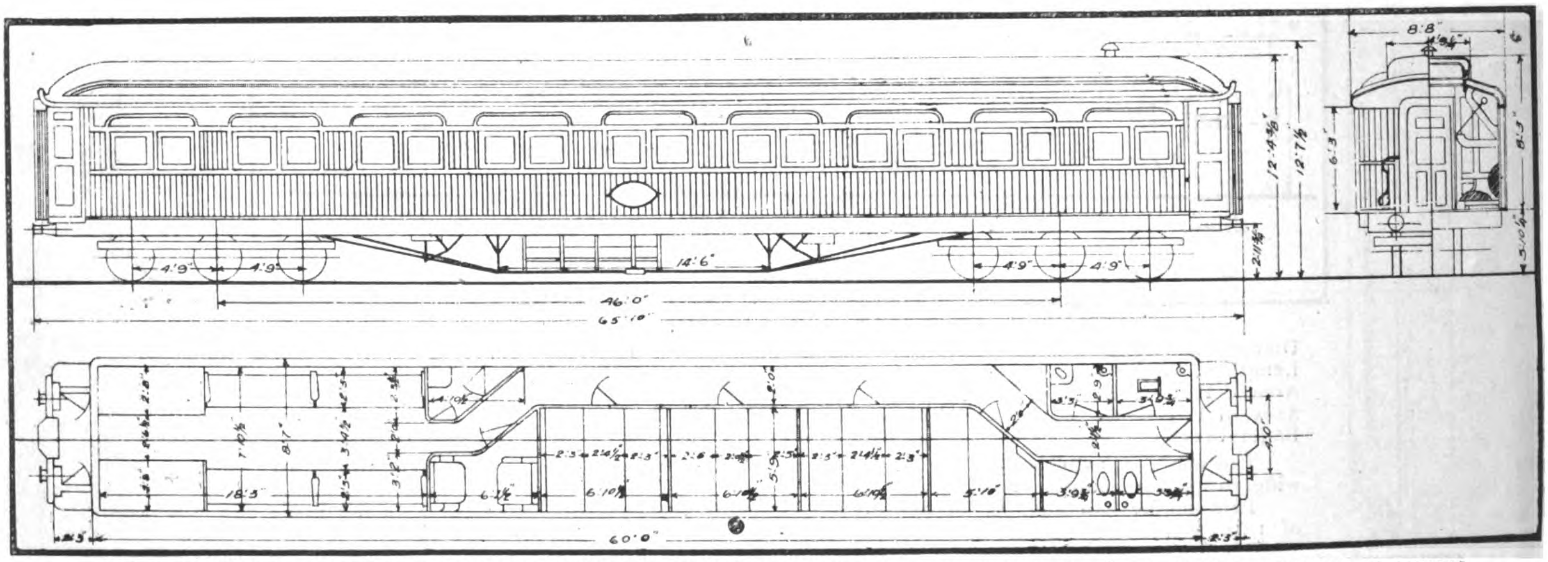
which arose in 1877 under the command of the late Saigo Takamori.

Two and a half miles from the castle is Suizenji Temple which is very well known for its laudscape garden. Aso Mountain, an active volcano, rising in the central mountain range of Kyushu, constantly sends up tremendous volumes of smoke, the sight of which makes the blood of lookers-on run cold.

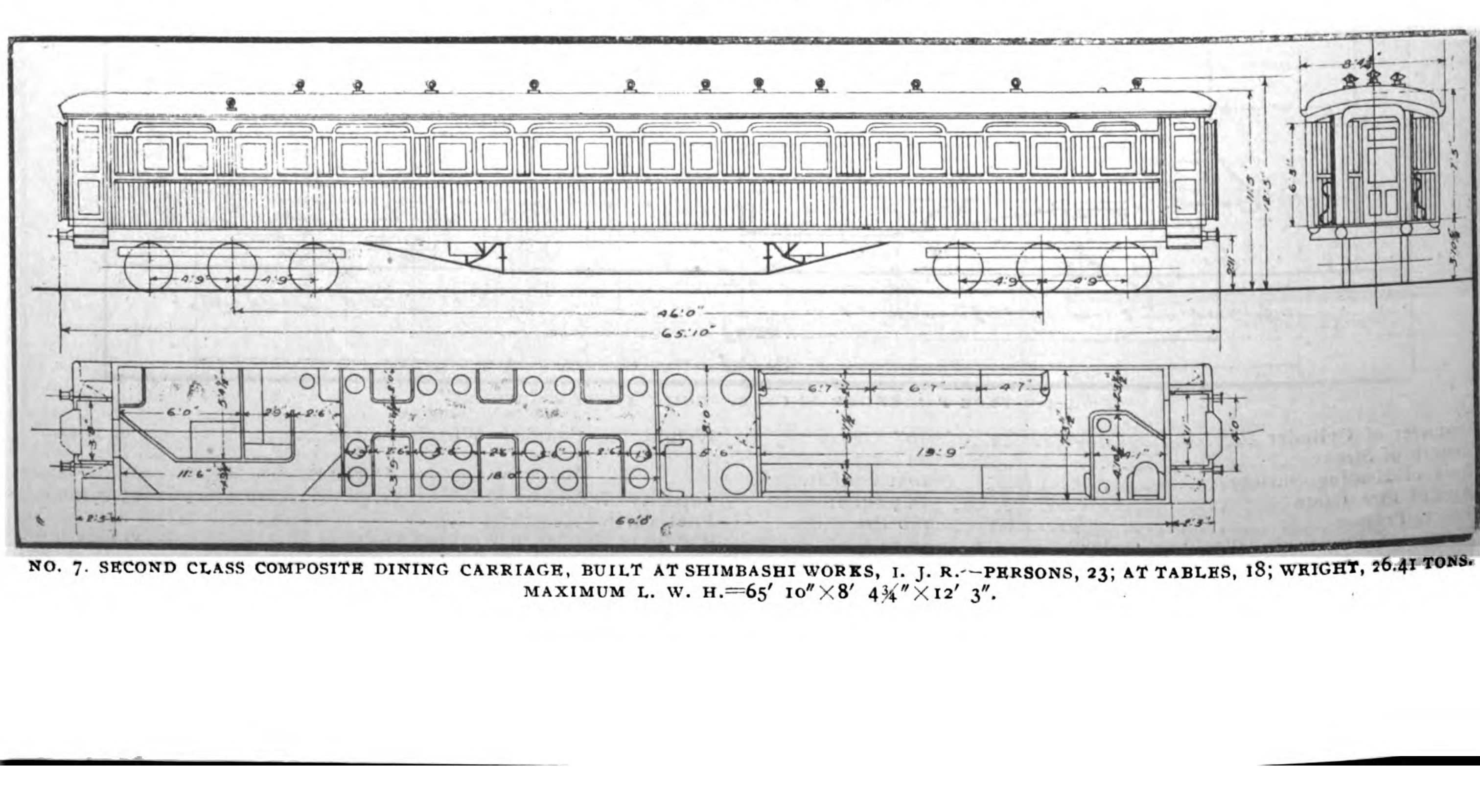
TYPES OF STANDARD CARRIAGES BUILT AT THE SHIMBASHI WORKS OF THE I. J. RAILWAYS



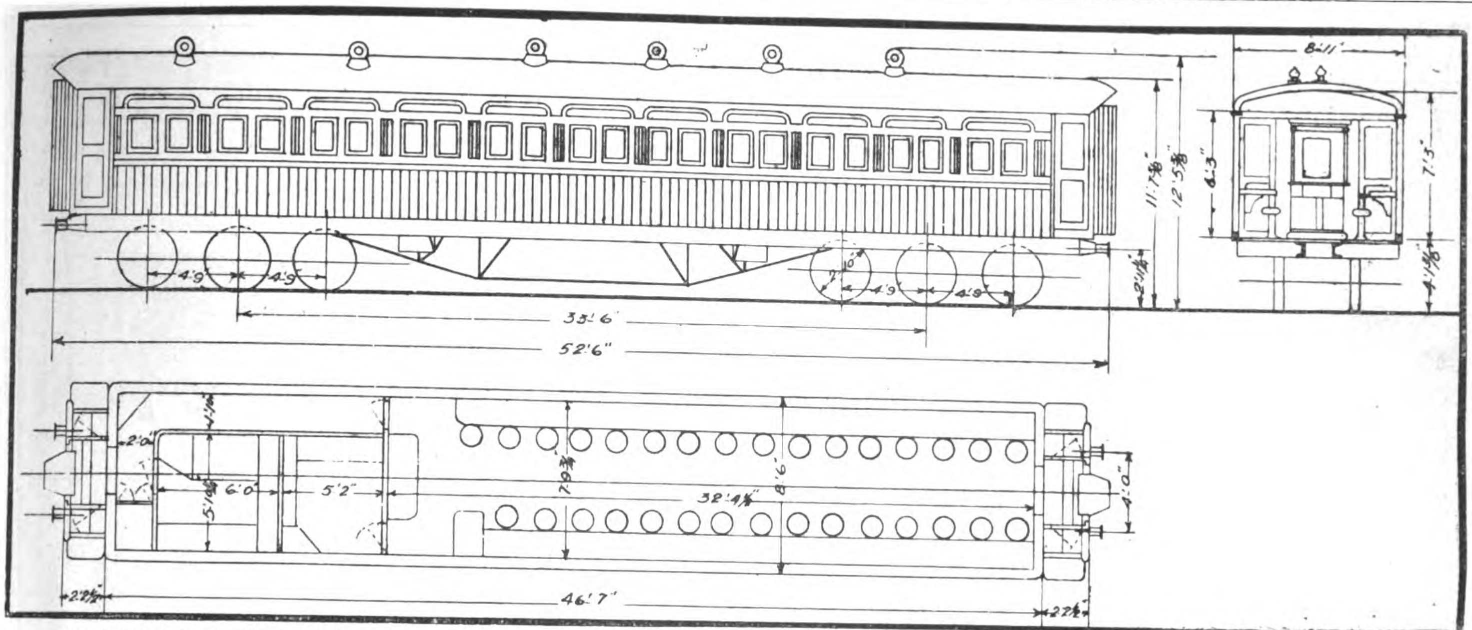
NO. 4. PRIVATE SALOON CARRIAGE, BUILT AT THE SHIMBASHI WORKS, I. J. R.—PERSONS 8; WEIGHT, 27.45 TONS; MAXIMUM LENGTH, WIDTH AND HEIGHT, 58′ 10″×8′ 10¾″×12′ 8½″.



NO .5. FIRST CLASS SLEEPING CARRIAGE, BUILT AT SHIMBASHI WORKS, I. J. R.—PERSONS, 26; WEIGHT 3 .19 TONS; MAXIMUM L. W. H.=65′ 10″×8′ 8″×12′ 7¼″.



NO. 7. SECOND CLASS COMPOSITE DINING CARRIAGE, BUILT AT SHIMBASHI WORKS, I. J. R.—PERSONS, 23; AT TABLES, 18; WEIGHT, 26.41 TONS. MAXIMUM L. W. H.=65′ 10″×8′ 4¾″×12′ 3″.



NO. 7. THIRD CLASS DINING CARRIAGE, BUILT AT SHIMBASHI WORKS, I. J. R.—PERSONS, 31; WEIGHT, 23.46 TONS. MAXIMUM L. W. AND H.=52' 6"×8' 11"×12' 5⅜".

The line between Yatsushiro and Hitoyoshi is built along the rapids of the Kumagawa and over the steep pass of Yatake. The construction of the section extending over 53 miles was most difficult being full of bridges, tunnels, and having a switch-back and a loop-line.

Kagoshima is the southern terminus of the trunk line and is 237 miles distant from Moji. The Shimazu, one of the powerful feudal Lords, had a castle in this city. The city reminds one of the bombardment by the British fleet in 1863, a contrast to the friendly relations, now existing between England and Japan. The Kagoshima clan has produced many distinguished soldiers such as Marshal Oyama and Admiral Togo.

The trunk line which leaves Tokyo toward the north has a branch line at Omiya which after passing Takasaki and Yokogawa climbs the Usui Pass on the line of Abt system with an inclination 1 in 15, passing through 26 tunnels in succession. On the top of the mountain is Karuizawa station, which is 3280 feet above sea-level. Karuizawa is very cool, even in summer, and is one of the most popular summer resorts among foreign residents in Japan. There are hotels with good accommodation and many private country houses.

Asama, an active volcano, which rises to the north of Karuizawa, lords it over the surrounding mountains.

46 miles further north is Nagano. Here is Zenkoji Temple, the Mecca of Japan, whither thousands of pilgrims journey throughout the year.

Passing Nagano, the line enters Echigo Province, famous for rice and kerosene, and terminates at Niigata, one of the first open ports in Japan.

ACCOMMODATION OF THE GOVERNMENT RAILWAYS AND HOTELS PROVIDED FOR FOREIGN TRAVELERS

In the foregoing paragraphs a general description has been given of the places of interest found along the Government Railways and a few words about the accommodations of the Government Railways and hotels providen in these cities may be necessary.

As it is only a few years since the nationalization of railways, there are of course many criticisms to be made with regard to them, but the authorities have made it their business to provide suitable accommodations which contribute to the comfort and safety of passengers. In fact, for the convenience of those passengers traveling a long distance, sleeping and dining cars are attached to express and through trains and European meals are served either "table d'hôte" or "à la carte."

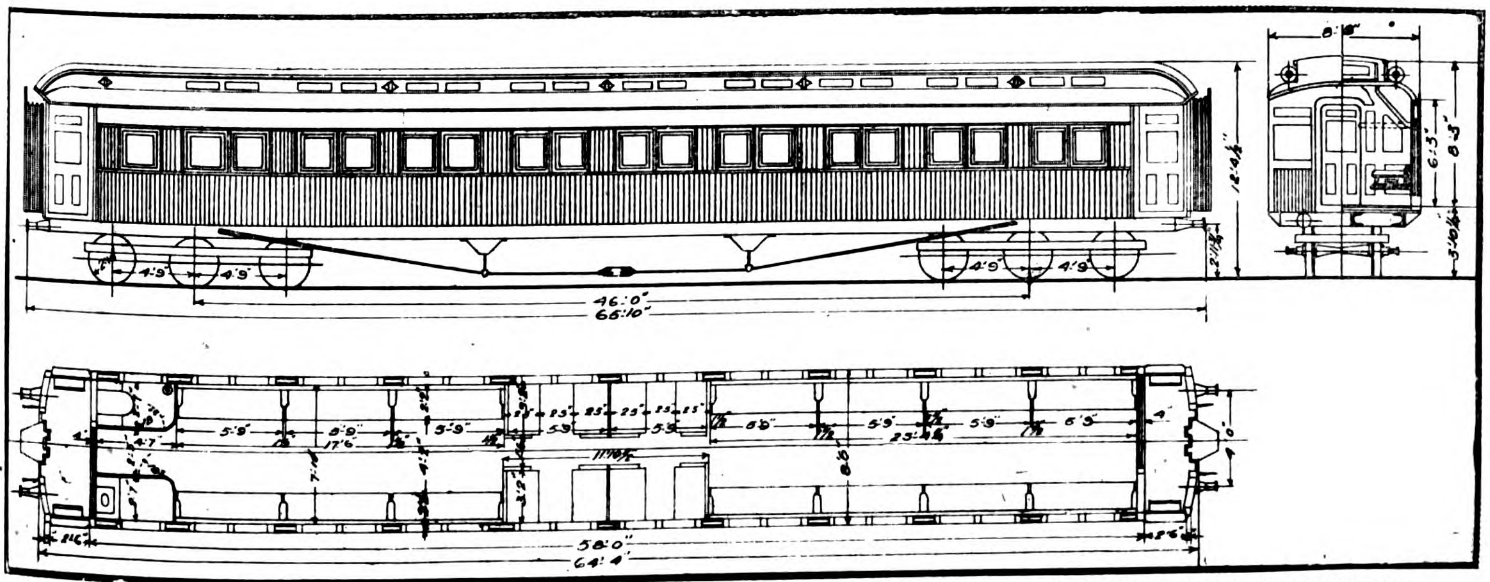
The Japanese are by nature hospitable, but owing to the ignorance of foreign languages, and to the consequent misunderstanding, they are sometimes unable to treat foreign guests satisfactorily, to their regret. This is specially the case with the people of the lower classes. In view of this, the railway authorities pay special attention to the training in English of the railway employees and, in order to attain their object, have established an English School, the graduates of which are now in service on the principal express trains for the purpose of rendering assistance to foreign passengers who do not know the Japanese language. Every station is provided with rickshaws and at the principal stations there are inquiry offices where guides who speak English are stationed, enabling foreign tourists to travel without inconvenience or trouble.

For a luxurious trip a private car can be engaged at a reasonable charge. The cars on the main trains are cooled in summer with electric-fans and warmed in winter with steam heaters. They are lighted by electric lamps, so that passengers can read at night.

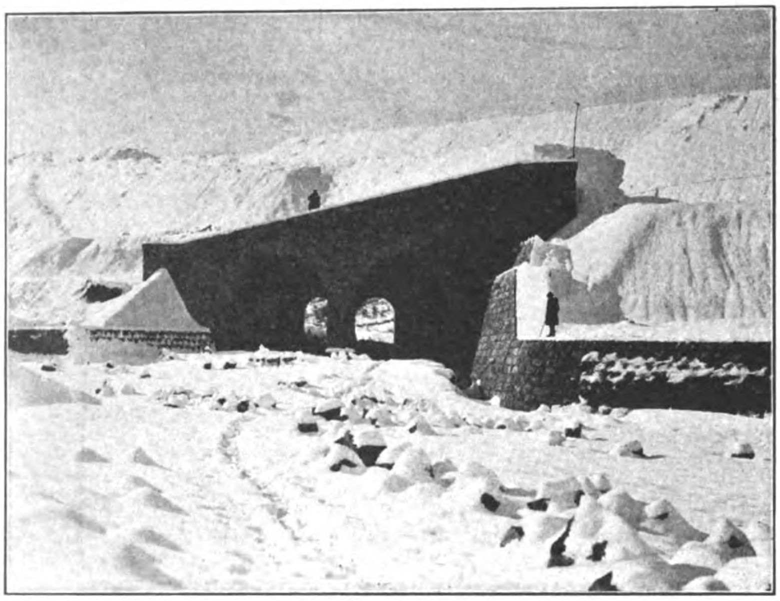
For the convenience of travelers to Japan the Government Railways have tickets sold at the European and American Agencies of Thos. Cook & Son and the International Sleeping Car Company.

The Government Railways conduct a fine hotel in European style at Shimonoseki, the point of communication between Kyúshú and Hondo and the centre of the steamship lines to China and Korea. This hotel is furnished with the best accommodation and excellent cuisine, at reasonable charges, either European or American plan.

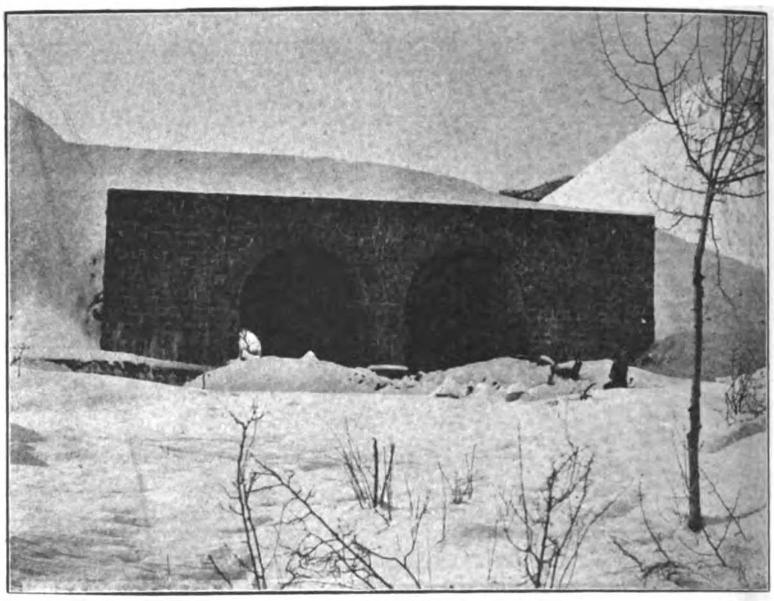
Besides the above railway hotel, there are European hotels in the principal cities and towns such as Nagasaki, Miyajima, Kóbe, Osaka, Kyóto, Nara, Nagoya, Hakone, Kamakura, Yokohama, Tókyó, Nikkó, Karnizawa, and Sendai. The hotels in Kyóto, Nara, Hakone, and Nikkó are specially snited for a stay of several days, being so ideally located that they make excellent resting places for tourists.



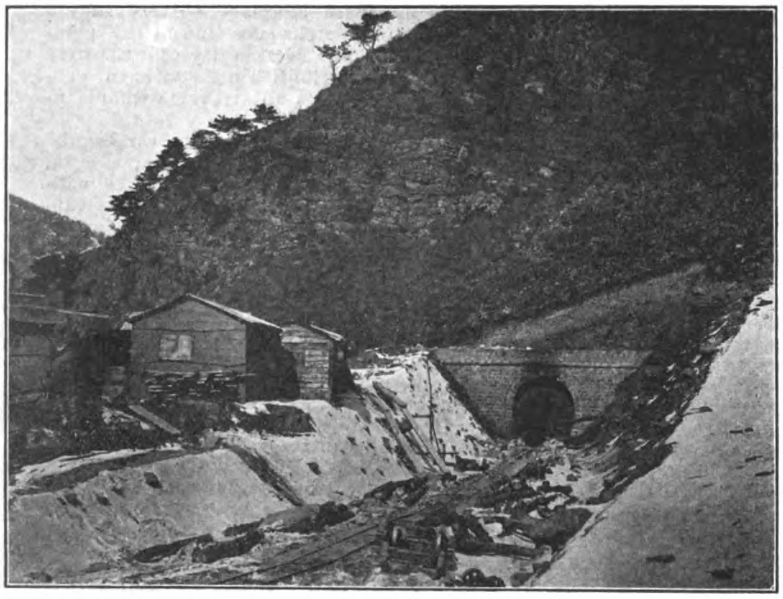
NO. 8. SECOND CLASS SLEEPING CARRIAGE, BUILT AT SHIMBASHI WORKS, I. J. R.—PERSONS, 58; WEIGHT, 30.25 TONS; MAXIMUM L. W. H.=65' 10"×8' 8"×12' 7½".



CULVERT NO. 6. NEAR THE WESTERN ENTRANCE OF CHIKUANSHAN TUNNEL (FEB. 1911)

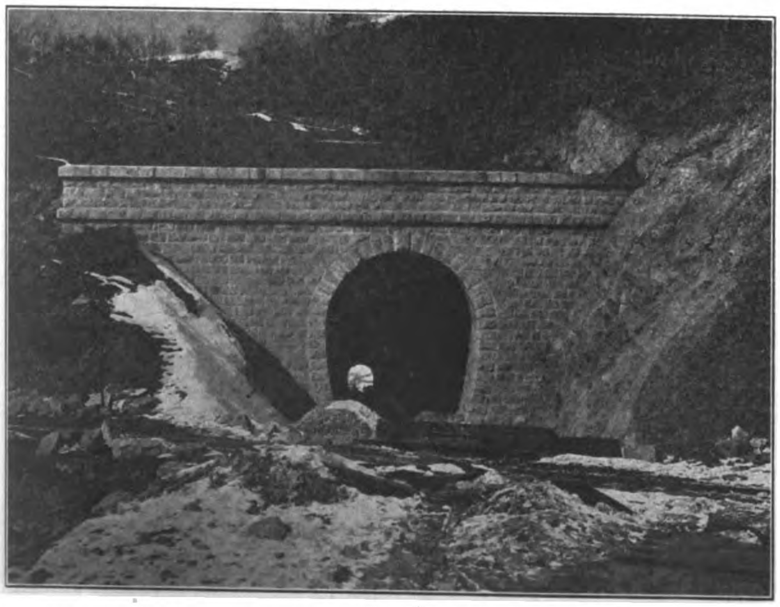


CULVERT NO. 7 NEAR WESTERN ENTRANCE TO CHIKUANSHAN TUNNEL (FEB 1911.)

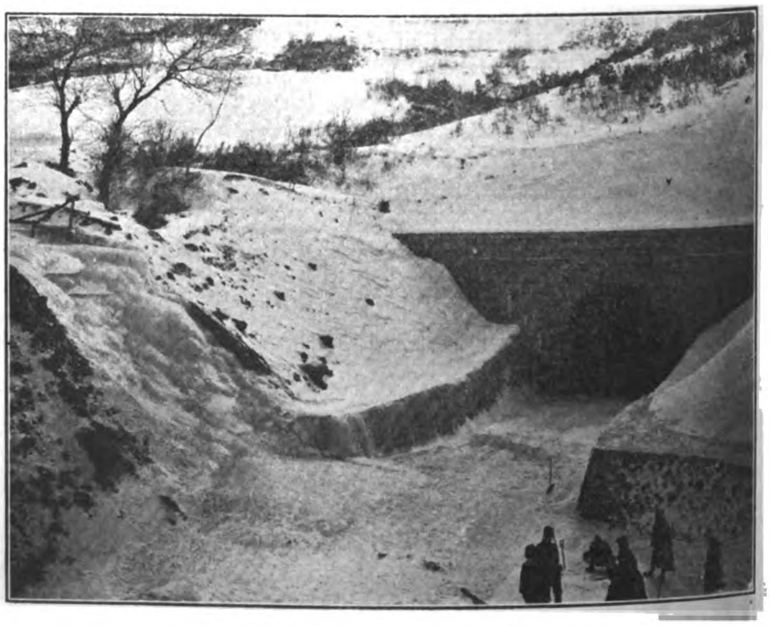


EASTERN ENTRANCE TO KUSUNGTZU TUNNEL (FEB. 1911)

WESTERN ENTRANCE TO CHINLENG TUNNEL (FEB. 1911)

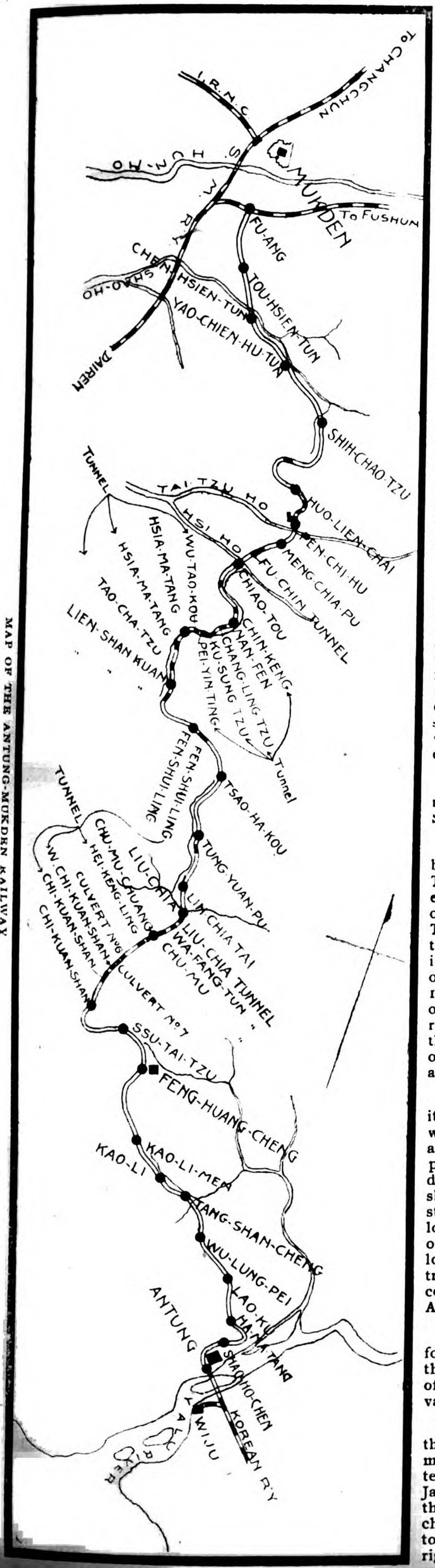


HSIAMATANG TUNNEL, AS SEEN FROM THE EASTERN ENTRANCE (FEB. 1911)



WESTERN ENTRANCE TO TAOCHATZU TUNNEL, (FEB. 1911)

THE ANTUNG-MUKDEN RAILWAY



MAP OF THE ANTUNG-MUKDEN RAILWAY

The railway line between Antung and Mukden, made necessary by the operations of the war between Japan and Russia, stands as a monument to Japanese engineering skill and enterprise, and typifies Japanese advance in Manchuria. This little narrow gauge road conceived during the stress of a great national conflict as imperative for the successful forward movement of the Japanese army into Manchuria, for some time simply served the needs of the army, but exigencies of politics and trade have transformed it into the most important thread in the web of Japan's strategic lines, and a necessary link in the development of transasiatic travel.

Shortly following the occupation of Antung by the Japanese forces in May, 1906, owing to the almost impassable character of the mountain roads in this region and the necessity of facilitating a more rapid movement of supplies, the construction of a light railway was begun by their engineer corps and its extension continued with the advance of the army as far as Shichiaotzu, a point about 30 miles to the southeast of Mukden. The country to the north and west of Shichiaotzu, drained by the Taitzu River, a tributary of the Hun Ho, being quite level and ordinary methods of transportation comparatively easy, this point was then made the terminus of the railway until August of 1908 when the Okuragumi, a large Japanese concern, received from the military authorities a contract to extend it to Mukden.

The gauge was 2 feet 6 inches. The rails as well as the rolling stock, including locomotives and trucks, were supplied by the Baldwin Locomotive Works. The system possessed altogether 150 locomotives, 100 of these being of 16 and the remainder of 11 tons. The freight cars were all open and similar to those used for hauling sand in America. The entire carrying capacity of the railway was only some 1200 tons. Besides these open cars there were a number with tops and designed especially for passenger traffic.

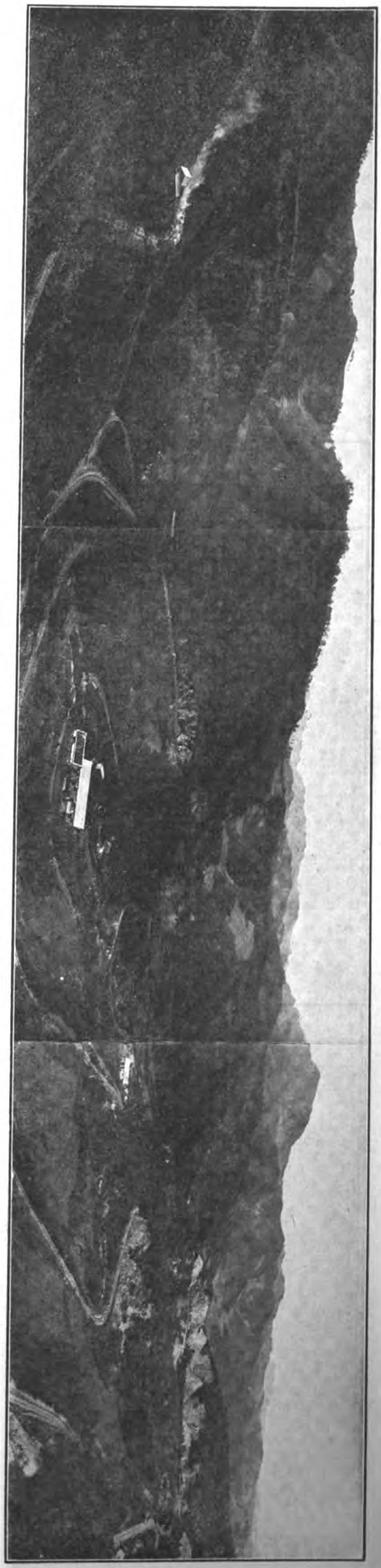
The line remained under control of the military authorities until its transfer to the South Manchuria Railway Company.

The railway was opened to general traffic, both freight and passenger, in August 1908. Two schedule-time runs are daily made from each end in addition to more or less regular ones between some of the intermediate points. The journey from Antung to Mukden requires two days. The through trains both leave in the morning, one at 6 o'clock and the other at 9, and reach Tsaohohu (Sokako) 12 hours later. Operation after dark would of course be subject to a great deal of risk, so that passengers are obliged to pass the night at this point, resuming their journey on the following morning at the same hours as before.

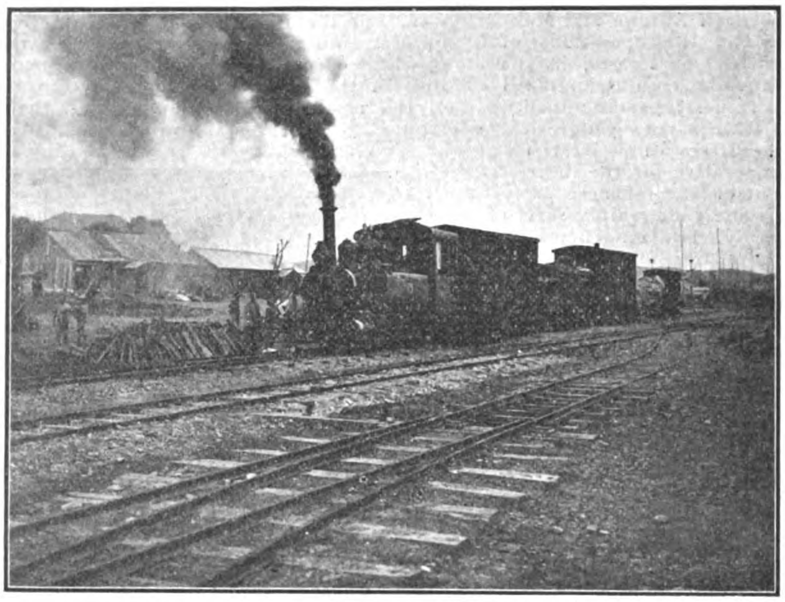
Designed primarily as a military supply line, it was constructed in haste to keep pace with the rapid forward movement of the army, and to avoid the construction of expensive tunnels the line was given a wide detour, with many steep gradients and short, sharp curves. The bridges were hastily constructed of wood and were unsafe for heavy loads. The small locomotive hauling three or four cars, travelled at an exceedingly low speed for fear of derailment, and travel by night was impracticable. The time consumed in covering the 188 miles between Antung and Mukden was two full days.

In other words the line was wholly unsuited for ordinary commercial purposes and after the termination of the war and the withdrawal of the Japanese troops, it had no practical value.

With an eye to the future availability of the line for similar strategic purposes and to make it efficient for the development of the territory and legitimate commercial uses, the Japanese Minister at Peking had inserted in the Supplementary Agreement to the Manchurian Convention of Peking of 1905 a clause to the effect that Japan not only had the right to maintain the line as a military railway, but the right to improve it and transform it into a commercial line. To make the line effective and useful as a connecting link in the through system the conversion of the narrow gauge to standard was the first requisite, and this in turn demanded the

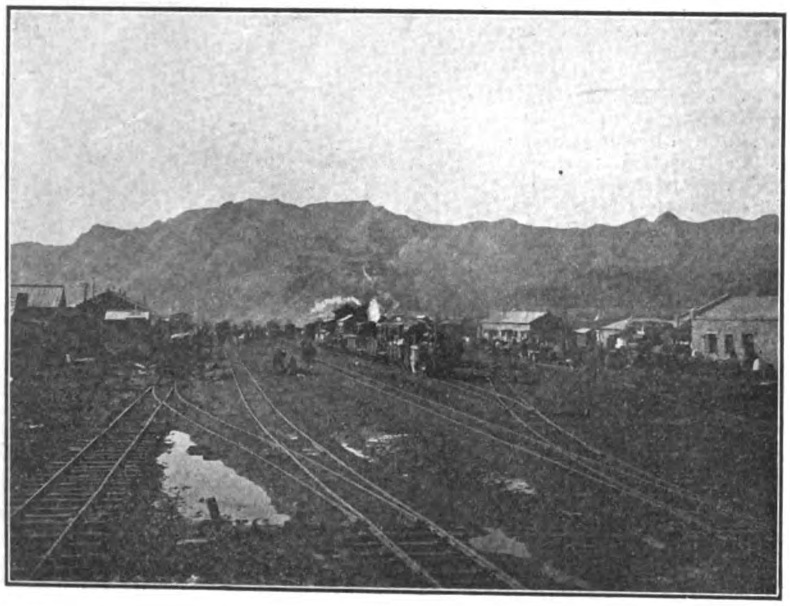


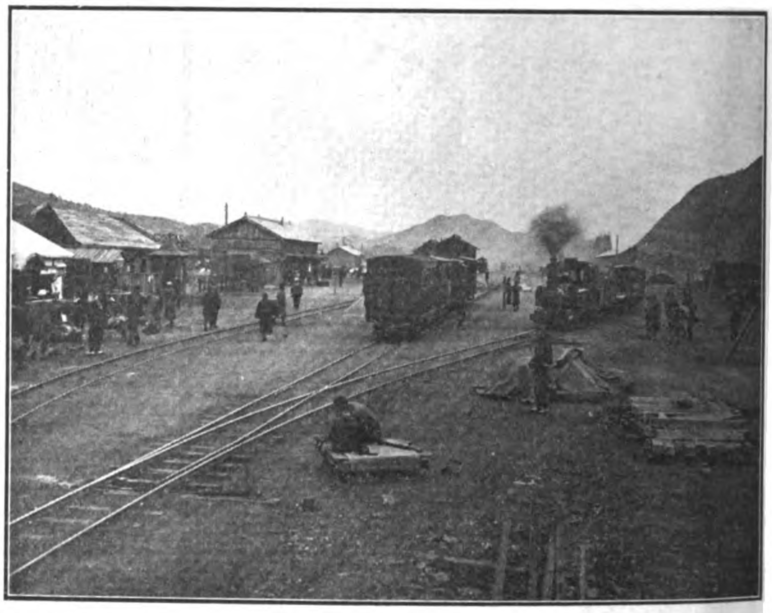
ANTUNG-MUKDEN RAILWAY: BLACK MINE PASS



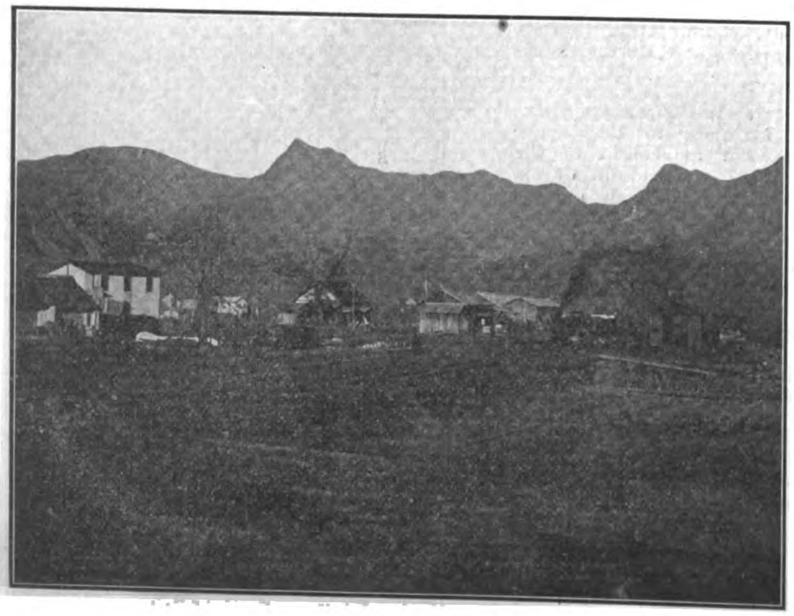
ANTUNG STATION

ANTUNG STATION



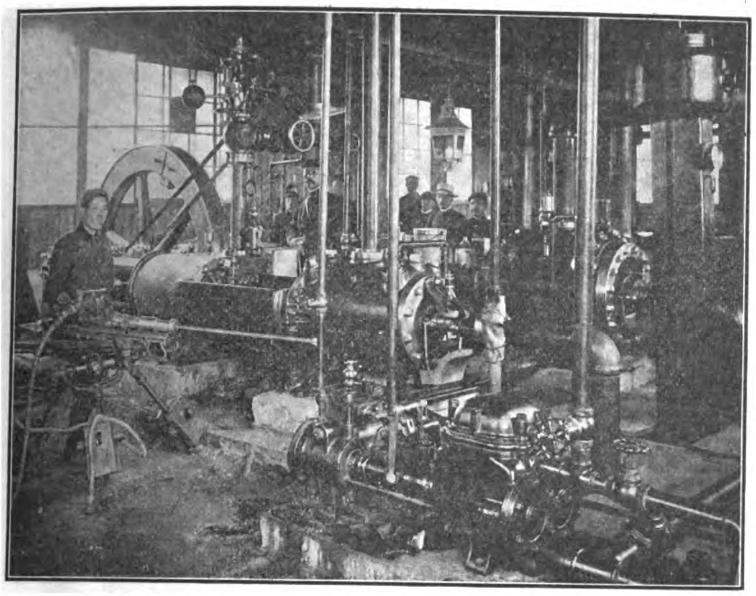
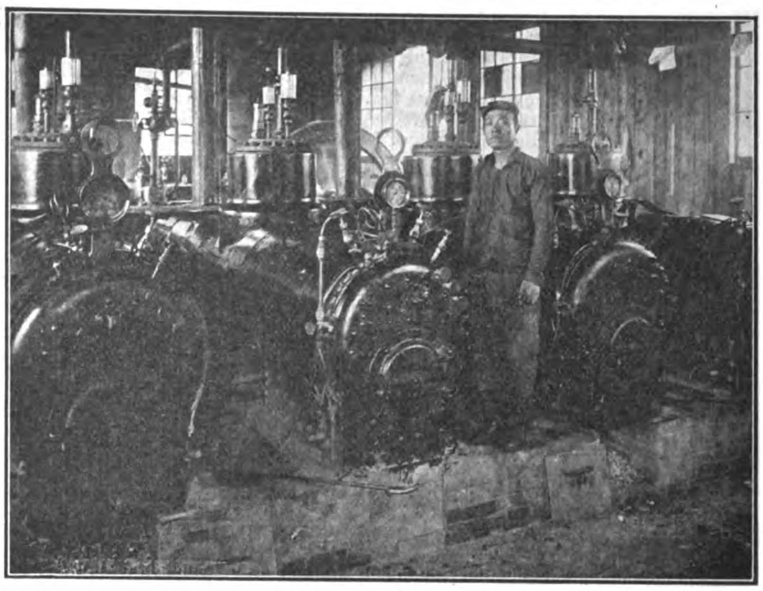


STATION AT CHIKUANSHAN



PENCHIHU STATION

VIEW OF TSAOHOKOU. THIS TOWN IS LOCATED MIDWAY BETWEEN MUKDEN AND ANTUNG

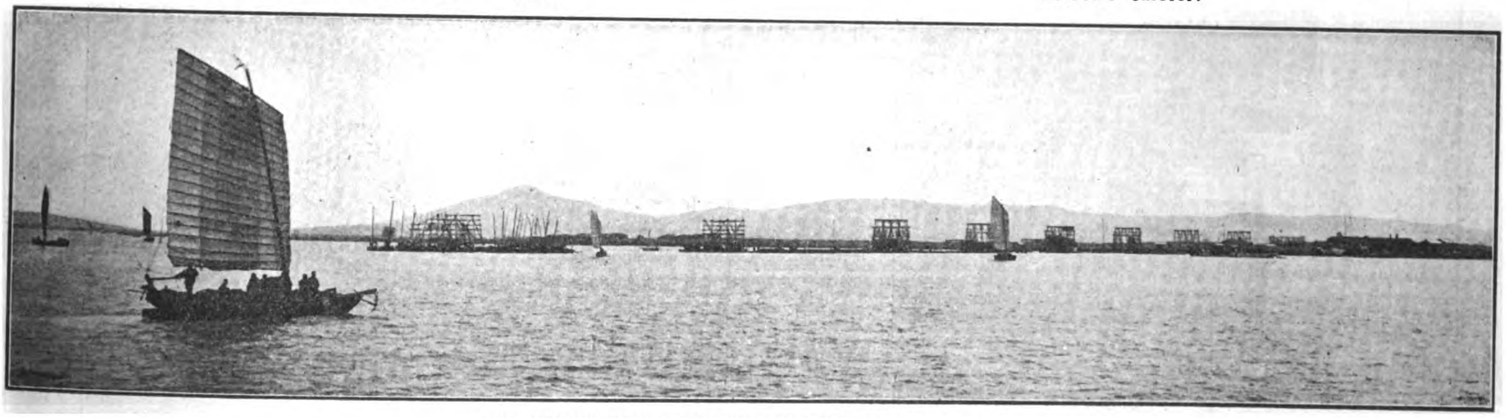



INGESOLL RAND COMPRESSOR PLANT AT FUCHINLING TUNNEL

building of new bridges, the boring of tunnels, the straightening and grading the line, and other improvements without which its value for commercial purposes would remain nil.

The Pekin Agreement of 1905 stipulated that the work of reconstruction should be unmistakable signs of her determination to strengthen her position East of Baikal as the first move in regaining her lost ground, stirred the Japanese Government into a sudden realization of the danger of further delay in reconstructing the Antung-Mukden line.

existing tract and no broadening of the gauge could be permitted. She revived several other immaterial issues which if concurred in by Japan would have nullified the provisions of the Peking Agreement and made impossible the use of the line as a commercial carrier.

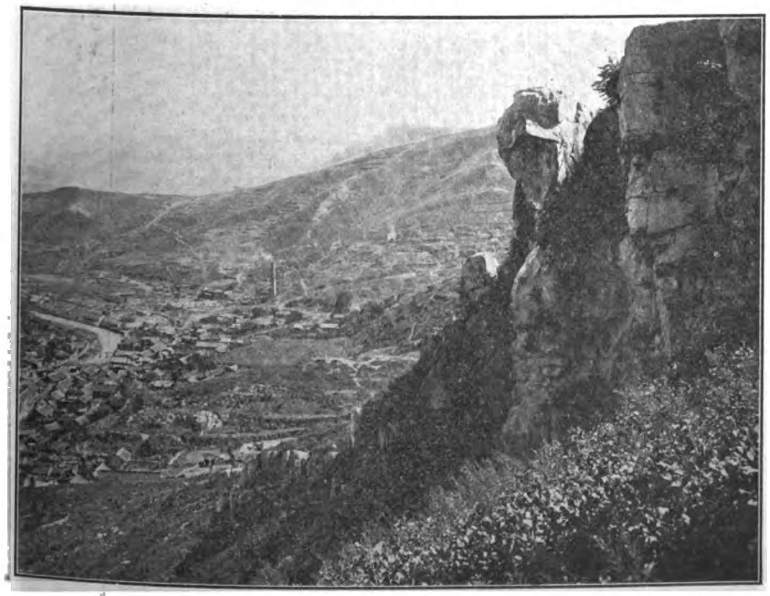


ERECTING PIERS FOR THE YALU RIVER BRIDGE

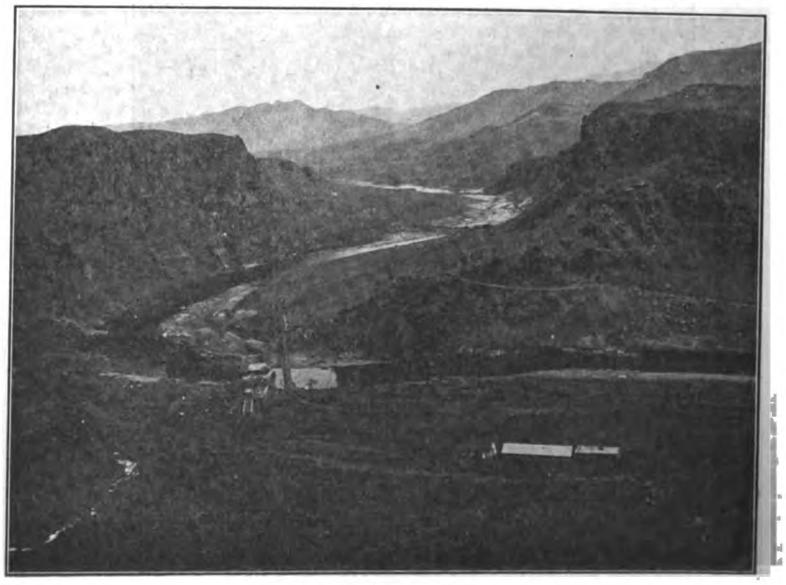
commenced within a period of two years but Japan failed to avail herself of the opportunity within the time limit. The sudden activity of Russia, however, in deciding to construct the Amur Railway and double track the Trans-Siberian line together with other

By this time, however, the Chinese Government, with the hope of regaining control over the line, raised various questions which for a time threatened to bring about a disruption of friendly relations with Japan. China finally advanced the argument that the work of improvement must be confined to the

The Japanese Government in the face of this uncompromising attitude, after a final attempt to induce China to reconsider her position, suddenly announced that it would take independent action and proceed to the reconstruction of the line in accordance with



PENCHIHU TOWN AND COLLIERY

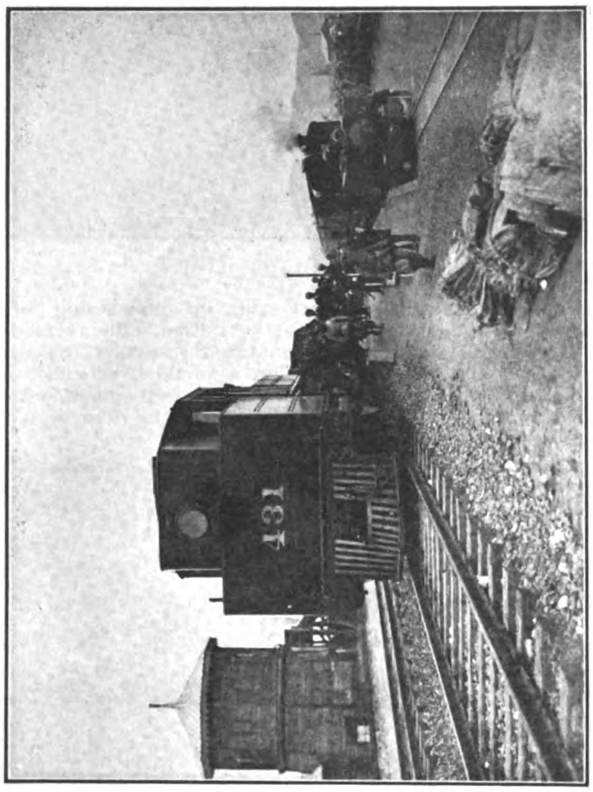


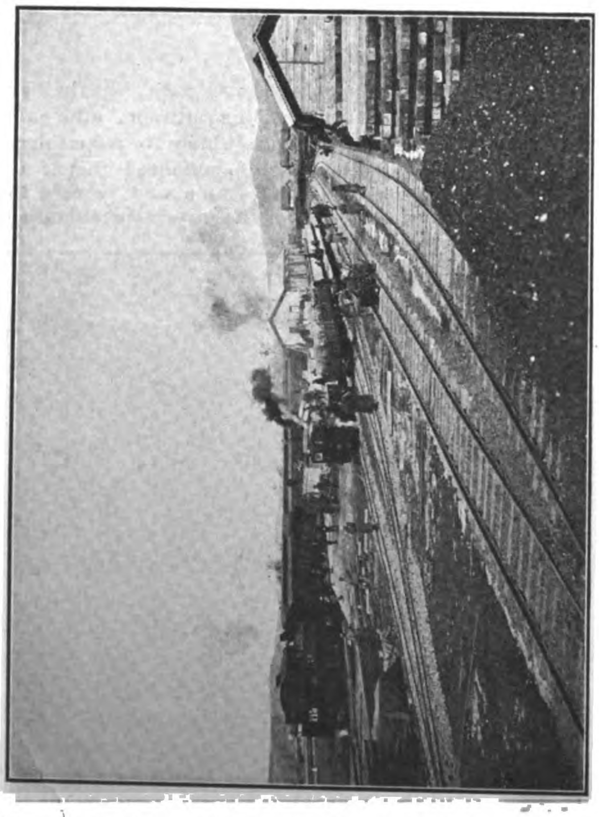
ANGLER'S POINT

her treaty rights and in harmony with the survey already determined on by commissioners of both Governments. Thereupon the Chinese Government, realizing that further obstruction was dangerous, authorized the Manchurian Viceroy to sign the following memorandum on the 19th of August 1909.

I.—The same gauge as that of the Peking-Mukden Railway shall be adopted.

II.—Both Japan and China shall recognize and approve of the whole line as already surveyed and agreed to by the Commissioner of the two Governments. But the location of that portion of the line from Chenhsiangtun to Mukden shall remain to be decided by mutual conference between the two countries.





JUNCTION WITH THE SOUTH MANCHURIA RAILWAY

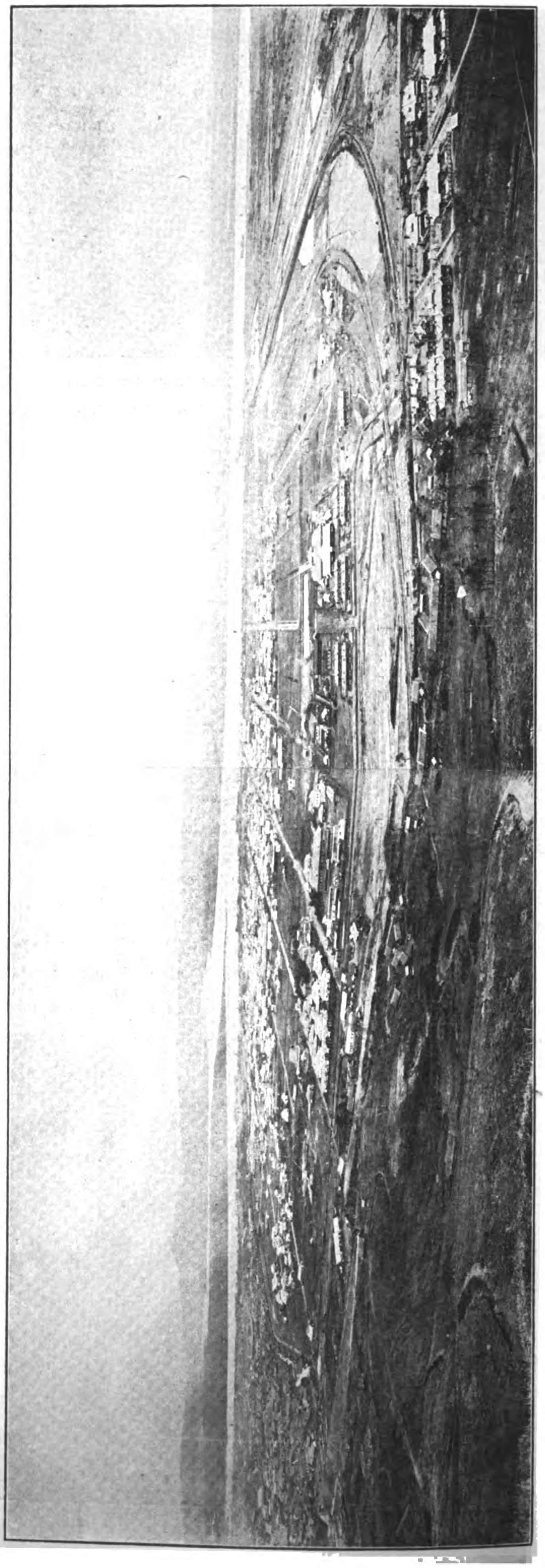
III.—On and from the date when the Memorandum is signed negotiations for the purchase of land and for adjustment of all other details be instituted.

IV.—From the day following the signing of the Memorandum, that is, from the day after the negotiations above mentioned, the instituted work of reconstruction shall be accelerated.

V.—China shall instruct local officials along the line to give every facility regarding execution of the works.

Under the new Agreement work on the line was initiated shortly afterwards and has been pushed ahead in a manner highly credit-

(Continued to page 20.)



VIEW OF ANTUNG, SHOWING THE JAPANESE CONCESSION AND YALU RIVER IN DISTANCE

THE FAR EASTERN REVIEW

GEO. BRONSON REA, M. E.

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THE HU-KUANG LOAN

When the principle of the "Open Door" in the matter of purchase of foreign railway materials, was first advocated by the FAR EASTERN REVIEW, in connection with foreign loan agreements it was not very warmly received in certain interested quarters, but the spirit of fair play involved, gradually appealed to the different groups interested in China's railway finance until it was finally accepted as the only reasonable adjustment of the usual conflict of the different foreign interests when any one nationality attempted to conclude a loan on the old basis. With the conclusion of the Hu-Kuang Loan, May 20, the principle was fully recognized by the four powers interested, viz, Britain, Germany, France, and America, which practically assures its incorporation in all future agreements.

This special clause in the Hu-Kuang Loan Agreement provides that the British and China Corporation and the Deutsche-Asiatische Bank will receive a commission of 5% for all foreign materials purchased only; that Chinese materials shall be utilized whenever available and specifically provides that the rails shall be purchased from the Hangyang Iron Works; that foreign materials necessary be purchased in the open market and under equal conditions as to quality and price, preference will be given to the manufactures of Britain; Germany, France and America; that if Chinese goods are offered in competition to the manufactures of the four nations named, all conditions being equal, Chinese material is to be given the preference.

In concluding a comprehensive review of the terms of the Hu-kuang Loan, the *Peking Daily News* directs attention to the improvement therein with respect to purchase of material as compared with former agreements and says:

"Though the agreement still bears features of the ordinary previous loans in the matters of the control of finance, the appointment of foreign engineers and the purchase of foreign materials, yet thanks to the editor of the FAR EASTERN REVIEW who first advocated the principle of equal opportunity to the goods of all nations to supply the wants of Chinese Railways there is to be found in the present agreement a decided improvement upon the old ones, the provision for giving railway materials of the world an equal opportunity to compete in the Chinese market".

The loan is for £6,000,000 drawing interest at 5% for a maximum term of 40 years but redeemable after ten years at a premium of two and one-half per cent and after seventeen years at par. If additional funds are required the agreement provides for an additional loan of £4,000,000 on the same terms.

China is to receive 95 per cent of the face value of the bonds and the amount deposited in the banks, other than in China, is to earn interest at the rate of 3% per annum the rate on deposits in banks in China to be later decided.

The proceeds are to be utilized in redeeming the American-China Development bonds outstanding to the face value of £500,000 at 2½% premium; to complete the Hupeh-Hunan section of the Canton-Hankow Railway, 600 miles, and the construction of the Hankow-Szechuan Railway, 700 miles, a total of approximately 1300 miles of line. The loan is secured by liens upon Hupeh likin and salt taxes and Hunan imported rice tax, general likin and salt taxes.

Provision is made for a British engineer-in-chief on the Canton-Hankow, a German on the section of the Hankow-Szechuan line to Tchang and an American on the Tchang-Kweichou section.

The agreement also provides for auditors to supervise the expenditures. The director general will be Chinese and the appointments of foreign engineers-in-chief will be made by the Chinese Government subject to the approval of the representatives of the financial interests.

The last word on this loan is the news from London that the issue was oversubscribed at a 101⅛ which indicates the favorable attitude of foreign investors to Chinese loans even involving the most liberal terms yet arranged.

THE NATIONALIZATION OF CHINESE RAILWAYS

It would seem that with the organization of the council-cabinet, China had inaugurated an active federal policy designed to strengthen the central government and bring order out of chaos. The most important edict issued in many years provides for the nationalization of the trunk lines of the Chinese empire and including them in one comprehensive system.

As the decree states, to control the defence effectively, the only means is the speedy construction of the railways. "After careful and repeated deliberations, the nation must possess a complete system of trunk lines to and from the four quarters of her territory in order to administer the government by a grasp on the central pivot." The decree proceeds to review the history of Chinese railways pointing out the unsatisfactory results obtained especially in Kuangtung, Hunan, Hupeh, and Szechuen where the decree declares: "the offices have been open for a number of years, only wasting money by inactivity. Thus in exhausting the fat of millions of our people, we find only waste and extravagance in some cases, and misappropriation and pocketing in others, so that it is feared the longer that time passes, the heavier will be the burden of the people, high and low will suffer from its effects, the consequences of which are beyond our present imagination. Therefore, we desire to proclaim explicitly to the world that all the trunk railways shall be State owned, this shall be the fixed policy. Whatever trunk railways in the provinces which were under private management by companies established before the third year of Hsuan Tung, have been delayed in construction long enough, they shall immediately be taken over by the Government as State owned, and their building work shall be pushed on with energy. With the exception of the branch railways which shall be continually allowed to be undertaken by the people according to their ability, all cases of trunk railways formerly granted shall be cancelled. With regard to the details in the manner of taking them over, let the Ministers of Finance and of Posts and Communications gravely obey this Decree, and devote their whole attention to devising the fulfilment of it. They shall then, as soon as possible, request our order before execution. The Ministers in control shall not feel hesitation or fear, in preventing matters going from bad to worse. If there be anyone, who intentionally disturbs the railway policy regardless of the public welfare, creates doubts and incites resistance, he shall be summarily dealt with in accordance with the penalty for disobedience to law. Let this be promulgated and made known to all."

Tuan Fang was appointed director general of the Canton-Hankow and Szechuan-Hankow trunk lines in connection with the carrying out of the nationalization decree and all the officials of the provinces and of the railways were instructed to facilitate the transfer. To offset any local manipulation of local shares an Imperial order was issued prohibiting the sale of railway shares in these three provinces and the Viceroys and Governors where directed to assume responsibility for the maintenance of order and the protection of officials engaged in the nationalizing of these lines and the carrying out of the construction program. As was expected there has been the usual opposition in these three provinces, but realization of the firm purpose of the government to carry out its railway policy is having very desirable effect.

It is understood that provision will be made whereby the provincial companies may undertake the construction of branch lines and if sincere they will find plenty of opportunity to expend their energy with good results. This proposal seems to appeal to some of the leaders previously opposed to any inter-

ference and it is to be hoped that by the time the trunk lines are completed, the mileage in branch lines constructed in this manner will be considerable.

PHILIPPINE GOVERNMENT'S FRIENDLY ATTITUDE TOWARDS CAPITAL

In our issue of February, 1911, certain references were made in an article appearing under the caption "American Capital in the Philippines" that might be construed as an unjust charge that the Philippine Government was discouraging outside capital. Nothing could be more untrue and misleading as all who have made investments in the islands or who have even expressed interest, can testify. Indeed, the most desirable feature of the policy of the Government is the continued encouragement of outside capital in the development of insular enterprises. Every means is exhausted in making investment as attractive as possible. It might also be said that the success realized in interesting capital in insular ventures is due almost entirely to the active policy and initiative of the Philippine Government.

We regret that such a misconception of the real attitude of the Government should have evolved from the article referred to, for the reason that it is not in accord with the facts, nor has any such conclusion our editorial endorsement.

The attitude of capital towards Philippine investments is slowly changing for the better as more general, reliable information respecting the favorable natural conditions and opportunities for legitimate enterprise in the development of uncovered wealth and latent industries are realized. When it is remembered that with the conclusion of the Treaty of Paris the American government undertook to administer the islands as a trust of an entirely new and altruistic character, with the disadvantages of inexperience in this line of governmental endeavor, with every industry almost at a standstill, the unsanitary conditions inviting the ravages of epidemics, and the unsettled political conditions retarding the confidential relations between the American government and the Filipinos, there now prevails a measure of participation in prosperity by all the people of the islands that is astounding. Today, no section of the Orient offers a more desirable field for the exercise of constructive ability of a high order in every department of industry than the Philippines and it is gratifying to learn that this is being realized in the centers of wealth and industrial activity throughout the United States.

American capital is always wary about invading unknown fields until convinced that enterprise affords substantial returns; that it will be accorded protection; that the labor supply is adequate and of a reliable character. It has taken many years for the Philippines to convince the outside world that all these requirements are fully met by insular conditions, and the most convincing proofs are those afforded by the experience of every American enterprise in the archipelago that has been directed by men who have adapted themselves to local conditions and whose relations with the native population have inspired confidence and respect in their integrity.

It is but natural that the casual, unthinking, western transient in the Orient is inclined to belittle the Malay laborer. He is usually compared unfavorably with the Chinese, and to substantiate it they point to the wonderful accomplishment resulting from the importation of Chinese labor, say for instance into the Federated Malay States. Indeed recently the FAR EASTERN REVIEW careful as it is of its editorial position, as a result of the presentation of a preponderance of apparently irrefutable evidence, took occasion to give expression to sentiments denouncing the Malay as a laborer to which such strong, and since proven well founded, objection was taken by Philippine labor authorities that we decided to make a more thorough investigation. We are now glad to revise our judgment of the Malay laborer and to take pleasure in doing justice to an element of the Philippine population that has suffered for centuries through no fault of its own, but with a remarkable appreciation of more liberal conditions of employment in the form of increased means of securing the comforts of life, better treatment, and a larger measure of personal independence, the Philippine laborer has more than demonstrated his capacity as a producer under proper encouragement and supervision.

This was not true of him in 1898. It may not be true of him even to this day in Malaysia. He secured little of the fruits of his efforts. He was the real "man with the hoe". It was to the interest of his masters to keep him alive, and in the centuries of peonage he was naturally reduced to that condition where there was no incentive to increased effort. He worked simply to secure the simple necessities of life and nature in its liberality relieved him of a large measure of dependence on his inconsiderate masters for his wants had been reduced to the simplest form.

But the Philippine Government did not accept the theory that the "Malay Won't Work", as did the foreigner in Malaysia. It proceeded along different lines. It investigated the conditions under which the Malay laborer lived; discouraged peonage and in every department of governmental activity gave him a fair wage, kind treatment and encouragement. At first this liberal policy was looked upon with suspicion. It was unheard of among the laborers that they should receive money direct from their employer and such a substantial sum that they would have something left over for comforts after supplying their simple wants. Then there was the opposition of the old masters to whom the ignorant mind, trained by centuries of submission, turned naturally for counsel. The motive of the masters 'attitude is obvious. Instead of remaining a serf whose labor cost little or nothing there was danger of the laborer becoming a real live entity that would have to be accounted for in calculating profits. This governmental interference was to the jefes an unheard of outrage. All over the islands the howl went up. But the administration never faltered. It continued to pay reasonable wages in its different departments of activity and as the years passed, an adjustment of private enterprises followed. The old masters discovered that the well paid laborer was a better investment than the half starved peon. The laborer slowly realized that increased effort brought larger returns in the comforts of life, the average production increased, industries received an impetus' and communities gradually took on a general appearance of prosperity.

It is very true that for several years, the sudden change had the effect of making the old peon unreliable. He had so much wealth after a few pay days and such simple wants, that he did not have to work all the time any more. But this did not last. He soon realized that the extra wage placed comforts within the reach of himself and his family. When he reached this point, the Malay laborer of the Philippines became ambitious. He made his aim in life to push his name along towards the top of the payroll. Today, the Filipino laborer is doing his share. He is reliable. Once adapted to his surroundings, familiar with his work and accorded the consideration due the producer he is now recognized as equal to, if not more desirable, than outside labor.

This is certified to by the Philippine Railway Company, the Manila Electric Railway Co, the Atlantic Gulf and Pacific Company, the Batan Coal Mines, the Director of the Bureau of Public Works, the Insular Lumber Company, The Cadwalladers-Gibson Lumber Co, Derham Bros, and many more of the leading successful private undertakings in the islands.

When we said in our February issue that "the British and Dutch forgot a century ago—that the Malay won't work" we were reflecting the general attitude towards him in Netherlands India and Malaysia, but we are now convinced that we were wide of the mark when we applied this reference to labor conditions in the Philippines. The Dutch and the British might also have occasion to revise their opinions of the Malay laborer were they to give him the same chance to make good in Malaysia as he has been given in the Philippines. Had Americans generally accepted him at his face value as they found him, as unfortunately some of them did, and had left him a starving peon without the strength or inclination to develop his producing powers we might today be justified in agreeing with our Dutch and British friends. But, very fortunately, we have taken the opposite course with most encouraging and remarkable results.

This was no easy task for the Administration nor the private interests. In the first few years of occupation under unsettled conditions, with the peonage system widespread and effective in its control of labor, the inexperienced westerner, anxious to hurry the east, ignorant of the system that controlled labor, and impatient of results, loudly denounced the Philippine laborer and clamored for Chinese. This conception of the laborer was naturally spread broadcast and was accepted without investigation. It was supported by the sentiment prevailing in Malaysia. Unfortunately slander spreads more rapidly than its retraction and notwithstanding the fact that these same westerners, after the exercise of patient investigation, followed by an adjustment of methods to undermine the peonage system, had been forced to revised their judgment to an appreciation of the labor under changed conditions, rarely took the pains to give expression to their changed attitude. This has not only proven unjust to Philippine labor but has misled investors on this important requirement.

We are unconvinced that Filipino labor has yet reached its highest capacity for production, but we have the unequivocal convincing testimony of the heads of the large firms referred to above, that the Filipino laborer has proven in every case equal to, and in many cases is preferred to the Chinese laborer.

The administration, notwithstanding any doubts to the contrary, has been most consistent in living up to the policy originally outlined. Its purpose is to develop the islands along lines designed to give all the inhabitants participation in benefits resulting. Even those who accepted wholly the precedents in colonial exploitation having little regard for the welfare of the native inhabitants, have revised their judgment in recent years as they recognize the increasing purchasing power of the Filipinos under the administration" beneficent policy. More adequate return fos labor with increased production and export, makes for prosperity. Trade reports for the last few years show increasing purchases abroad and the internal revenue report shows annually increasing internal trade. All this bespeaks a healthy prosperity not confined to any class and justifies the course pursued by the American government.

Such conditions are an invitation to capital not duplicated in countries where the greater purpose of government is sacrificed in the interest of the few. With a population industrious, prosperous, and contented, a climate most desirable, sanitary conditions unexcelled, and with unlimited tropical wealth, no section of the world offers greater returns for capital invested in industrial enterprises wisely directed.

THE GOOD NAME OF THE MANILA CIGAR

In a recent issue of the FAR EASTERN REVIEW attention was directed to a proposed publicity campaign on the part of the Manila Tobacco Association to overcome the malicious propoganda carried on by enemies in the United States against the good name of the Philippine cigar and that has resulted in a serious falling off in export for the eleven months ended May 31, 1911 compared with the corresponding period of 1910. For eleven months ended May 1910 there were 82,000,000 cigars exported while during the corresponding period 1911 the total export was only 24,000,000. This seems sufficient reason for united and prompt action.

That the press of the United States is friendly to Manila cigar interests has been demonstrated by hundreds of favorable comments by our exchanges on this article and should hearten our local manufacturers.

Typical of this attitude on the part of the American press is the comment of the *Rochester Union and Advertiser* of Rochester, New York, which we take pleasure in quoting in full as follows:

"THE FAR EASTERN REVIEW, a journal published in Manila, Shanghai and Yokohama, declares that the 'predatory tobacco trust in the United States that practically controls the distribution of cigars and the cigar situation generally throughout that country,' has for the past six months been conducting a well-organized campaign against the Manila cigar. It asserts that 'vicious misrepresentation designed to prejudice the consumer and hamper the retailer by trade duress, the weapon of the Trust when other means fail' have been made the basis of the campaign. It calls upon the newly organized Manila Tobacco Association to fight the trust.

"While we have not perceived any signs of a fight upon the Manila cigar by the tobacco trust in this country, we may believe that such a fight has been begun from the very fact that the Review, which deals with the engineering, commercial and financial life of the Far East, complains of the fight. It must surely have discovered by the effects upon the Manila trade that some such campaign as it calls attention to was being waged. That the Manila cigar has benefited by the Payne-Aldrich law, which gave it free entry to this country in limited amounts, is seen in the fact that 83,931,000 cigar were sent here in 1910, early in which fiscal year the law went into effect, as against 2,696,000 sent here in 1909. This trade surely is a prize worth contending for and the means the Review advises the Manila Association to use are commendable for their business sense.

"The Review tells the Association its best weapon is publicity. It advices it to control the export of cigars which will take from the trust one of its best weapons, the misrepresentation of cheap and inferior cigars manufactured by small Chinese factories to the American consumer as a standard Manila cigar. The Manila cigar is, of course, a good cigar and has an excellent reputation in Europe, where it has been sold largely for many years. The Association is advised to take up the publicity campaign as soon as it is thoroughly organized. The advertising propaganda is to be directed to the consumer and to the jobber and retailer. By control of the export, inferior products will not be allowed to down the good Manila cigar and the American market will not be glutted. The Review thinks the news that such an organization, with such aims, had been effected would be a bit of publicity that would be welcomed by and would hearten the friends of the Manila cigar here.

"There seems to be a characteristic trust feature to the proposed plan, in the control of the export trade. But since the Association is simply an organization of men in the same trade, it may escape downfall from this source. The publicity compaign is a sensible device. Whether there is a fight on the Manila cigars here or not, the advertising will doubtless benefit the sale of Manila cigars and the people will probably be able to test the Manila cigars. If then it is as good as claimed, it will make headway."

Following is also comment apropos of this subject by *Tobacco*:

"Everybody in the trade who studies conditions at all carefully can readily perceive a marked similarity between the mistakes made in the early attempts to market Porto Rican cigars in the United States, and the more recent efforts to make Manila cigars a factor in the business of the jobbers and retailers in this country.

"The Porto Rican cigars received a tremendous black eye at the outset, and the Manila cigars have met with conditions in many ways similar and largely due to the same causes.

"The early imports of Porto Rican cigars, as the trade is well aware, were made largely through commission houses engaged primarily in other lines of business, and having little or no practical knowledge of the requirements of the cigar business, and this was to a considerable extent true of the first imports of cigars from Manila following the removal of the tariff duty by the Payne-Aldrich act.

"It is a fact that not all of the early importers of Manila goods were without experience or knowledge of the requirements of the cigar trade, but even these parties made the mistake of accepting a large percentage of the lowest grade cigars made in the Philippines.

"But the commission houses, particularly on the Pacific coast, made the greater mistake of overloading the trade with low grade Manilas, which were placed on consignment in a limited number of markets.

"After the first flush of curiosity to Manilas was over, it was found that the goods were not moving as fast as had been expected, and then came a series of offerings of job lots at heavily cut prices, which was most demoralizing to the profitable sale of the cigars from the Philippines. This brought about a situation that to a large extent paralleled that which existed in regard to the Porto Rican cigars something like a decade earlier.

"Furthermore, such advertising as was done for the Manila cigars in the columns of the trade papers was largely of a tentative and half hearted sort, in no way to be compared even for a moment with the steady, vigorous, persistent publicity campaign which was earlier conducted by a few of the leading houses in the Porto Rico cigar trade.

"Because of the intelligent and continuous campaign which was conducted in the trade papers in behalf of their product it was possible for the Porto Rican manufacturers within a comparatively short time to overcome the apathy on the part of the trade generally toward their goods, and they can now look with the utmost complacency upon the results obtained, as revealed in the fact that THE SHIPMENTS OF PORTO RICAN CIGARS TO THE MARKET OF THE UNITED STATES DURING THE FIRST FOUR MONTHS OF 1911 WILL BE CONSIDERABLY IN EXCESS OF FORTY-FIVE MILLIONS, an increase of more than five and a half millions over the corresponding months of 1910, notwithstanding the fact that serious strikes in the island for many weeks this year have tended to largely keep the shipments below the actual demand.

"The lesson for the importers of Manilas, as well as for the manufacturers in the Philippines, is so plain that he who runs may read.

"The cigar manufacturers in the Philippines must send to the United States the best cigars that it is possible for them to make, and they must back this up by a steady, continuous campaign of education through the columns of the trade press.

"They cannot expect to accomplish it all in a few weeks, or a few months, but with patience and persistence they can accomplish wonders in a year or two. The rank and file of the trade are mighty indifferent just now to the claims of the Manila cigar, and there are thousands of dealers who have never even given them a trial in their show cases —but this indifference can be overcome and the great majority of these thousands of dealers can be interested in pushing Manila cigars if those behind them will enlist in an intelligent and persistent campaign of education through the medium of the trade press."

THE RAILWAY OF JAPAN

The present railway system of Japan had its inception in 1872 when the Government constructed the line between the capital and its port at Yokohama, a distance of 18 miles. For ten years afterwards the expansion of railways in the Empire was left to official initiative, and as a consequence the rate of progress was slow, the length of roads completed in this period being only 150 miles. Up to this date (1883) private capital had refrained from embarking in railway enterprise but in that year the first private company was formed for this purpose followed by others who soon monopolized the most profitable and important trade routes. In 1887 the Private Railways Regulations were issued, which gave an added impetus to such undertakings. Private railways then took the lead and by 1907 there were 42 lines with a mileage of 3,140, while the Government lines open to traffic were only 1,344 miles. In 1900, the Private Railway and Railway Traffic Laws were promulgated which prohibited the hypothecation of railway properties and made it difficult for private companies to incur a bonded indebtedness.

To remedy this condition a Railway Mortgage Law was passed in March 1904, under which a private joint stock company might mortgage its properties for an amount not exceeding its total paid up capital.

There were certain reservations however in the various railway laws and franchises which enabled the State to secure control by purchase or otherwise whenever such a measure was deemed of national necessity, and the severe tax on the transportation facilities of the Empire during the war with Russia, convinced the Government that to carry out its post bellum policy the control of all the railways was imperative for strategic reasons, and to further its commercial program. With some 40 odd private lines, transportation arrangements lacked uniformity and entailed economic disadvantages in the expansion of the newly conceived trade policy. Accordingly the Railway Nationalization Law and the Keifu (Korean) Railway Purchase Laws were presented to the Imperial Diet and passed by that body in March 1906. This measure provided for the purchase of all main trunk lines and concentrating their management under the Ministry of Communication leaving only the small local and branch lines to be operated by private capital.

The plan originally decided on by the Government, embraced the purchase of 32 private lines, or practically every road over 2 miles in length, but the Diet excluded 15 of the shorter lines or feeders and the coal mines belonging to the Hokkaido Tanko Railway Company.

The 17 lines purchased under this Law were the Nippon, Sanyo, Kobu, Kwansai, Kyoto, Hankaku, Hokoyetsu, Nishinari, Nanao, Ganyetsu, Kyushu, Hokkaido, Sangu, Sobu, Boso and the Tokushima, all main trunk lines, with an aggregate length of 2 812 miles, and charged with a cost of construction of about Y229,000,000 (£23,463,115) or a rough average of £8,000 or $40,000 goldper mile.

The Law provided for the purchase of the 17 lines within a period of ten years from 1906 to 1915, the purchase money to be delivered within five years from the date of purchase in public loan bonds bearing five per cent interest calculated at their nominal value: from the day of purchase until the day on which the bonds are delivered the Company so bought out were to receive semi-annually five per cent per annum on the purchase price.

The price was determined by first ascertaining the average rate of profit against the cost of construction during the last six semi-annual terms. Twenty times that rate multiplied to the cost of construction was set as the purchase price, plus the value of supplies existing at the time of purchase. In the event of the cost of construction being under the purchase price so determined, that cost was made the purchasing price.

This arrangement was employed for such new lines which had had not yet been operating for the six specified semi-annual terms.

The total amount of public loan bonds delivered under the provisions of the Railway Nationalization Law as purchase money to private railway companies was Yen 476,318,800 (£48,788,159). Of this sum the bonds paid

up to the 31st May, 1909, were of the following amounts:—for the Keifu (Seoul-Fusan) Railway, Yen 20,123,800 (£2,061,231); for the Hokkaido Tanko (Colliery) Railway, Yen 30,997,100 (£3,174.957); for Kobu Railway, Yen 14,599,550 (£1,495,396); for the Japan Railway, Yen 142,523,600 (£14,598,341); for the Ganyetsu Railway, yen 2,422,000 (£248,-079); for the Nishinari Railway, yen 1,846,900 (£189,173); for the Sanyo Railway, yen 76,-639,200 (£7,849,964); for the Hankaku Railway, yen 273,650 (£28,029); for the Sobu Railway, yen 150,000 (£15,364); for the Nanao Railway, yen 100,000 (£10,243); and for the Tokushima Railway, yen 100,000 (£10,243); total, yen 289,775,800 (£29,681,020).

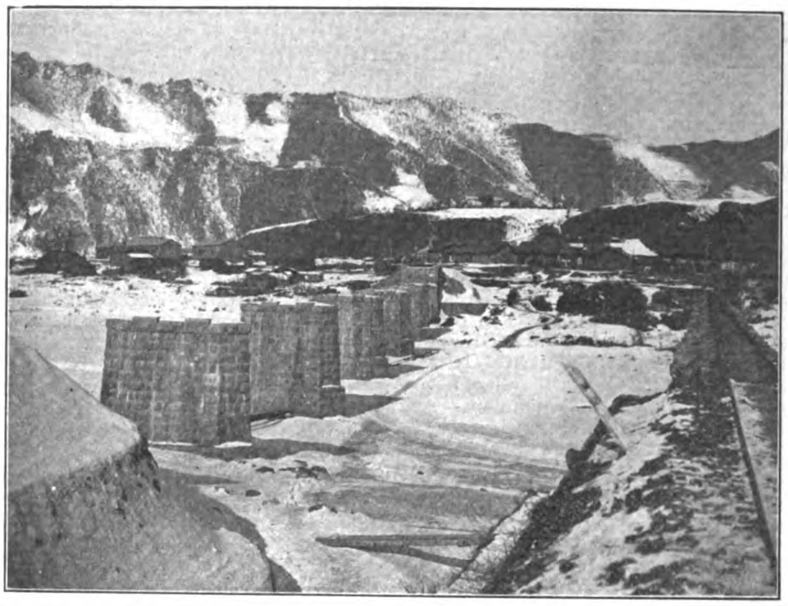
While the Government had the option of completing the purchase of the lines within the period of ten yea·s by paying the companies the 5% interest on the purchase price in lieu of their customary dividends, it was found more economical to float the entire issue at once, and the remaining balance of yen 186,543,000 was paid by the end of July 1909 in the following proportions. For the Hokkaido Railway, yen 6,131,500 (£628,034); for the Kyushu Railway, yen 118,508,150 (£12,138,497); for the Hokuyetsu Railway, yen 3,721,800 (£381,215); for the Kyoto Railway, yen 3,296,400 (£337,641); for the Boso Railway, yen 960,400 (£98,371); for the Kwansai Railway, yen 30,437,550 (£3,117,643); for the Sangu Railway, yen 5,728,950 (£586,802); for the Hankaku Railway, yen 4,010,700 (£410,-806); for the Sobu Railway, yen 12,256,050 (£1,255,357); for the Nanao Railway, yen 894,300 (£91,601); and for the Tokushima Railway, yen 597,200 (£61,170).

The total mileage of the private lines on the day of purchase was 2,823 miles, and the total amount of loan bonds delivered to the companies as purchase price was Y 476,318,000 (£48,788,159) at an average of Y 168,000 ($84,000) per mile. It was feared that the issue of such an enormous amount of bonds in one year would naturally lower their market value but, owing to the solid financial condition of the railways, a steady rise in value has been witnessed instead.

The purchase bonds were taken up as a domestic loan, and bear five per cent interest. The principal of the loan remains unpaid for the period of five years from the time of issue (1913) and is to be fully redeemed within fifty years (1963) from the profits of the railways. Provision has been made for the retirement of these 5% bonds and their substitution by four per cent bonds, to enable the Railway department to effect a saving so as to pay the interest on additional loans for future improvements and extensions.

Before the nationalization scheme was effected, funds for the Government railways were appropriated from the general account of the Treasury, but with the absorption of the 17 private lines and the creation of the large bonded indebtedness, a special law was enacted in 1909 placing the finance of the State Railways entirely independent of the General Budget and accounts.

Under this law the Imperial Railway capital and funds for materials and all moneys to be hereafter invested are made the capital of the railways and a special account established by applying the annual revenue therefrom to the annual expenditure. The expenditures required for the construction and improvement of railways are defrayed out of the railway profit; and in case of a deficit in the railway profit, the Govern-



BRIDGE NO. 5 UNDER CONSTRUCTION OVER HSIHO—(FEB. 1911.)

THE ANTUNG—MUKDEN RAILWAY

(Continued from Page 16.)

(1) Land—Right of way, 6,210,000 "tsubo".

(2) Total volume of Earthwork involved, 1,384,000 cubic tsubo. The portion already completed, 990,000 cubic tsubo.

(3) Bridges—Total number, 218; aggregate length, 21,180 ft.; the longest bridge is the one across the Taitzu with a length of, 1,900 ft,

(4) Culverts—Total number, 213; length of open culverts, 1,510 ft; length of arch culverts, 2,098 ft.

(5) Temporary wooden bridges (between Antung and Chikuanshan)—Total number, 67; aggregate length, 4,210 ft.

Note: (1) A "tsubo" is equal to 36 qs. ft. (2) A cubic "tsubo" is equal to 216 cub ft.

(6) Tunnels—Total number, 25; aggregate length, 26,540 ft. The four main tunnels are:—

	Length	Heading completed
Fuchinling	4,884 ft.	3,800 ft.
Chikuanshan	3,284 "	2,770 "
Fenshuiling	1,914 "	Complete
Heikengling	1,505 "	Complete

Heading has been drilled in the case of the other 21 tunnels.

(7) Railway line—Length of main line, 170 miles (including 8 mile section between Fuan and Mukden); length of sidings, 35.5 miles Total track length, 205.5 miles; the 38 mile section from Fuan to Penchihu and the 53 mile section from Antung to Chikuanshan was opened to standard guage traffic, the former on January 15 this year and the latter on November 3 last year.

(8) Stations—The number of stations, 25.

(9) Coolies and labourers—The working force now employed comprises 600 Japanese, 3,200 Chinese and about 200 Koreans. In summer time, last year, the total number of coolies employed exceeded 20,000. The ordinary coolies wage ranges from 45 sen silver to 50 sen silver per day.

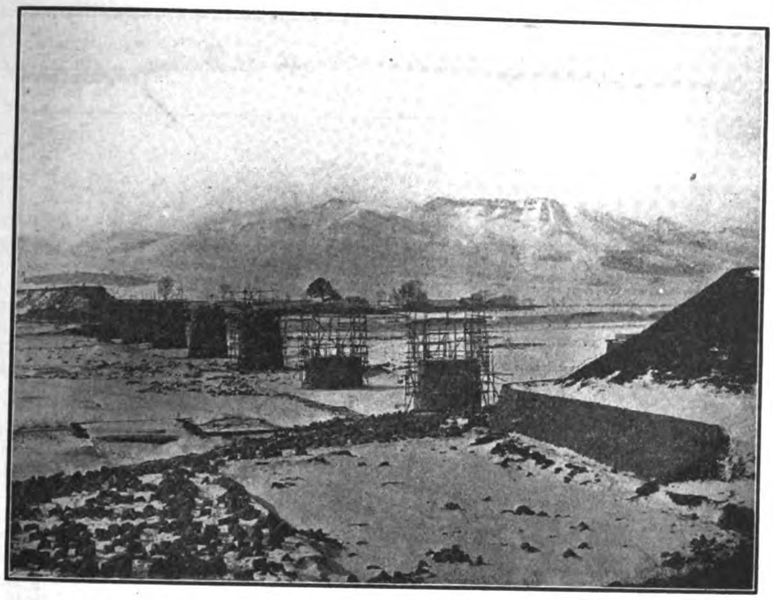
(10) Supervision of Work.—The line is divided into four divisions which are subdivided into 19 sections. The division superintendent's quarters are located at Penchihu, Chiaotao, Chikuanshan and Shahochen (Antung) The personnel of the superintendents' quarters comprises 4 superintendents, 9 clerks, 37 foremen.

(11) Geological Formation—From the Yalu River proceeding up north west to Chikuanshan the geological formation consists of granite on the right side of the Railway Line, and of gneiss on the left; about Chikuanshan it changes to stratified rock of cambria as far west as Penshihu where a carboniferous layer is found surrounded by old vision limestone. From Penshihu, going to westward the strata changes to cambria again, the alluvia extending to Mukden, the terminus of this line.

PIERS FOR BRIDGE NO. 8.—OVER THE HSIHO (FEB. 1911.)

ment is authorized at the charge of this special account, to issue public loans or make temporary loans from other special accounts and other sources, and for the purpose of consolidating or redeeming public or temporary loans chargeable to this account, the Government is further authorized, at the charge of the same account, to issue public loans or make temporary loans from other special accounts and other sources. The public and temporary loans above re-

railway use, and other miscellaneous expenses chargeable to it. The Revenue Account has for its revenue the various receipts from the working of the railways, charges for the loan of articles forming part of its capital' interest on loans advanced, and miscellaneous receipts belonging to it, and for i sexpenditure various expenses required for the working of the railways, expenses for the upkeep, repair, and replacing of articles forming part of the capital, interests on debts, and miscellaneous



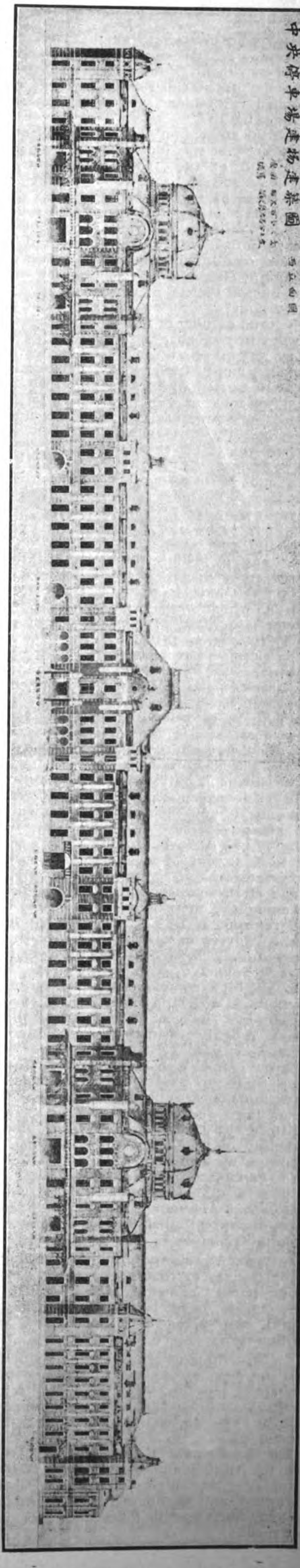
HSIHO BRIDGE (No. 12) IN COURSE OF CONSTRUCTION, FEB. 1911.

ferred to, the public loans already issued to defray expenditures required for carrying on the railway enterprise, the public loans already issued or to be hereafter issued for the consolidation or redemption of the loans last-mentioned, the public loans issued under the provisions of the Railway Nationalization Law, and the debts chargeable under the same law to the Government which have not yet been completely repaid, all these loans are chargeable to the special account under consideration; and the amount required in each financial year for their redemption or payment of interest thereon is to be transferred to the Special Account for the National Debt Consolidation Fund. The Railway Special Account is subdivided into the Capital Account, the Revenue Account, and the Reserve Account. The Capital Account has for its revenue the moneys transferred from the railway profit, proceeds of public and temporary loans, proceeds of sale of its property, receipts from materials and structures for railway use, and miscellaneous receipts belonging to it, and for its expenditure the cost of the construction and repair of railways, redemption of its debts, cost of materials and structures for

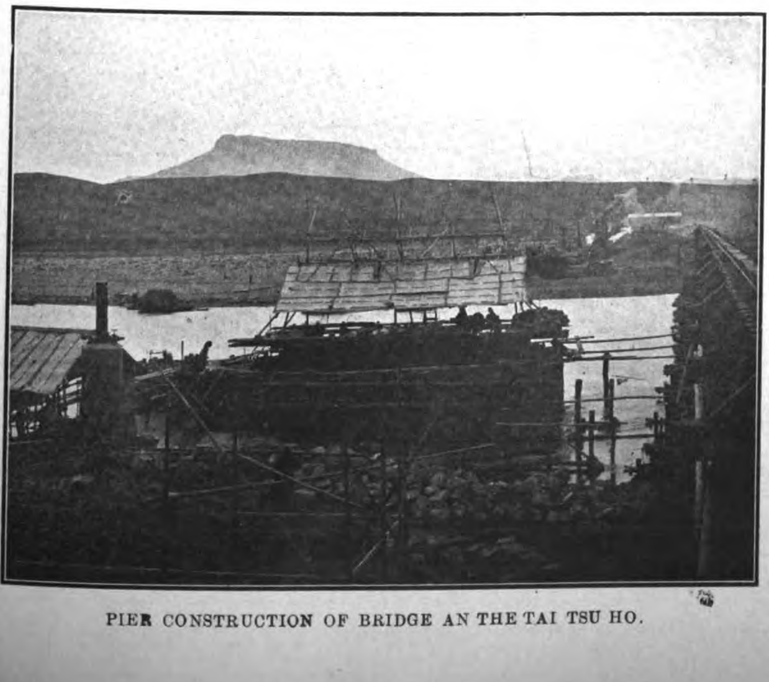
expenses chargeable to it. The excess of the total annual revenue over the total annual expenditure in the Revenue Account becomes the profit, and the balance remaining after deducting therefrom the amount to be transferred to the Reserve Account is to be transferred to the Capital Account. The Reserve Account has for its revenue the sum not exceeding ten per cent. of the railway profit to be annually transferred therefrom, and for its expenditure sums required to meet deficit in the revenues of other accounts caused by natural calamities, accidents, and other unforeseen occurrences.

This law severs the railway finance completely from the general account, and from now on the railways must meet all obligations from their own profits, and all new lines and extensions must be constructed from the surplus, without any appropriation from the general fund.

The capital invested in the Government Railways up to the end of March 1907 was Yen 189,966,470. Adding to it yen 195,224,066 expended during the year, and subtracting yen 4,843,079 for depreciation, gives a bal-



FRONT ELEVATION OF THE NEW GRAND CENTRAL RAILWAY STATION AT TOKYO



PIER CONSTRUCTION OF BRIDGE AN THE TAI TSU HO.

ance of yen 380,347,457 as the total capital investment at the end of the fiscal year March 31st, 1908. Of this amount Y283,355,218 represents unredeemed capital, yen 71,273,916 redeemed capital and yen 25,718,323 special working fund.

With the absorption of the private lines the capital account was increased to Y753,886,988 at the end of the 1909 fiscal year. For this expenditure the Government owns 4,542 miles of road open to traffic, with a total track mileage of 5,020 miles. This operating mileage has since been increased to 4773 miles, with several hundred miles of new roads and extensions under construction. The cost of cons ruction of the state lines at the end of 1909 was Y503,450,000 (£51,567,141).

The total number of passengers on Japanese railways in 1908-09 was 146 973,870, of whom 123,337,543 travelled on Sta e railways and 23,476,327 on private lines; and the total amount of goods carried during the same period was 25,455,799 tons, of which 23,524,559 tons were carried on State lines and 1 931,240 on private lines; and the total receipts from the traffic reached yen 83,688,575 (£8,572,014) of which yen 79,821,583 (£8,175,928) was earned by State lines and yen 3,866,992 (£396,086) by private lines. The working expenses amounted to yen 44,867,153 (£4,595,632), of which yen 42 859,637 (£4,390,007) was spent by State lines and yen 2,007,516 (£205,625) by private lines; and when the above working expenses are deducted from the receipts, the net profit comes to yen 38,821,422 (£3 976,382) of which yen 36,961,946 (£3,785,921) belonged to State railways and yen 1,859,476 (£190,462) to private railways.

The estimated receipts and expenses of the Railway Board for the Financial Year 1910-11 are, receipts yen 90,481,321 (£9,267,778) and expenses, yen 81,507,594 (£8,348,622), giving a net profit of yen 8,973,727 (£919,157); in these expenses is included yen 32,090,641 (£3,286,965), the interest on the public loans for the purchased railways, etc.

The financial outlook for the State owned railways is exceptionally bright, and with economical and efficient management, and the natural increase of traffic and profits, there is every reason to hope for a successful working out of the elaborate program for extensions and improvements, without undue strain on the special railway finances.

Among the most important of the extensive reforms in the present railway program, is the conversion of the present 3ft. 6in. gauge to 4ft. 8½in., and as soon as the necessary financial arrangements are made, work will be commenced on the trunk line from Tokio to Shimonoseki, a distance of 704 miles. The cost of converting this section is roughly estimated at Y160,000,000, $80,000,000 gold (£18,000,000).

Baron Goto, Minister of Communications, some time ago made public a detailed explanation concerning the conversion of the trunk lines and the estimate cost thereof:—

Before the Government decided upon the widening of the gauge the following investigations were made:

1. Possible increase of transportation power without changing gauge. This plan would cost about a hundred million yen in the improvement of gradients at Hakone, Sekigahara, Osakayama, etc.

2. Reconstruction of the lines without widening gauge, so that the greatest transportation powers of which narrow gauge lines are capable, may be obtained. This plan would cost about a hundred and ninety million yen.

3. Widening gauge to 4 ft. 8½ in. at the cost of yen 230,000,000. The expenditure necessary for the third plan is greater by yen 100,000,000 compared with the first plan and by yen 30,000,000 compared with the second plan.

The Government therefore decided to car y out the third plan beginning next fiscal year, namely, reconstruction of the lines between Shimbashi and Shimonoseki on the wide gauge system, and then the following lines will be widened.

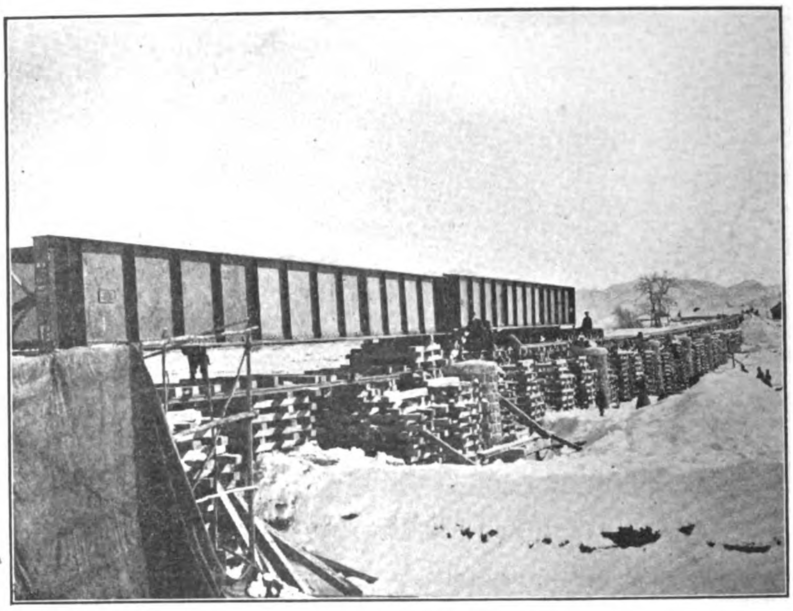
Yokohama Custom House Branch Line, Yokosuka, Hiratsuka, Taketoya, Atsuta, Otsu, Narita, Onohama, Wadatage, Uno, Kure, Ujina.

Railway Finance.—Since the establishment of the Railway Board the authorities have been engaging in the readjustment of the special Railway Accounts. Great attention has been paid to the economy of expenditure for coal, petroleum, the curtailment of employes, etc., and in this way a saving has been effected of yen 3,000,000 in regard to coal and petroleum, yen 1,600,000 in regard to employes and officials.

annual subsidies to the amount of at least yen 10,000,000 for the construction of light railways. And at the same time Government light railways will be laid in Hokkaido and in Japan Proper.

Annual Expenditure.—The appropriation for the reconstruction of the lines will be made in the following sums annually:—

1911	4,449,000
1912	4,550,000
1913	6,000,000



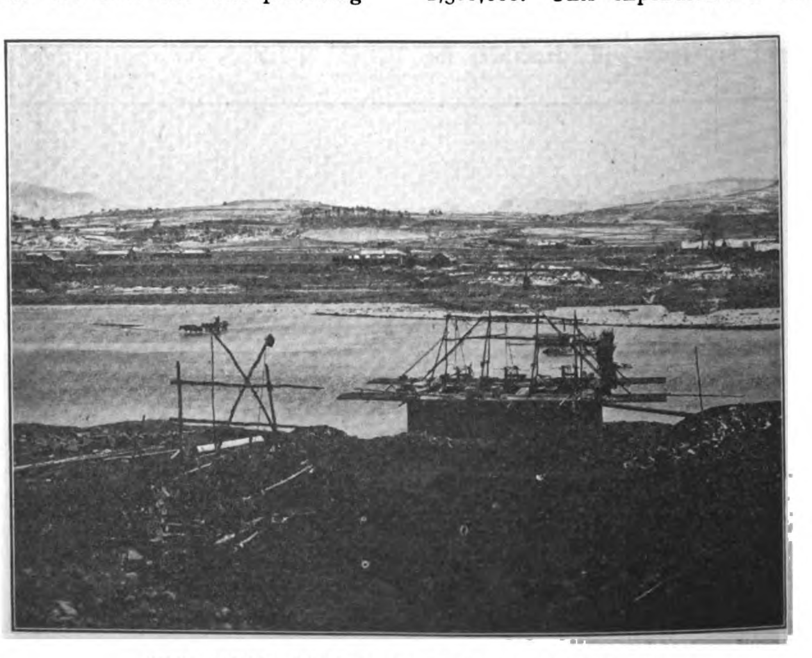
TSAOHOKOU BRIDGE NO. 3 IN COURSE OF CONSTRUCTION.

Redemption of Debt.—The total amount of the railway debt is estimated at yen 830,000,000 of which yen 657,270,000 is in the form of public bonds. Even supposing that neither profit nor loss results from the new lines after 1911, not only will the total amount of debt be redeemed by 1972, but even a net profit of yen 52,000,000 will be obtained, and after 1973, the annual net profit of yen 88,000,000 will be realized. If the new project for reconstruction of the lines is not carried out, the debt will be redeemed in 1958, and after 1959 a net profit of over yen 88,000,000 will be obtained. So that through the reconstruction of the trunk lines the period for the redemption of debt will only be extended by 14 years.

Light Railways.—The Government will introduce into the Diet the Bill providing

1914	10,000,000
1915	13,000,000
1916	14,000,000
1917	15,000,000
1918	25,000,000
1919	27,000,000
1920	27,000,000
1921	30,000,000
1922	30,000,000
1923	24,051,000

New Lines Between Tokyo and Yokohama.—The new double tracks between Tokyo and Yokohama which are now under construction will be converted into broad gauge. The original expenditure for the lines was estimated at yen 8,000,000, but in changing the plan the expenditure will be increased by yen 1,300,000. This expenditure is included in



PIER CONSTRUCTION FOR THE HSI HO BRIDGE.

yen 230,000,000 which is the total amount needed for the reconstruction of the trunk lines.

Fares will not be Reduced.—The Japanese railways occupy third position among the railways of the world in regard to lowness of fare. It is premature to expect the reduction of fare after the gauge is widened. But the public should know that the railways, after they are reconstructed will be better able by increased capacity to provide the traffic which may make it feasible for the Government to reduce the rates.

For convenience of administration the State lines are divided into five districts with headquarters as follows;—

Eastern District office, Uyeno, Tokyo; Central District office, Shombashii, Tokyo; Western District office, Kobe; Hokkaido District office, Sappora; Kyushu District office, Moji. There is one branch office at Yonago. The district management is in turn under the supervision of the Ministry of Communications, composed of a Secretariat, Railway Administration, Construction, Transportation, and Finance departments presided over by the Minister and the Vice Presidents of the Board.

Rolling Stock.—The State Railway carriages and wagons used are built almost exclusively at home. The former, excepting in case of local sections, are practically of bogie type cars, while wagons are of 4 wheel type. Nos. 4, 5, 6, 7, and 8 in the annexed drawings show types of bogie cars lately built at home, and Nos. 9 and 10 show those now in course of building. These bogie cars are used for express trains run on truck lines, as between Nagasaki and Moji, Shimonoseki and Tokyo, and Tokyo and Aomori. A train of this special service is generally composed with five to eight of such bogies. The compartment is divided to furnish largest possible seating space and height admissible in narrow gauge system. Aside from the Government Car Shops many carriages and wagons are made at the works of the Osaka Railway Car Co., Nagaya Car Works, and the Amano Works at Tokyo.

As shown in the tables, the rolling stock returns comprise 2,227 locomotives, 5,510 carriages, and 34,334 wagons. Their ratios per 10 traffic miles correspond to 4.7 locomotives, 2.5 carriages, and 71.9 wagons. The locomotives used come in greater part from foreign works, as British, American, and German, but at the same time those built at home are not small. The drawings Nos. 1, 2 and 3 show some of the home built locomotives that are most commonly used. With the greater speed of passenger trains and increased tonnage of freight trains, engines equipped with wheels of wider radius and of heavier weight have to be adopted. In view of this it is contemplated to adopt for passenger trains engines with wheels measuring 5.3 feet and 50 tons, equipped with superheater, and for freight trains Millet Type locomotives with 4.1 ft. wheel and 54 tons.

The approved list of locomotive makers for the State Railways is:—

A. Borsig, Tegel, Berlin; Baldwin Locomotive Works; Berliner Maschinenbau A. G.; Beyer, Peacock & Co.; American Locomotive Co.; Hannoverische Maschinenbau A. G.; Henschel & Sohn, Cassel; Krauss & Co., Munich; A. Maffei, Munich; Robert Stephenson & Co.; La Société John Cockerill; North British Locomotive Co.; Vulcan Foundry; Kitson & Co.; Loco werke der K. K. priv; Oesten and Staats-Eesen bahm G. Vienna.

For repair of locomotives and cars, 23 work shops are maintained throughout the country, employing over 16,000 hands. Of these at Shimbashi, Omiya, Kobe, and Takatori are of larger scopes than others. All these works are operated in most cases by steam appliance. It is intended, in view of the facilities which Japan supplies in regard to water power plant to change to the use of electric power. The matter is now under investigation. As to the method of work imposed on the hands, it is, with rare exception for special work, carried on as piece-work, so as to expedite the progress of the work and to minimize the time of repair. The photos show parts of the scenes at the Omiya Works. This establishment is situated several miles north of Tokyo, possesses yard lines aggregating 8.3 miles, and the building shops capable to receive 36 locomotives at one time.

JAPAN'S RAILWAYS

	Hokkaido.	Eastern.	Central.	Western.	Kiushu.	Yonago Branch Office.	For Construction.	Under Repair.	Loaned to Other Railways.	Total.
Traffic Mileage	693.4	1337.1	1023.4	1041.6	566.8	110.9	—	—	—	4773 2
No. of Locomotives	181	534	533	434	264	22	25	228	6	2227
No. of Carriages	265	1105	1283	1471	511	139	—	736	—	5510
No. of Wagons	3343	7645	6393	5730	7133	167	639	3092	192	34334
No of Engine Sheds	16	29	24	28	15	2	—	—	—	114
No. of Engine Drivers	271	797	757	699	432	23	—	—	—	2979
No. of Assistant E. D.	10	41	93	59	7	2	—	—	—	212
No. of Fire Men	229	839	649	656	401	23	—	—	—	2797
No. of Assistant F. M.	32	125	226	33	23	5	—	—	—	444
No. of Workshops	4	4	4	8	3	—	—	—	—	23
No. of Workmen	1327	3867	2895	3823	2191	—	—	—	—	14103
No. of Locomotives, repaired per month	13	73	25	38	14	—	—	—	—	163
No. of Carriages, repaired per month.	33	181	222	242	44	—	—	—	—	722
No. of Wagons, repaired per month...	1112	1217	392	2076	548	—	—	—		5345

N. B. The above tabled numbers are at the end of September 1910.

SWITCHBOARDS FOR JAPAN

BY EMIL BERN

Two switchboards of considerable size have lately been built by the General Electric Company of Schenectady, New York, for the Kyoto Municipal Water Works, Japan.

The generating station board is shown in Fig. 1. It is forty feet long and consists of twenty-four three-section marble panels, supported on a pipe framework. This framework also carries the oil switches, disconnecting switches, instrument transformers and several sets of busses.

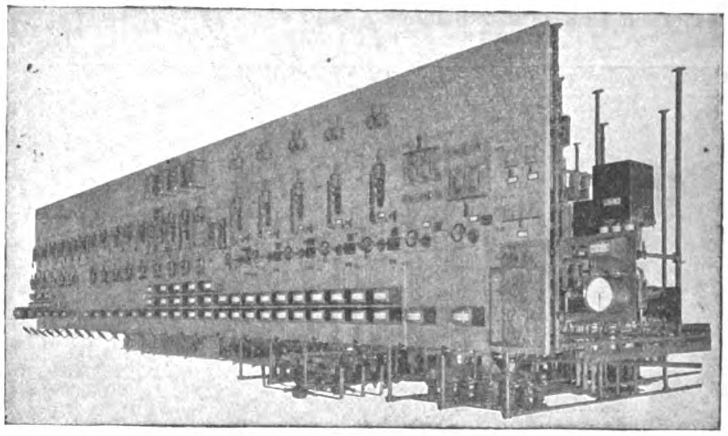


FIG. 1.—6600 AND 35000 VOLT, SWITCHBOARDS FOR MUNICIPAL WATER WORKS KYOTO, JAPAN

The station equipment controlled from this board consists of:—

2 Turbo exciters, 125 volts, 125 kilowatt.

5-3phase turbo generators, 6600 volt, 1500 kilowatt, 60 cycles.

3-3phase outgoing lines, 6600 volts, to substation.

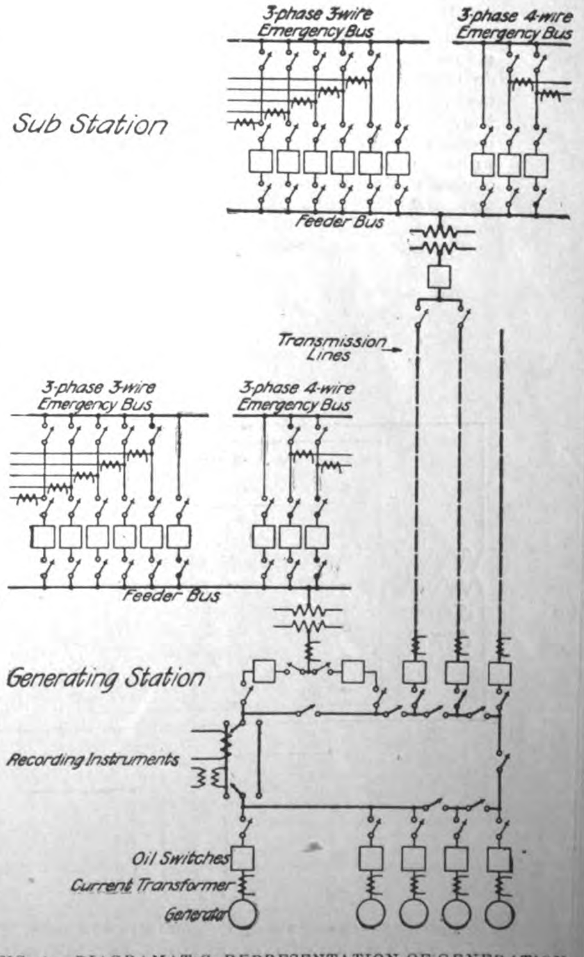


FIG. 4.—DIAGRAMATIC REPRESENTATION OF GENERATION STATION AND SUBSTATION WIRING

1 Bank of transformers 6600/3500 volt.
7-3 phase feeders, 3500 volt.
3-3 phase 4 wire feeders, 3500 volt.

Each exciter has a triple-pole, double-throw switch and a double set of busses so arranged that either exciter can be used to excite the generator fields, while the other is used for station lighting and auxiliary power.

The alternating current generator panels, in addition to the usual instrument and synchronizing equipment, have reverse current relays for automatically tripping the oil switches on a reversal of current which might result from a short circuit in the winding of the generator or from a failure of the prime mover.

The panels controlling the different lines and feeder circuits are equipped with inverse time limit overload relays in connection with automatic oil switches in addition to the indicating instruments.

Continuity of service was considered of primary importance in the design of this switchboard, and to insure this, an arrangement of spare equipment, as illustrated in Fig. 3, was adopted. For the transformer bank consisting of 3-750 kilowatt single phase units, one spare transformer of the same capacity was installed to take the place of any disabled unit. These four transformers are connected through transfer switches on the primary and secondary sides to enable the operator to disconnect any unit and connect the spare for service in the shortest possible time.

Spare oil switches for both the three-phase, three-wire and the three-phase, four-wire feeder systems connects the main feeder bus with a set of emergency busses to which any feeder circuit can be connected through transfer switches. The feeder oil switches are provided with disconnecting switches on each side and can be taken out of service for inspection and cleaning without interrupting the circuit. Fig. 4 shows this arrangement. This illustration also shows clearly the ring bus system used, by which certain groups of feeders may be connected to different generators independent by of other groups or the whole system operated together.

The sub-station switchboard consists of twelve marble panels and is very similar to the board for the generating station. Spare transformer systems and oil switch arrangements for the two stations are identical.

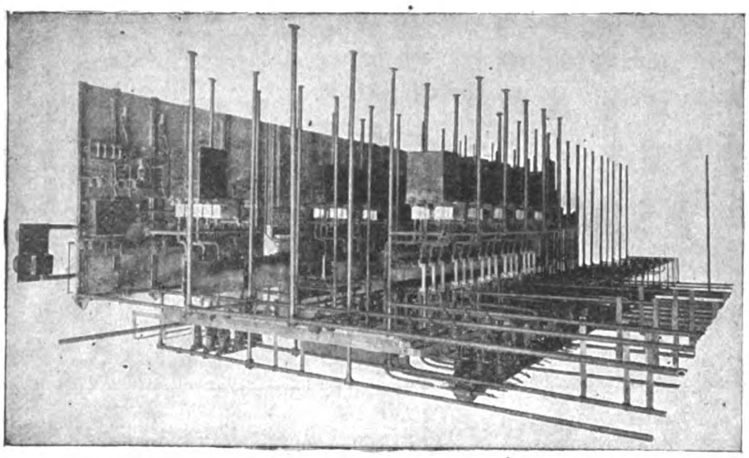


FIG. 2—ARRANGEMENT OF SWITCHING APPARATUS FOR MUNICIPAL WATER WORKS, KYOTO, JAPAN

FRICTION TESTS INTERPRETATION

G. A. PERLEY, M. A.

The age of contentment with any sort of a grease lubricant is past. The old expression "grease is grease" is no longer uttered by the sane engineer. In spite of this tendency towards progress we have many failures. The majority of the people interested in lubrication have chosen the grease which seems to oil the bearing and keep the temperature low, but beyond this they have no method of measuring the efficiency of the friction eradication.

The results of tests made by our testing machines are giving much insight into the true value of the grease as a lubricant as well as to its limitations. There are, however, some unfortunate facts concerning the interpretation of results. The present engineer has been taught that each bearing should be thoroughly studied as to the correct lubrication required since one bearing behaves differently than another. With such an idea he immediately condemns the friction testing machine data on the ground that perhaps the lubrication is of a different nature. This is exactly the wrong inference. A study of the friction testing machine curves and data will tell at what temperature the grease loses its power as a lubricant, as well as showing at the lower temperature how efficient the friction is reduced as compared to what we term a pure lubricant. Knowing these facts the engineer can judge the temperature of his bearing sufficiently close to choose the proper consistency of grease. Although the grease is to be applied to a different type of machine still if that grease has showed up poorly on a testing machine it stands in the realm of common sense that it will not improve much on more severe tests.

The choice of a good lubricant should involve no game of chance.

After having seen the importance of interpreting the friction curves it might be well to point out the chief features to observe. The ideal grease lubricant gives an extremely low coefficient of friction not only for a minute but for hours and days. Dependent upon the consistency, the particular grease will work best below a certain maximum temperature.

The following type curves for some characteristic greases on the maket will be given.

Curve A is a representative curve of Albany Grease; curve B, that of some greases attempting substitution for Albany; and curve C shows some materials on our market unworthy of the name grease, yet sold as such. For the sake of comparison curve D gives the results of a pure lard oil.

We see that Albany Grease gives as near perfect results as could be realized. It reduces the friction at once and *continues to maintain*

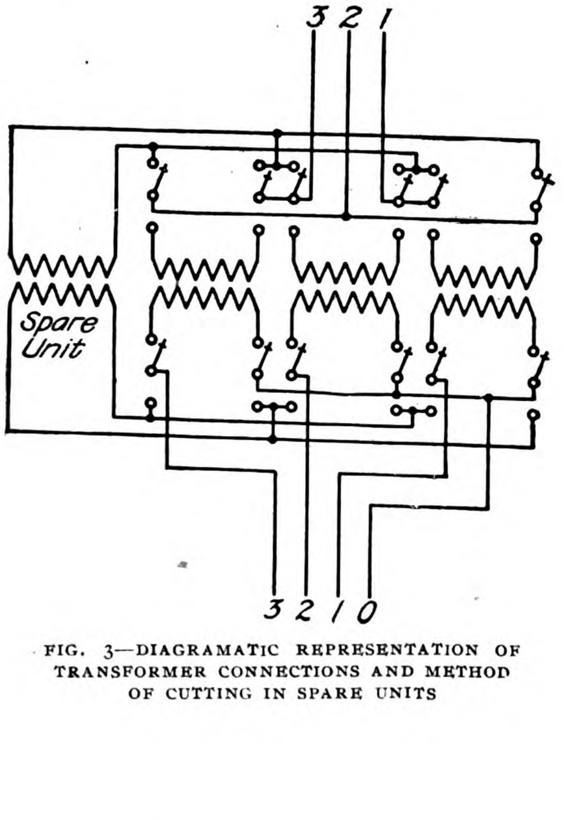
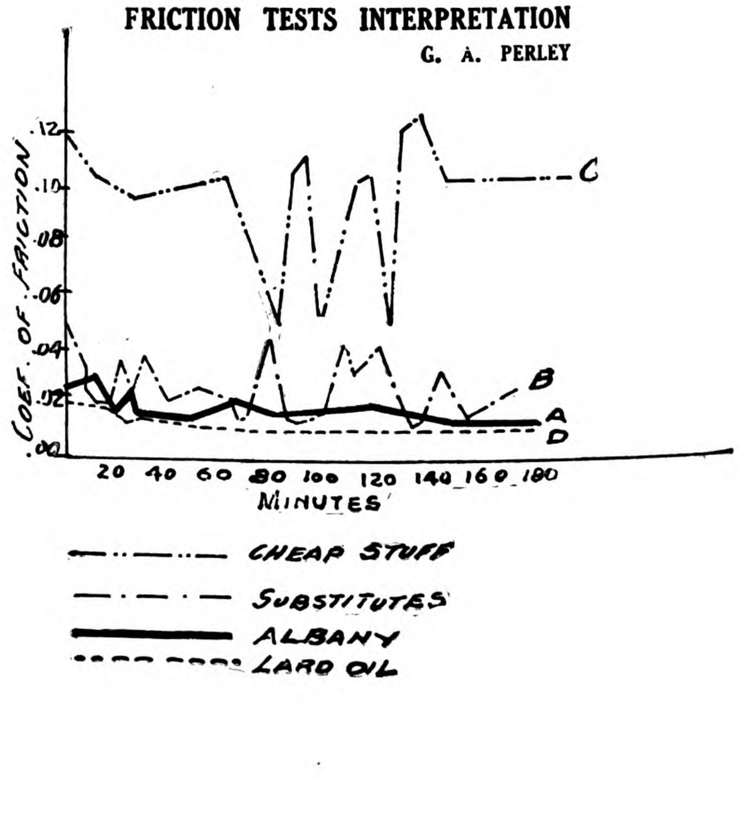


FIG. 3—DIAGRAMATIC REPRESENTATION OF TRANSFORMER CONNECTIONS AND METHOD OF CUTTING IN SPARE UNITS



its efficiency. With the substitute grease we find at first that it reduces friction very well but sad facts appear on continued use. It gives out. Examination shows a hardened soap residue on the bearings. The oil has done its work but departing leaves behind something to undo the work it has so beautifully accomplished. The folly in using such a grease becomes apparent at once. With the cheap imitation we find that not even is the friction materially reduced to say nothing of the injurious products it leaves upon the bearing.

The moral of the above is that an engineer should make no mistake in the interpretation of friction tests. It is the grease that continues to do its work day in and day out that counts. Friction tests if carried on for a sufficient length of time will aptly show this. In other words Albany Grease is the only choice. If the engineer knows the approximate temperature and chooses the consistency of Albany adapted to that temperature, the requisites demanded by his machine will forever be fulfilled.

RECORD ORDER FOR MARINE ENGINES

What is unquestionably the largest order for gasoline engines has just been placed by the W. H. Mullins Co., Salem, Ohio, builders of Mullins Pressed Steel Boats. The order was placed with the Ferro Machine & Foundry Co., Cleveland, Ohio, and calls for 2,000 engines to be delivered within the next 90 days. It is expected by The Mullins Co. that considerably more than this number of engines will be ordered before the season is over, as the estimate was naturally made on a very conservative basis.

This order is notable in several ways. Of chief interest to the motor boat enthusiasts is the fact that this large order is indicative of a very much increased popularity in motor boats during 1911, which has been apparent to the trade for several months past. It is also evidence of the wide sale of the Ferro Engine both of which standard products are well known to our readers.

In deciding upon the engine to be installed in their boats for 1911 The Mullins Co. state that they investigated and experimented with a number of leading marine engines, endeavoring to get one that would in every way be in keeping with the high standard set by their steel hulls, and thoroughly satisfied themselves that they could do no better than to decide upon the Ferro.

FRANK L. STRONG'S ELECTRICAL DEPARTMENT

The firm of Frank L. Strong, one of the oldest machinery and electrical supply houses in the Philippines has established an electrical department in the new quarters, 105 Escolta, Manila, to meet the steady expansion of its electrical business. R. Naess, M. E. who is in charge is a graduate of Horten Technical School of the famous Norwegian college and served as designing engineer for the Watson Stillman Company and mechanical inspector of the Hudson Terminal Companies of New York for several years after which he accepted the position of electrical engineer for the Manila Electric Railroad and Light Co. He later resigned and the firm of Messrs. Johnson & Neiss was organized and he remained a member until he accepted charge of the Electrical Department of Frank L. Strong. Frank L. Strong is exclusive agent in the Philippines for the General Electric Company and has made a number of important installation of plants among which was the pumping equipment for the Manila sewer system. The department is equipped to furnish and install all kinds of electrical plant and supplies and prepared to submit designs and estimates covering every branch of electrical work.

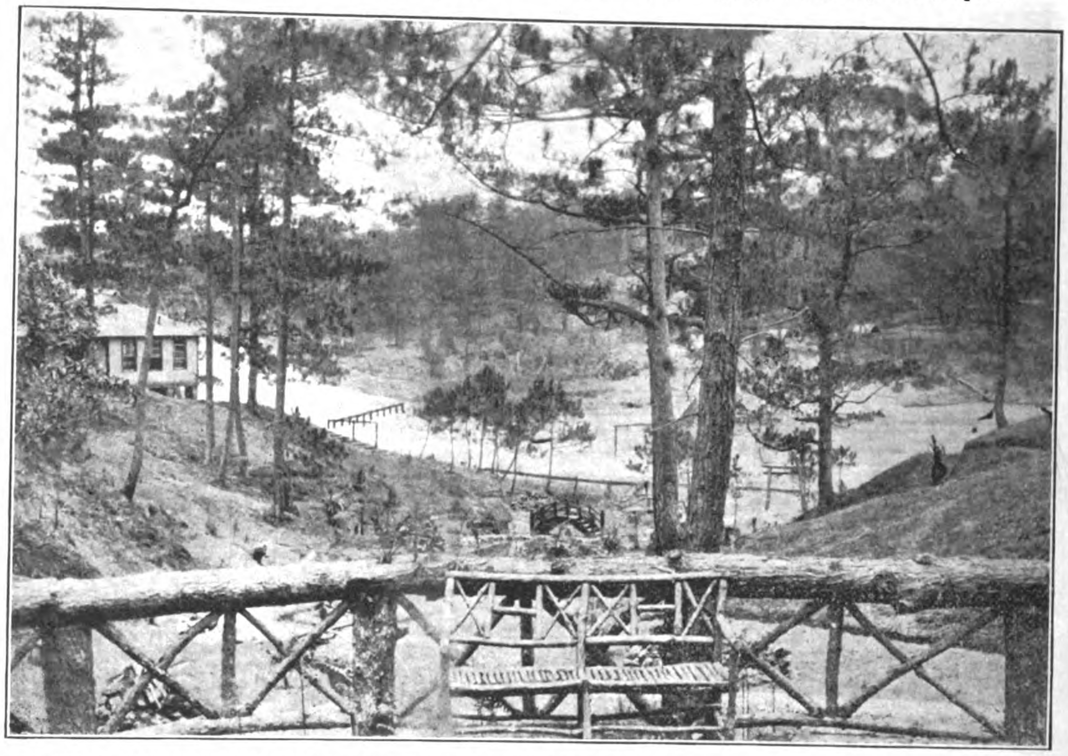
BAGUIO, THE SIMLA OF THE PHILIPPINES

Ten years ago, if anyone had predicted that the traveler could now board a train at Manila at 10 o'clock at night and have breakfast in Baguio, there would have been some question of his sanity, for beyond Dagupan, the terminus of the Manila Railroad Company, the traveler had to depend on carabao carts to the foothills and follow a tortuous trail for days before he might reach his objective.

A decade ago there were but few white settlers and Baguio had little to warrant special notice beyond the fact that it was the capital of the province of Benguet, had an invigorating climate, and prospectors in that region had reported the presence of gold.

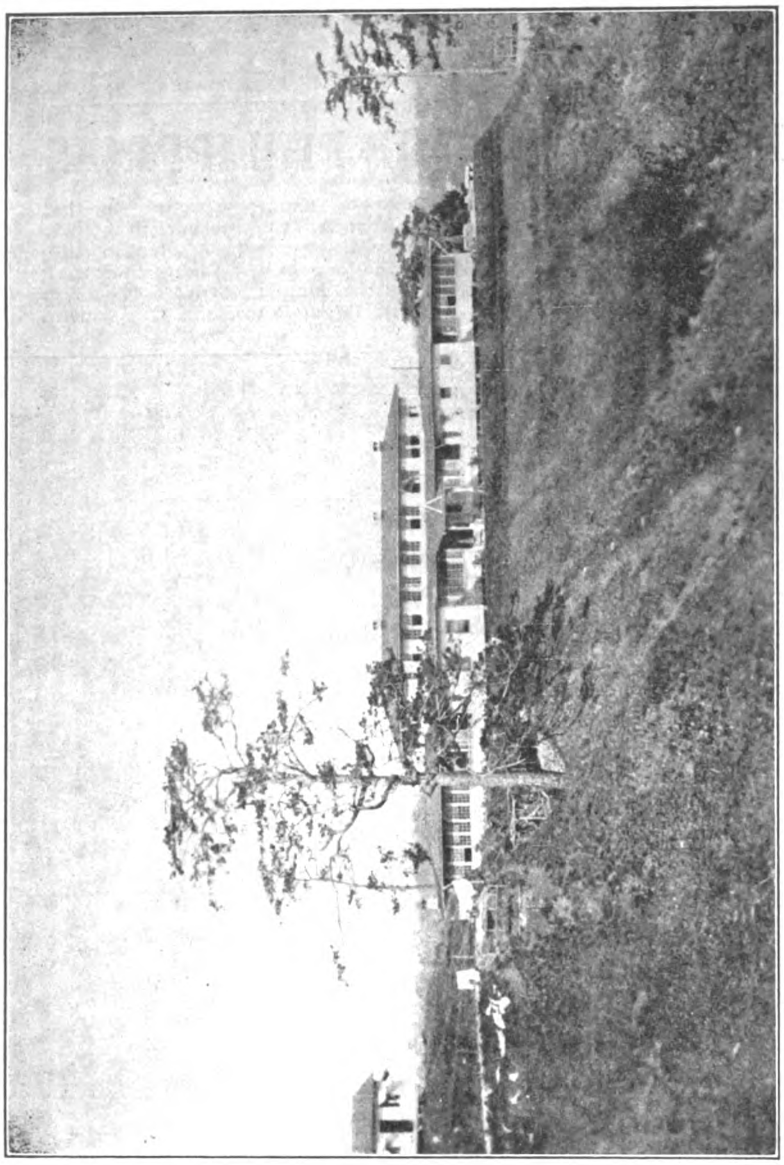
Now that is all changed. A splendid automobile road has superseded the tortuous trial; a branch of the Manila Railroad Co. now extends from Dagupan to Camp One, a point about m 21 miles from Baguio over which the traveler is whisked in less than two hours through the beautiful Alps of the Philippines to arrive at a modern town with the comforts of modern hotels provided where once lodging was represented by the local tribunal building.

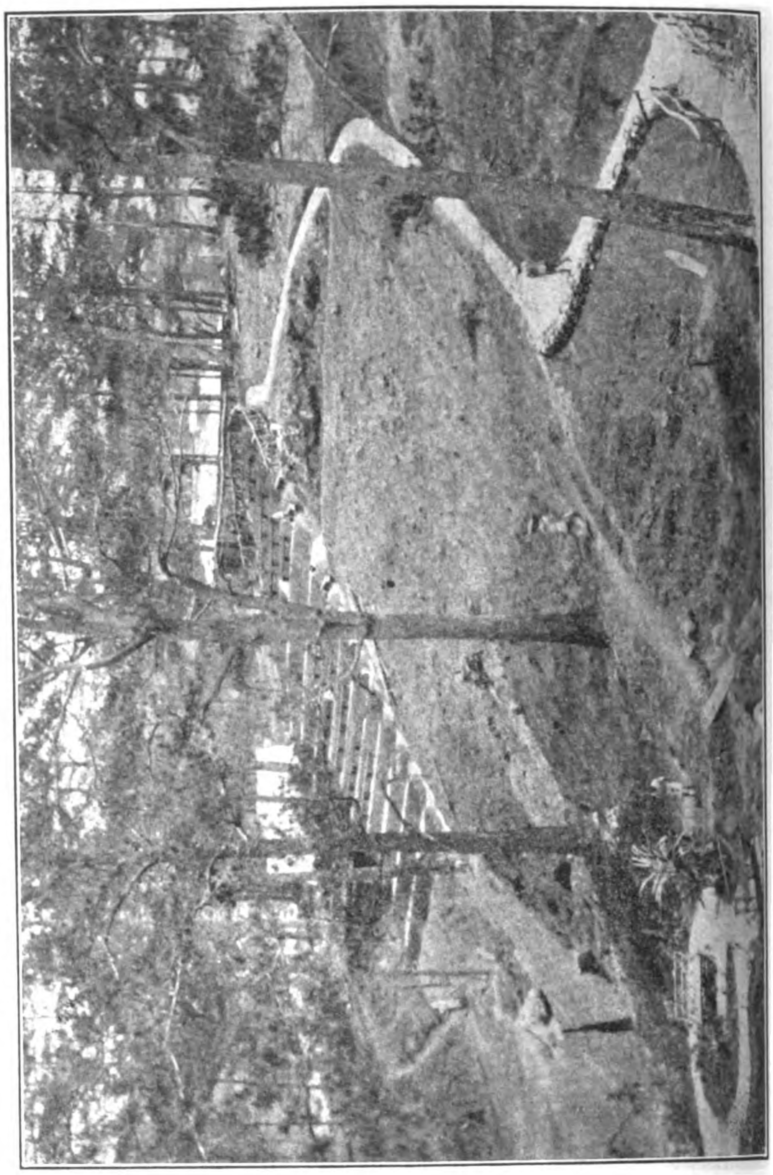
Baguio comprises a reservation of twenty

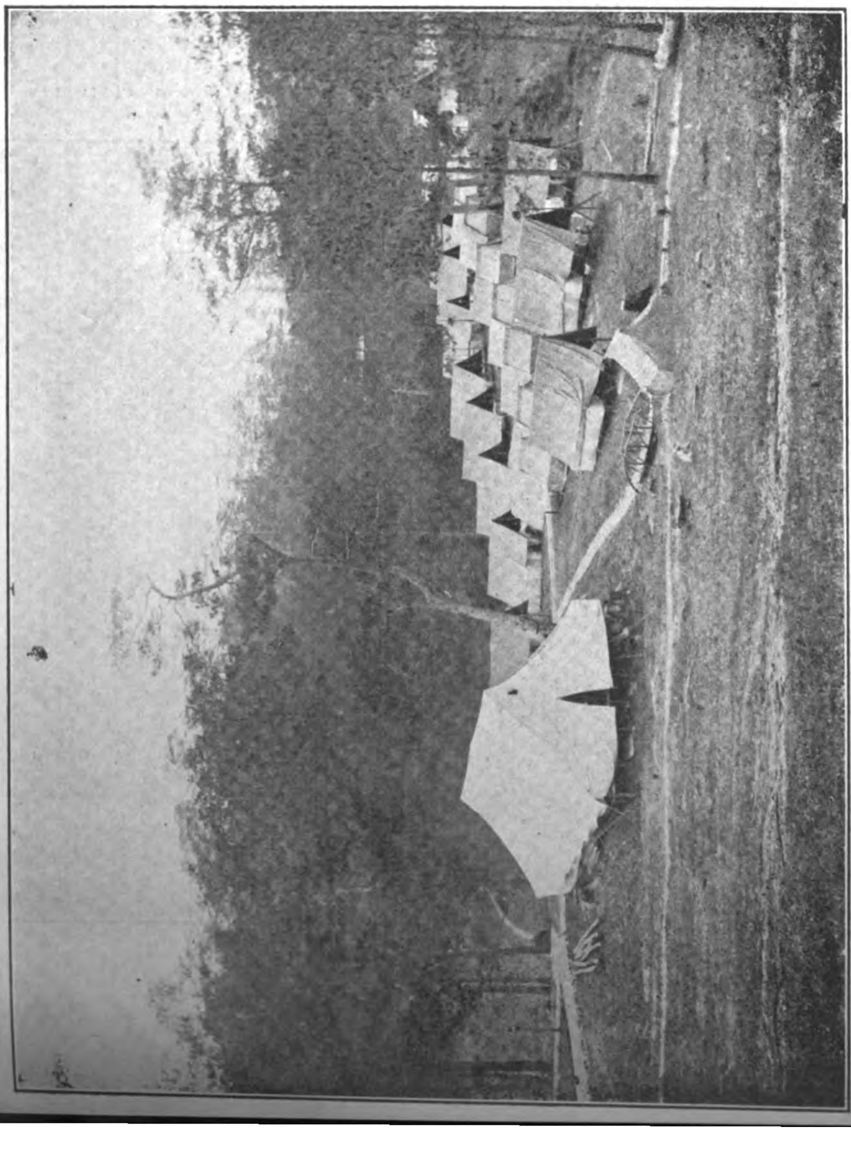


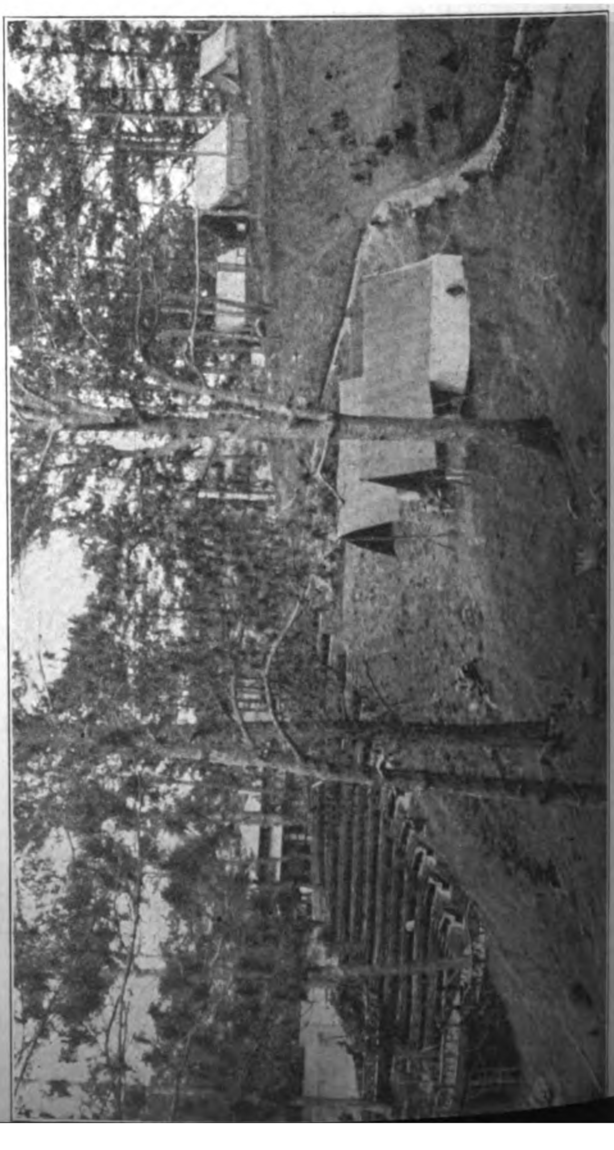
LOOKING DOWN THE VALLEY THROUGH THE JAPANESE GARDEN TO THE ATHLETIC GROUNDS AT BAGUIO

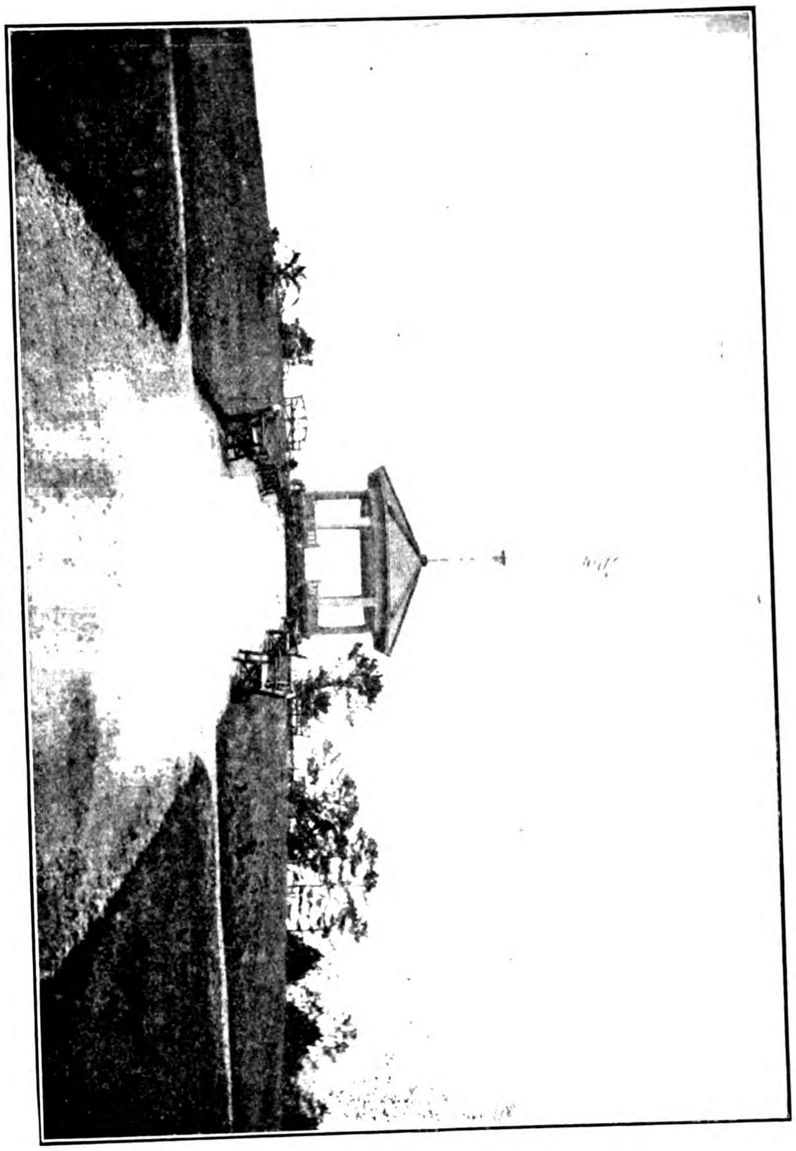
ENTRANCE TO CAMP JOHN HAY, BAGUIO


THE BAGUIO HOSPITAL

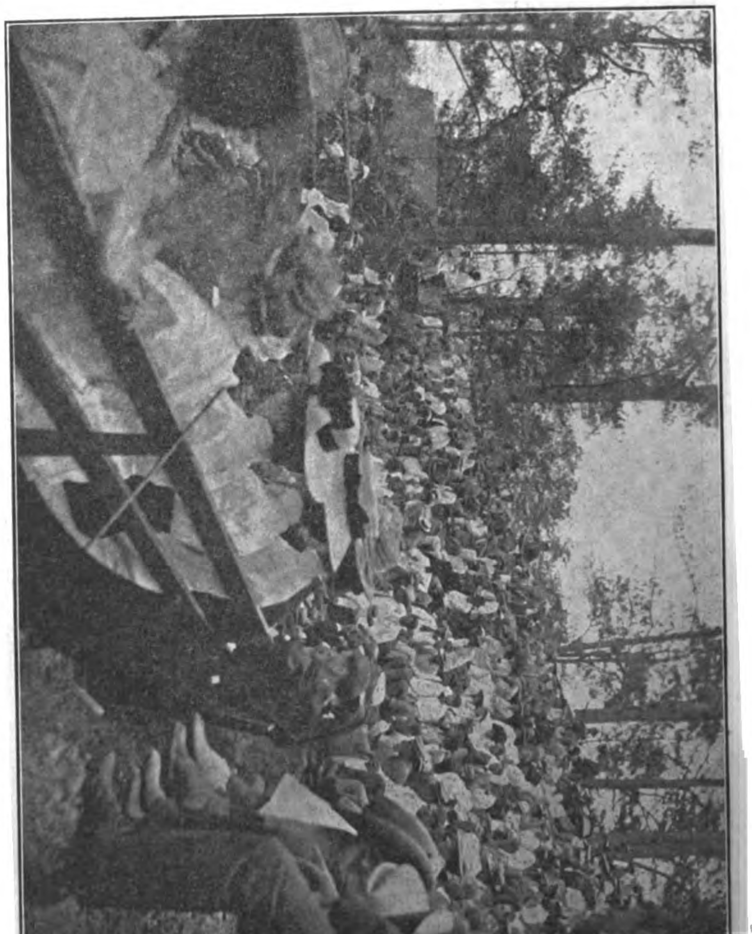

CAMP PROGRESS IN THE NEIGHBORHOOD OF THE AMPHITHEATER AT BAGUIO


LECTURE TENT AND QUALITY ROW, TEACHERS' CAMP, BAGUIO

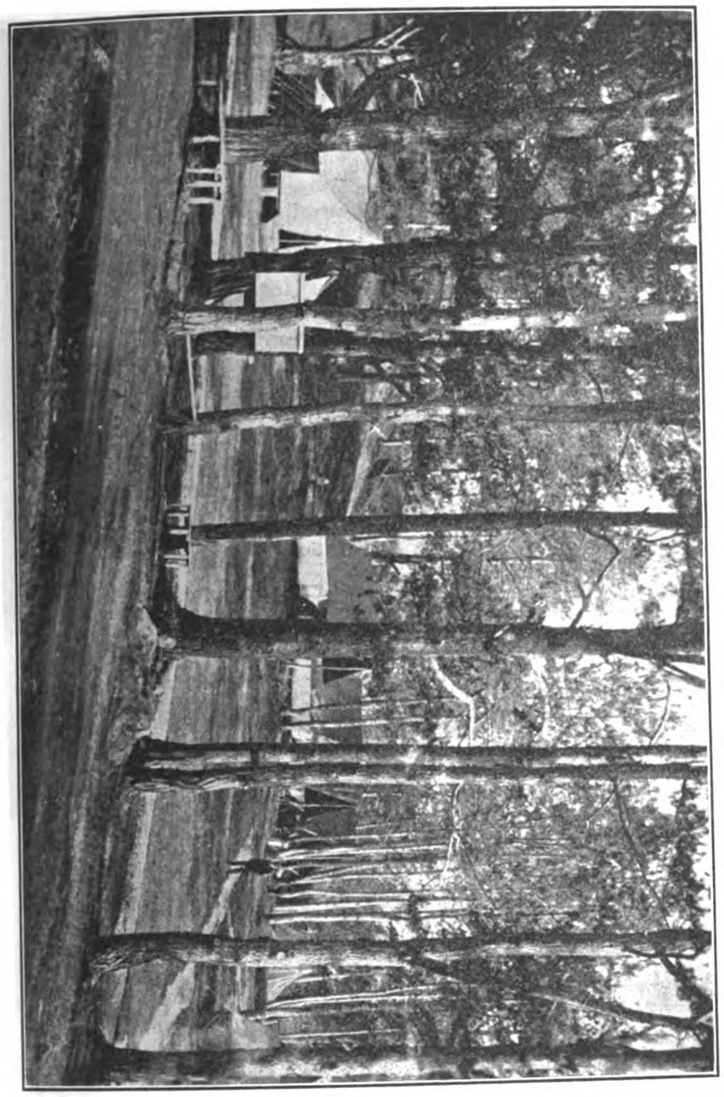

AMPHITHEATER AT TEACHERS' CAMP, BAGUIO



THE LUNETA AT BAGUIO.



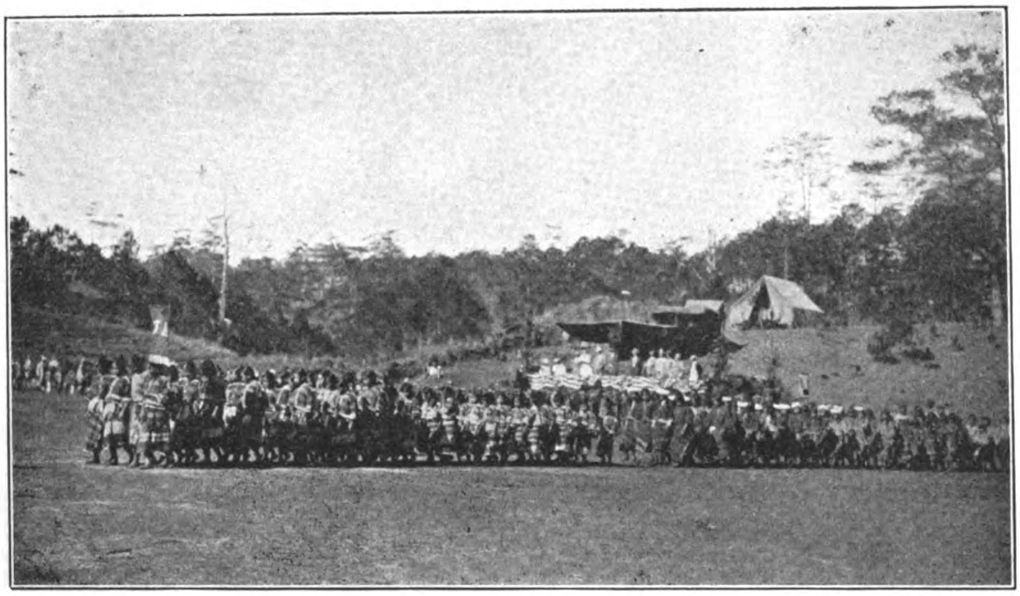
SCENE IN THE AMPHITHEATER AT TEACHERS' CAMP, BAGUIO, 1911.



LOOKING THROUGH TEACHERS' CAMP, BAGUIO, 1910.

VIEW OF TEACHERS' CAMP, BAGUIO, 1911.

THE MESS HALL AT BAGUIO



PROCESSION OF MOUNTAIN PROVINCE SCHOOL GIRLS PASSING IN REVIEW AT BAGUIO ON CLOSING DAY OF ATHLETIC MEET

BASEBALL GAME BETWEEN TEACHERS AND "G—STRINGS" TEACHER'S CAMP, BAGUIO

square miles situated on a plateau in the province of Benguet at an elevation of about 5,000 feet. It is the center of what is termed the temperate zone of the tropical Philippines. The need of some place for recuperation during the heated term within easy distance from Manila was soon realized by the American administration and trips into the mountains in the Benguet region were indulged instead of a vacation abroad between February and June of each year. Governor Taft was greatly impressed with the vigorous climate of the Baguio region after a few visits and recommended that a wagon road be substituted for the trail so as to make the hills more easily accessible.

The undertaking to build the road through the hills proved a much more serious task than at first anticipated and at times there were doubts whether the heavy expenditure involved was warranted. Having put its hai d to the plow the government refused to turn back and finally in 1905 the Benguet Road was completed under the supervision of Colonel Kennon, U. S. A.

In the meantime the members of the Philippine Commission had arranged to carry on their work in Baguio during the hot months. Temporary quarters were prov ded and a sanitarium established for convalescents and treatment of natives. The Hotel Pines was opened under private management and quite a number of residents of Manila joined the small official colony.

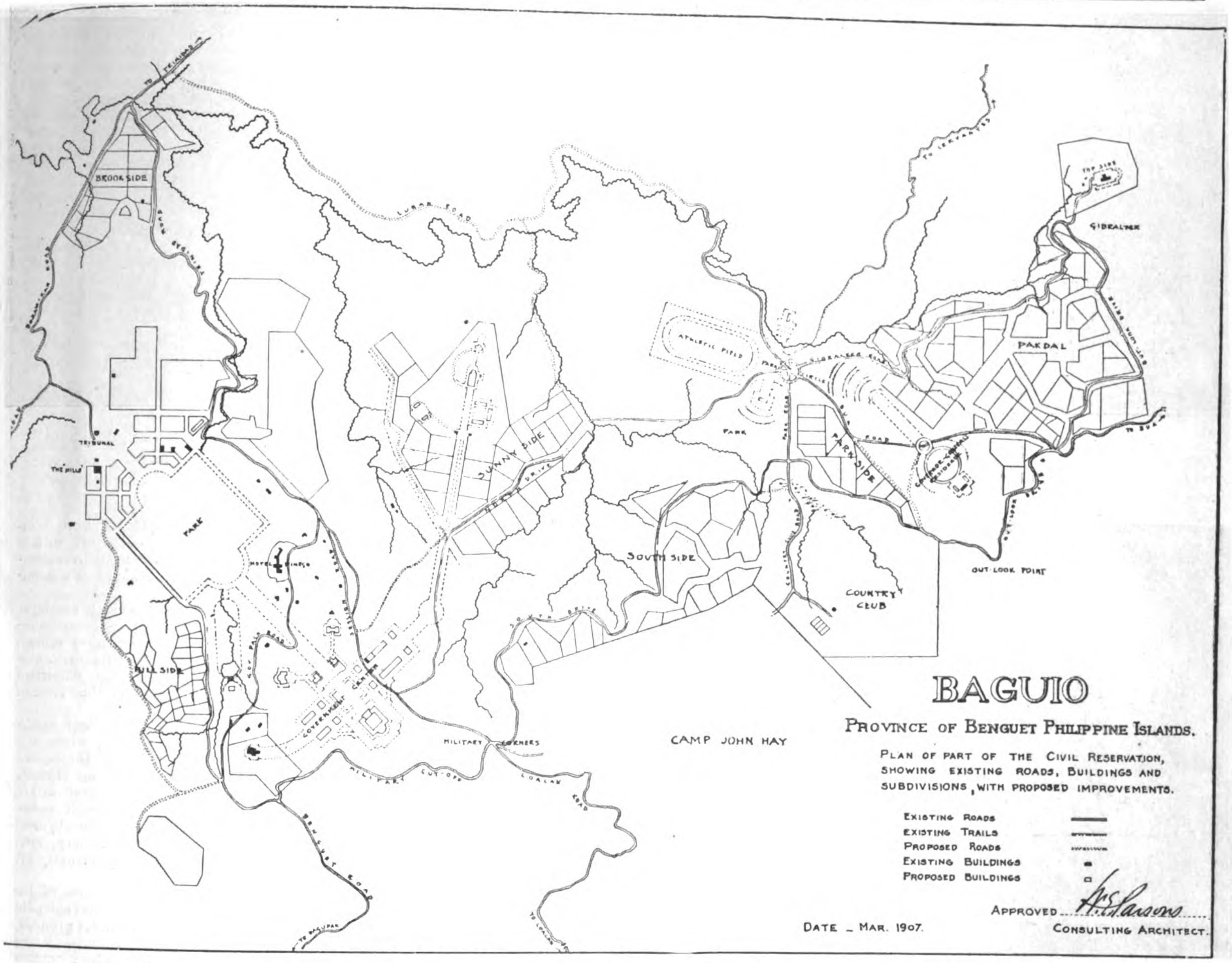
The military authorities also became interested. The tropics have serious deteriorating affect on troops and a retreat where patients might have the benefit of a temperate climate while convalescing appealed to them. The result was the purchase of a tract of 550 acres now known as Camp John Hay near the municipio of Baguio commanding one of the most delightful views of that region. With the co-operation of the military authorities, the Insular Government proceeded to enlarge its original plans so that Baguio might develop into a summer resort available to all classes. Plans were prepared for a model city; streets were constructed and lots were offered for sale at auction. While interest outside official circles was not marked at first owing to limited transportation facilities, it increased year by year until many Manila families now own summer residences at Baguio where formerly they sought relief abroad.

In the meantime the Manila Railroad Company extended its line from Dagupan to Camp One, a point on the Benguet Road about 21 miles from the Summer Capital and 142 miles from Manila by rail. Automobiles superseded mule transportation over the road. The cost of traveling from Manila to Baguio has been reduced from about ₱100 one way in 1901 to ₱27.50 for a round trip first class ticket good for six months; ₱23, second class; and ₱11 third class, in 1911. This remarkable improvement in transportation facilities had the desired result in attracting thousands of visitors where formerly there were but tens comprising the annual pilgrimage. The two hotels and temporary additions were filled to overflowing, while every available residence was occupied this year. Indeed, so great was the demand for accommodation that arrangements are now under way to double the hotel capacity for the 1912 season.

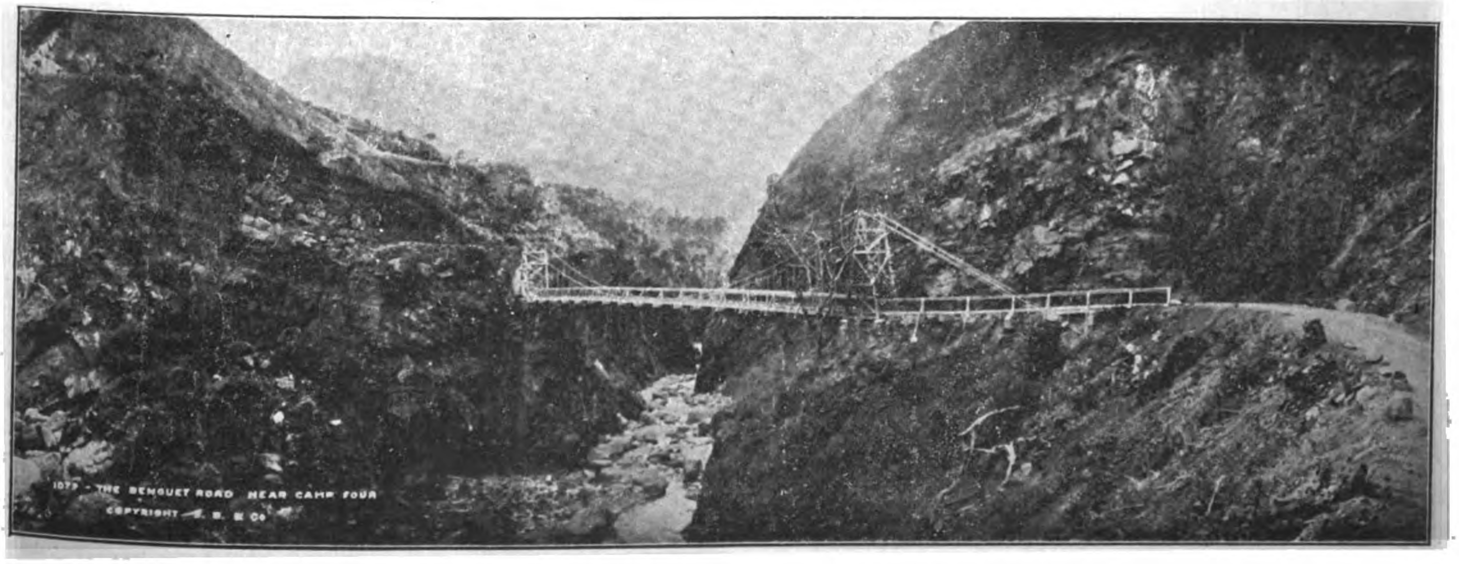
Baguio now boasts an electric lighting plant, a water supply, sewer system, telephone exchange and a taxicab service.

There are a number of handsome private residences, among which is "Top Side," built by Governor General Forbes, besides Mansion House, the Governor General's official residence while in Baguio. These two buildings are constructed of Benguet stone and finished largely in Banguet pine. At Camp John Hay a very imposing residence has been constructed for the Commanding General of the Division, with a row of officers cottages, military hospital and quarters for convalescents.

Government Center includes the administration building occupied by the secretaries of departments and the executive bureau with separate buildings for all the different bureaus of the insular government while a large



MAP OF BAGUIO SHOWING DEVELOPMENT AND PROPOSED PLANS UNDER DATE 1907, MANY OF WHICH HAVE BEEN CARRIED OUT



VIEW OF A TYPICAL SECTION OF THE FAMOUS BENGUET ROAD

ANOTHER VIEW OF TEACHERS' CAMP

BASEBALL AT TEACHERS' CAMP—HIS EXCELLENCY, GOVERNOR GENERAL FORBES AT THE BAT

VIEW THROUGH JAPANESE GARDEN UP THE VALLEY TO TEACHERS' CAMP, BAGUIO

THE MESS HALL, TEACHERS' CAMP, BAGUIO

number of government cottages have been provided for officials and employes with a central mess hall maintained for their accommodation where board is secured at a nominal rate.

A large dormitory for government employes has also been established. Among other buildings constructed are the Constabulary school, the local weather station at Mirador, a new city hall, a new hospital and a municipal market, and the club house of the Veteran Army of the Philippines.

Among the educational institutions established is the Baguio Boys School, where the children of foreign residents have the benefit of a modern training in a bracing climate.

There are many points of interest within easy distance of Baguio and available either by automobile, as Trinidad Valley, or by trail to Mount Santo Tomas, Haight's place, etc., where excursion parties find opportunity for healthy outdoor exercise.

Among the most desirable features of Baguio is the Country Club with its splendid club house, its expansive, well kept grounds, including golf links, polo grounds, tennis courts, baseball diamond, etc., where outdoor sport in all its departments are encouraged. Governor General Forbes is an active exponent of healthy sport and it is due to his continued interest that the Country Club has proved such a success. Mr. Forbes believes that the Filipinos should be encouraged to development physically. During the summer season at Baguio, he may be found on the Baguio Home team or "rooting" for it with vigor from the bleachers.

One feature of the year 1911 was the large convention of teachers from all parts of the islands. Teachers' Camp, where the Assembly was located, was one of the great central attractions of the season and in no department was there more interest than in athletics. Teams from all parts of the islands vied with each other in base-ball, basket ball, etc. and a few local records were broken during the season. The different hill tribes had their representative champions and indeed there were few races not represented. This commingling of the races in healthy athletic competition is encouraged by the Government whenever possible and by this means much of local prejudice has been overcome.

Many visitors from other points in the Far East were attracted to Baguio during the present season and there is every indication that its beautiful climate will appeal more to residents of Oriental ports during the heated term.

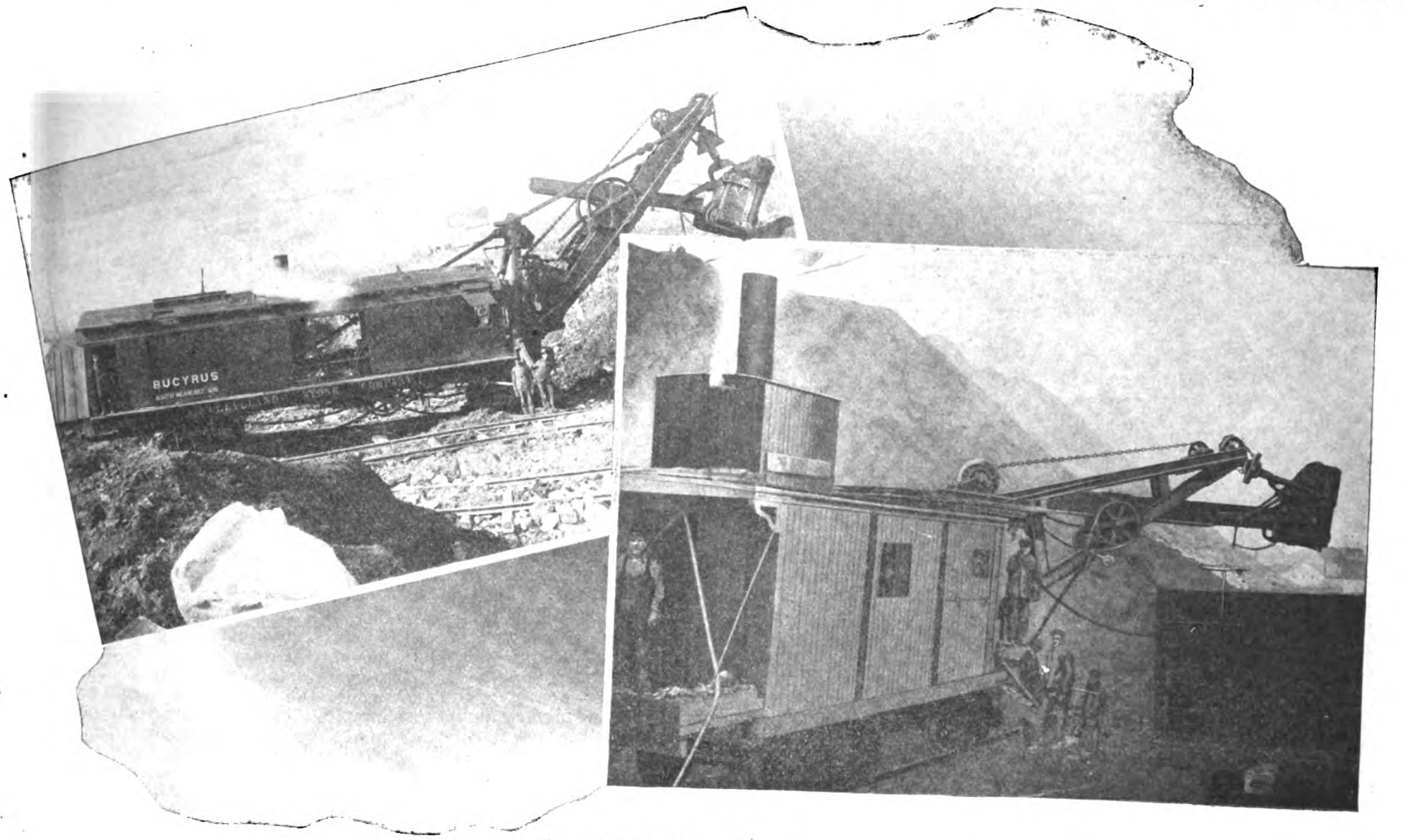
For several years an effort has been made to interest capital in the construction of a railroad from some point on the Manila Railroad Co.'s line to Baguio. A line over the Benguet Road a distance of 21

THE DEVELOPMENT OF THE STEAM SHOVEL

It was early in the last century that the steam excavator was introduced into the field of engineering. At this time it was but a crude machine, clumsy to operate, clumsier to move around and adapted only to digging earth and loose material. Since that day, however, owing to the tremendous advance that has been made in its development, mechanical excavating machinery has played a very prominent part in engineering. Indeed it is safe to say that there are many great projects that never would have been attempted without its use.

In European countries, England, France and Germany in particular, excavating machinery has been in use for some years but its development has not been rapid, the type remaining small and light. In fact in England at the present time the heaviest steam shovel built is a 36¼ ton steam navy manufactured by the Ruston & Proctor Company. The Germans, however, have within the last few years turned out a few large and powerful machines, but it is interesting to observe that all modern developments along the line of power and size have emanated either directly or indirectly from the United States.

The American steam shovel through its 30 years of development has gone through many stages. The first excavating machine that can be classed under the general designation of "steam shovel" was built by the Pound Manufacturing Company of Lockport,



THE BUCYRUS STEAM SHOVEL

miles from Camp One was first considered. Several surveys were made and recently preliminary location was completed by the Manila Railroad Company covering a route connecting Aringay, a point 25 kilometers south of San Fernando de Union on the Manila Railroad Company's main line, with Baguio, a distance of 61 kilometers. The survey carries the proposed line along the mountain range near the top of the divide so as to avoid serious landslides. The country to be traversed by the proposed railway offers many engineering difficulties due to the character of the country. The final location and estimates have not been completed, but it is understood are now being prepared.

The distance via Camp One to Baguio by present transportation is 263 kilometers and via the proposed through route over the Manila Railroad Company's lines 292 kilometers approximately.

In the meantime, the mining industry in Benguet near Baguio is slowly developing. Notwithstanding many drawbacks, serious damage by storms, and in some instances unwise direction, the presence of large deposits of gold in paying values has been fully demonstrated. There are now installed mills with an aggregate of thirty stamps besides the new twenty stamp mill of the Headwaters now being installed. While the output of gold has fallen off, it is not due to disappointment in values but to the destruction of active plants by storms and the lack of capital to restore them. This industry in Benguet has a great future before it under wise direction and will surely justify every effort put forth to give that section desirable transportation facilities.

The soil and climate is attracting agriculturalists interested in the cultivation of temperate products and with a market easily available, there seems a future in this line of endeavor.

The average temperature in Baguio is 75° maximum and 51° minimum. In December and January, the thermometer drops to the freezing point and there are few evenings when a fire is not welcome.

It is the firm purpose of the Government to increase the accommodation for government employes from year to year, so that ultimately the great majority of them may enjoy the benefits of the climate annually. The Government claims it pays. The improved physical condition of the members of the service gives returns in the form of better service and a greater degree of contentment. In addition Baguio provides a general health resort for the islands, which, as facilities for transportation are increased will put the benefits of the climate within reach of all.

The views of Baguio and Teachers' Camp in this number are reproduced by courtesy of the *Teachers' Assembly Herald.*

New York in the year 1870. The body of the machine, including the mast, swinging circle, crane and car frame was constructed almost entirely of wood. It was mounted on broad wooden wheels of small diameter having a gauge of 10 feet. All the motions were controlled by one vertical engine. Whenever the shovel had to be moved any considerable distance it was necessary to take it apart and haul in wagons to the desired place where it was reerected. The next type to be developed was also equipped with small traction wheels of broad face. This machine had two engines, one operating the swinging and hoisting machinery and the other, a small oscillating engine, the movement of the dipper. Then came the first railroad shovel shown in the cut above. This particular machine was built dy the Bucyrus Company in 1882 and has been in use until the last few weeks. The most marked change in the machinery was the abandonment of the small inefficient oscillating engine for manipulating the dipper in favor of a friction clutch and sprocket chain operating from the train engine.

The next development was along the line of design rather than power. Until this time the shovel in general appearance was very much like the present English navvy. Now a steel boom held up by an A-frame or tripod replacd the old crane, a locomotive boiler took the place of the former type and finally, in answer to the demands of heavier digging, an engine again appeared on the

AMERICAN HIGH DUTY LATHES OF NEW DESIGN

The illustrations accompanying this arti' cle are those of the 42 inch "American'- High Duty Lathes manufactured by the American Took Works Company of Cincinnati, Ohio, whose high standard machinery enjoys a worldwide reputation.

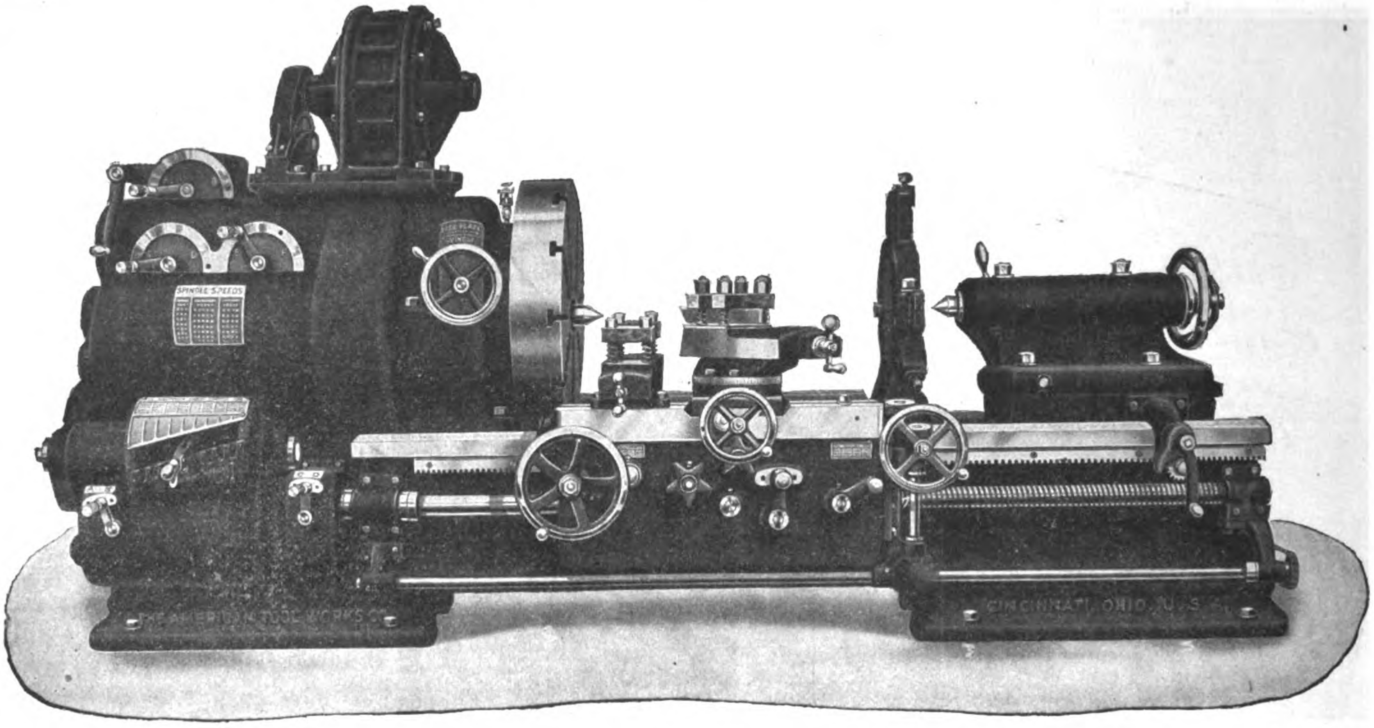
The machines referred to are the very latest

As implied above, in power, range and convenience these new lathes are in advance of all similar size lathes of previous design and one of these tools will prove a very valuable asset in every shop in which large lathes are used.

Some idea of their enormous power may

on any other similar machine. A constant speed motor is advantageously used for 16 spindle speeds are regularly provided. If, however, a variable speed motor is preferred a speed variation of only 35% will be required.

The 16 spindle speeds are all obtained through a medium of positive clutches and



and highest developments in high duty lathes and the manufacturers claim that there never has been a similar sized lathe produced which can be compared with these lathes in regard to power, range and convenience.

Although these machines are strictly new in design the are by no means still in the experimental stage. In fact, where installed they have more than exceeded expectations.

be gained from the fact that for a moter driven machine the manufacturers recommend a 20 H. P. Motor and guarantee the lathe to work without strain under continuous service of 50% overload of the motor and also from the fact that with the counter-shaft speed given on a belt driven lathe the speed reduction between the counter-shaft and the spindle is far greater than

slip gears the clutches being of the selective type and easily engaged while the teeth of the slip gears are machine rounded thus causing them to slide easily into mesh on the same principle as many automobile transmission gears. The gears are all mounted on long bronze sleeves which are oiled by means of eight feed oilers from the outside of the head. There is absolutely nothing which will require adjustment in the headstock, the only attention necessary, being occasional oiling. Of the 16 speeds provided 8 are obtained directly through the spindle gear and the other 8 through the face plate drive. This is a distinctive point of these machines as in the usual type of triple geared lathes only ⅓ of the speeds are obtained through the face plate drive. This later type necessitates using the spindle gear drive for a great deal of heavy turning on large diameter work which on this lathe is handled through the face plate drive thus relieving the spindle of the enormous strain.

In regard to the detailed construction of the head, all driving is done either through shorth shafs or through sleeves, there being no long shafts in torsion at any time thus eliminating all possibility of binding or chatter. All gears in the driving mechanism are of unusually coarse pitch and wide face and the pinions are made of steel cut from the bar. The gears have ample strength for far in excess of any strains which may be placed upon them.

Another very important point in connection with the head construction is the elimination of all loose gears from the spindle. The spindle is made in taper form, a construction common to heavy wheel lathes. The only gear on the same is the spindle driving gear which is set close against the front spindle bearing. The spindle is therefore at no time under severe torsional strain. This feature adds greatly to the life of the bearings and the alignment of the spindle itself. The bearings throughout the head are all bored out from the solid and are lined with massive phosphor bronze bushes. This also applies to the entire feeding mechanism

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boom; but this time one of greater power and efficiency.

From now on the applicability of the shovel to new fields became recognized as it came to the used in heavier and more refractory material. Steel took the place of iron in various vital parts and others were enlarged and strengthened to cope with new conditions.

Thus the development continued until several distinct types came in vogue: the small revolving shovel for light road, cellar and small brick plant work; shovels of from 40 to 70 tons for railroad construction and the ordinary run of digging; the 80 ton for heavier work of this class and shovels from 95 to 11 otons for open cut iron and copper mines, rock and cement quarries and work where unusually severe conditions are encountered or particularly large output required.

The Panama Canal is undoubtedly the best instance of the use of modern excavating methods. Here there are 100 steam shovels in use, 47 of which are of the heaviest and most powerful type. On account of the very accurate records kept it is particularly interesting to note the outputs recorded in material which is considerably harder than the average. The daily record is now held by a 95 ton shovel built by the Bucyrus Company of South Milwaukee, Wisconsin, which furnished 77 of those on the Isthmus. This machine in eight hours dug 4823 cubic yards of material designated as rock and earth, although delayed 160 minutes waiting for cars and for other reasons. More remarkable performances are frequently reported by contractors but the above is mentioned as it is strictly official.

There are many examples of the extensive use of shovels for mining work. Perhaps the best is the Lake Superior Iron Ranges located in the northern part of the United States. Here there are several hundred engaged in stripping the over-burden and digging the ore. The Rio Tinto Mine in Spain, the greatest open cut copper mine in the world is operated by 15 Bucyrus shovels, and even above the Arctic Circle in northern Norway Bucyrus 95's are mining iron ore. The Rock Industry is the last to find the use of steam shovels not only economical but necessary. What with the severe strains imposed by digging blasted and some times almost solid rock it is here that the shovel meets the hardest possible conditions and perhaps it has here reached the highest point of development.

By far the greatest user of the steam shovel, however, is the railroad contractor. He generally starts business with teams, wagons and scrapers and picks up small light work not adapted to heavy machinery. His aim, however, is eventually to purchase a steam shovel, a small locomotive and a few dump cars. He is then in a position to bid on contracts and if successful to invest in more equipment. Indeed there are many contractors who find it profitable to own upwards of 20 shovels each costing between $9,000 and $9,500.

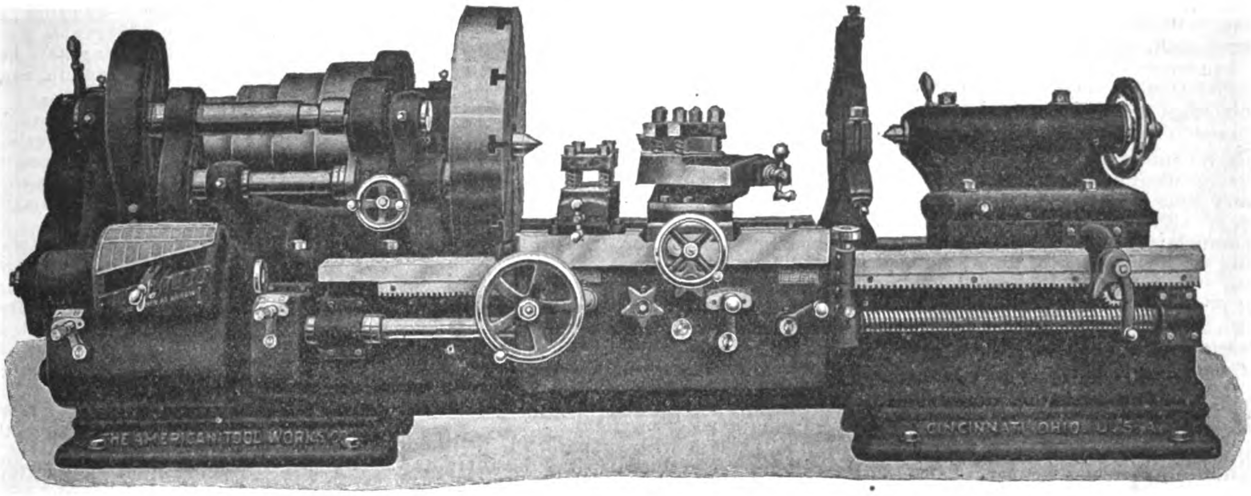
It has been said that "necessity is the mother of invention". In the case of the steam shovel its "mother" may be considered the high scale of wages. It is this force which has existed in the United States to such an extreme degree which has, more than anything else, brought the steam shovel to what it is today, and although the same conditions may not exist in other countries to lend an impetus to its use the steam shovel has effectively established itself once for all as an economic tool.

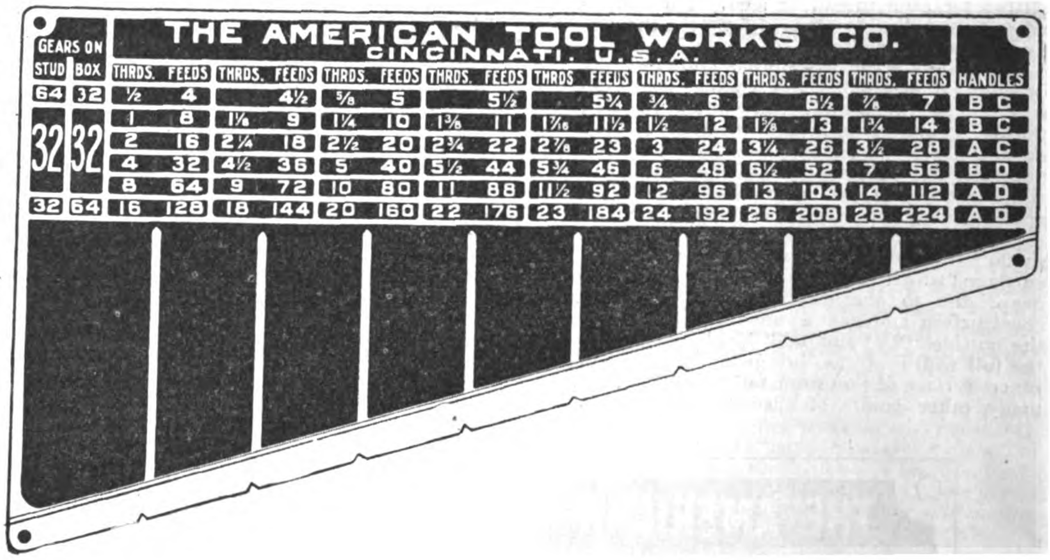
and all the bearings throughout the machine are of a high grade phosphor bronze.

Another point which has been very carefully worked out, is the construction of the driving pulley which is mounted on a steel sleeve of large diameter. The pulley is bronze bushed and runs on the steel sleeve thus relieving the driving shaft of all pull from the belt. The pulley is also self-oiling, the hub of same forming a retainer for the oil-which is fed to the shaft through felt wipers. With this construction a circulation of oil is continually taking place with the result that fresh oil is being cons antly fed to the shaft.

All speed changes can be made without stopping the ini ial drive as the machine may be started, stopped and slowed by means of a friction clutch which engages and disengages a driving pulley or motor gear from the shaft. This clutch is operated by a lever shown at the right hand side of the pulley. The control is very sensitive thus enabling the operator to quickly make the various speed changes. The positions of the lever for the various spindle speeds are plainly indicated on the index plate on the front of the head. This plate has been very carefully worked out and every lathe operator will appreciate its simplicity and the ease with which each spindle speed is obtained. An illustration of the index plate is shown herewith.

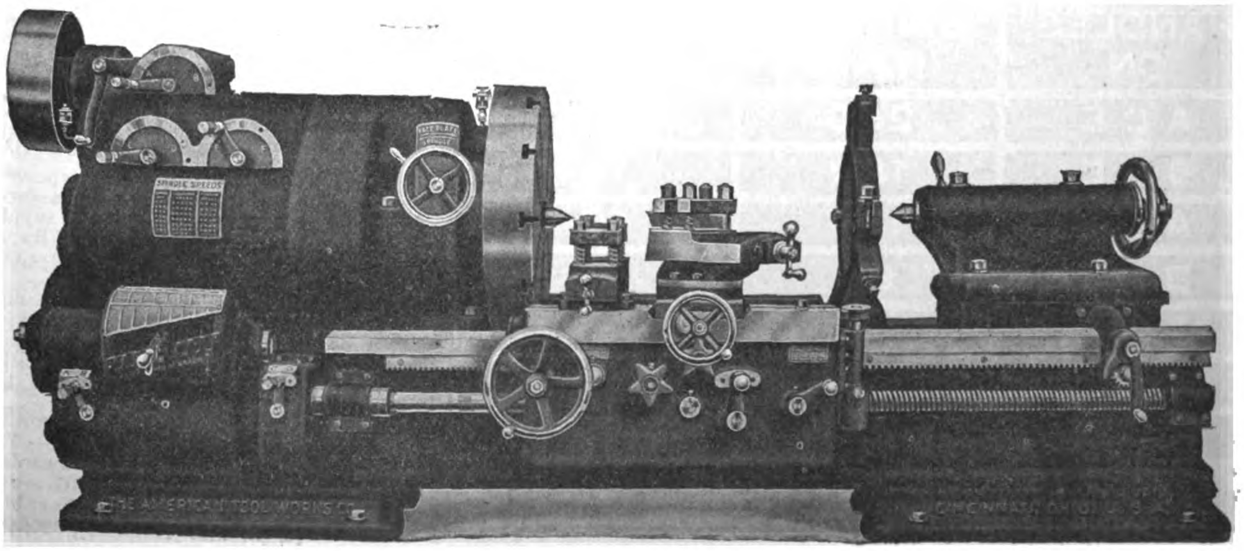
One of the most notable features of these new lathes and one upon which great emphasis is placed is the Rapid Change Gear Mechanism. All gears in which are steel. The material used in the gears is the very best obtainable, being either of bar steel or drop forgings. This mechanism is embodied in a self-contained unit carried on the front of the bed and provides 32 fundamental changes of threads ranging from 1 to 14 per inch. In addition to this a compound quadrant gear is provided on the end of bed which will furnish 16 additional changes thus affording 48 thread and feed changes ranging from ½ to 28 threads including 11½ pipe thread and from 4 to 244 cuts per inch. The 32 changes in the box are all obtained through the medium of a cone and tumbler gear and two sliding clutches of the selective type. Anyone of these changes may be instantly obtained while the machine is running. The quadrant mentioned also





THE AMERICAN TOOL WORKS CO.
CINCINNATI, U.S.A.

GEARS ON STUD	GEARS ON BOX	THRDS.	FEEDS	THRDS.	FEEDS	THRDS.	FEEDS	THRDS.	FEEDS	THRDS	FEEDS	THRDS.	FEEDS	THRDS.	FEEDS	THRDS.	FEEDS	HANDLES
64	32	½	4		4½	⅝	5		5½		5¾	¾	6		6½	⅞	7	B C
32	32	1	8	1⅛	9	1¼	10	1⅜	11	1$\frac{7}{16}$	11½	1½	12	1⅝	13	1¾	14	B C
		2	16	2¼	18	2½	20	2¾	22	2⅞	23	3	24	3¼	26	3½	28	A C
		4	32	4½	36	5	40	5½	44	5¾	46	6	48	6½	52	7	56	B D
		8	64	9	72	10	80	11	88	11½	92	12	96	13	104	14	112	A D
32	64	16	128	18	144	20	160	22	176	23	184	24	192	26	208	28	224	A D



CONTRACTING NEWS

PROPOSALS INVITED

PROPOSALS FOR WOODEN LORCHAS.—Headquarters Philippines Division., Office of Chief Quartermaster, Manila, P. I., June 3rd, 1911, Sealed proposals, in triplicate, for constructing and delivering to the Quartermaster Department, U. S. Army, four (4) Wooden Lorchas, will be received here until 11:00 a. m., June 26th, 1911.

BUREAU OF PHILIPPINE CONSTABULARY.—Sealed proposals, in triplicate, subject to the usual conditions, will be received at the office of the Chief Supply Officer, Bureau of Constabulary, until ten a. m., November 1, 1911, for furnishing the following articles: 200 Capes and Hoods, khaki, for officers.

MUNICIPALITY OF SHANGHAI—ELECTRICITY DEPARTMENT

The Council invites tenders for the supply of:
(a) 100 Radiators
(b) 12 Cooking Ranges

Sealed tenders endorsed "Tender for Radiators" or "Tender for Cooking Ranges" must be forwarded to them not later than noon on Saturday, July 15, 1911.

The Council is prepared to receive LAND CEMENT in such quantities as may be required during the year beginning on September 1, 1911.

Sealed tenders will be received not later than noon on Saturday, July 8,911, and should be marked "Tender for Portland Cement."

The Council is prepared to receive tenders for the supply of 12 tons of COIR YARN in varying qualities.

Sealed tenders will be received not later than noon on Saturday, July 8, 1911, and should be marked "Tender for Coir Yarn."

BIDS OPENED AND CONTRACTS AWARDED

MUNICIPALITY OF SHANGHAI ELECTRICITY DEPARTMENT

Three-phase Motors.—The Electrical Engineer having reported that within a few months the new 3-phase power supply will be available in the Northern and Western Districts, and with a view to keeping a supply of 3-phase motors available, specifications were forwarded as an urgent matter to all the firms who tendered in response to Notification No. 2075 of December 8, 1910, Single-phase Motors.

Upon the recommendation of the Electricity Committee orders have been placed as follows:—

One 60 H. P. motor manufactured by Allgemeine Electricitats Gesellschaft, Berlin, speed 585 revolutions per minute, Messrs, Arnhold. Karberg & Co. £111.

Two 60 H. P. motors, manufactured by Messrs Bruce, Peebles & Co. Ld., Edinburgh, speed 585 revolutions per minute, Messrs. Brighten, Malcolm & King, Ld. £246.10.0.

Two 50 H. P. motors, manufactured by Siemens Schuckertwerke, Berlin, speed 730 revolutions per minute, The Siemens China Electrical Engineering Co., £156.

Three 30 H. P. motors, manufactured by The British Thomson-Houston Co, Rugby, Messrs. Andersen, Meyer & Co. £145.10.0.

Indents.—The following have been approved for dispatch to the London agents:—

No.	Firm	Article	Approximate cost.
906	Crosby Lockwood & Son	Engineer's Year Book	10s. 6d.
907	British Elect. Transformer Co.	Repairs to transformer	£30
908	—	875 meters	£1,210

Coal Supply.—Of seven tenders received in response to Notification No. 2101 for the supply of coal for the Electricity Department during the year ending April 30, 1912, that of Mr. J. H. Johnsen has been accepted for Shinkoyanose Coal. at the rate of Tls. 5.15 per ton.

U. S. QUARTERMASTER'S DEPARTMENT.—1,000,000 pounds of reinforcing steel. Tenders follow:

For 20,000 pounds of quarter inch round rods, per 100 lbs., Wise and company, ₱3.44; W. F. Stevenson and company, ₱3.70; Findlay Richardson ₱3.6482; Ker and company, ₱3.363 for American steel; American Hardware and Plumbing Company, ₱3.7134; Atlantic Gulf and Pacific company ₱3.38.

For 400,000 pounds of half inch round steel rods. Wise and company, ₱3.43 per 100 lbs.; W. F. Stevenson, ₱3 335; Findlay Richardson, ₱3.2784; Ker and company, same price as for other steel; American Hardware, ₱3 3064; Atlantic Gulf and Pacific, ₱3.33; for 300,000 pounds of half inch square steel rods; Wise and company, ₱4.06 per 100 lbs.; W. F. Stevenson, ₱3.335; Findlay Richardson, ₱3.2784; Ker and company, same as other bids, Atlantic Gulf and Pacific, 3.33.

For 80,000 pounds of one inch round steel rods; Wise and company, ₱3.44 per 100 lbs.; W. F. Stevenson, ₱3 135; Findlay Richardson, ₱3.2784; Ker and company, same as other bids; Atlantic Gulf and Pacific ₱3.33. For 200,000 pounds of one inch square steel rods; Wise and company, ₱4.06; W. F. Stevenson, ₱3.335; Findlay Richardson, ₱3.2784; Ker and company, the price as their other bids; Atlantic Gulf and Pacific, ₱3.33.

U. S. MARINE CORPS, PHILIPPINES.—Food Supplies—Awards covering an approximate value of ₱200,000 were as follows:

Castle Brothers-Wolf and Sons, crate bacon, canned bacon, mackerel, cornmeal, rice, onions, potatoes, hops, vinegar, lard, syrup, fresh butter, and lemon extract; John Rothschild and company, salmon, prunes, apples, peaches, jam, coffee, sugar, Ceylon tea, pickles, salt, pepper, ground cinnamon, cloves, ginger, nutmeg, and vanilla extract; William H. Anderson and company, canned baked beans, flour, canned butter; Connell Brothers, dry beans, canned tomatoes, evaporated milk.

MANILA HOTEL COMPANY

The following bids were opened and awards made—1600 pieces narra furniture.

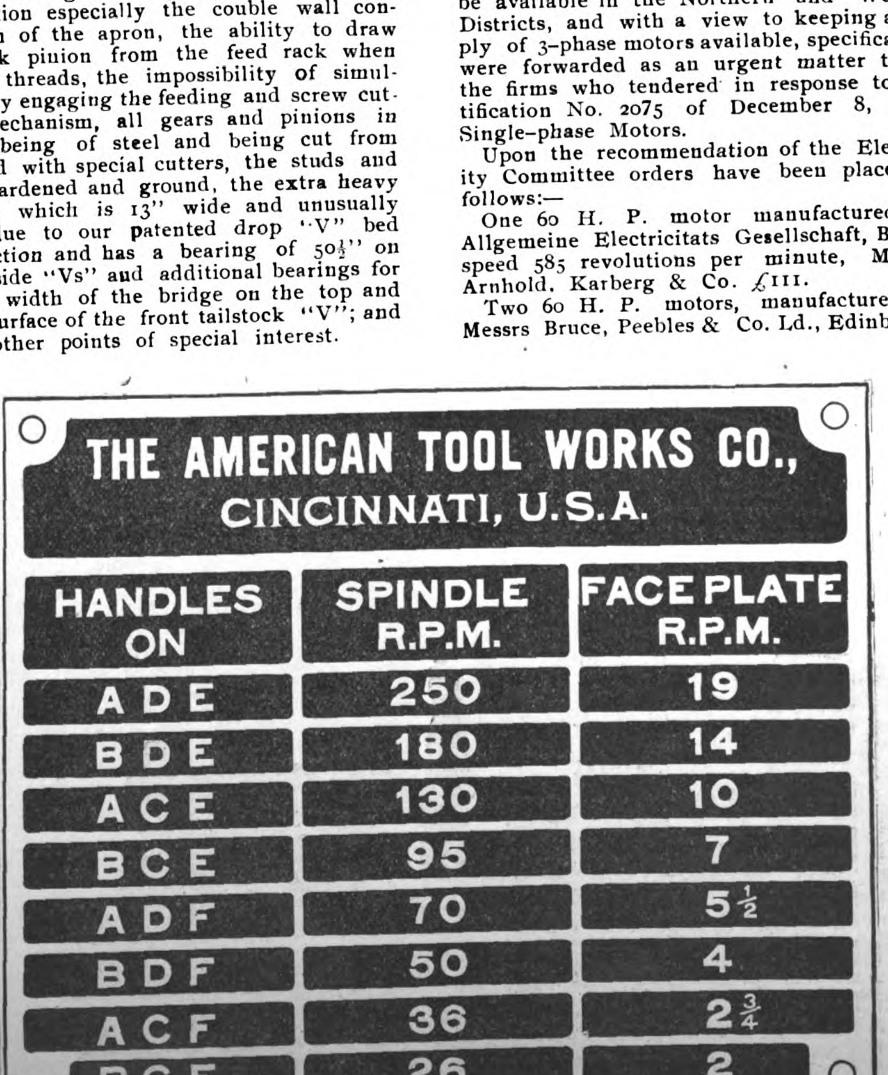
R. M. Loper offers to supply the furniture for ₱55,700, while the Export and Import Lumber company bid ₱54,982,06.

Wm. H. Anderson and company, Philippine representative for the Brunswick Balke Collander company, have secured the contract for furnishing pool and billiard tables and equipment for the Manila hotel.

FURNISHING CEMENT FOR SIX MONTHS ENDING DECEMBER 31, 1911— Philippine Bureau of Supply—Contract awarded Messrs. Wm. H. Anderson & Co., Green Island Emerald Brand ₱4.50. The other bits were: Alsen ₱4.48, and Haiphong ₱4.59½.

provides means for obtaining through the medium of loose gears any odd rates or feeds which may from time to time be desired. The cone gears are all of the Brown & Sharpe 200 involute pointed type which provides an especially strong tooth and greatly facilitates the engaging of the gears while running. *The One Great Feature Of This Quick Change Mechanism which is Distinctively Superior and can positively not be found on any other design is that which eliminates the necessity of speeding up any time for any of the different feeds or threads.* The coarse threads and feeds are all obtained through the cone, and no member in the box does at any time run faster than the initial driving gear. The value of this construction will certainly appeal to every person interested in and familar with lathes. The index plate completely worked out, is in full view of the operator on front of the gear box showing the exact setting for each thread or feed. The simplicity of this place is obvious from the illustration shown herewith.

There are a great many other points worthy of mention especially the couble wall construction of the apron, the ability to draw the rack pinion from the feed rack when cutting threads, the impossibility of simultaneously engaging the feeding and screw cutting mechanism, all gears and pinions in apron being of steel and being cut from the solid with special cutters, the studs and shafts hardened and ground, the extra heavy carriage which is 13" wide and unusually deep, due to our patented drop "V" bed construction and has a bearing of 50½" on the outside "Vs" and additional bearings for the full width of the bridge on the top and inner surface of the front tailstock "V"; and many other points of special interest.



FAR EASTERN RAILWAY NEWS

THE HU-KUANG RAILWAY LOAN AGREEMENT.—A dispatch from Peking under date of May 21 announced the conclusion of the loan of £6,000,000 bearing interest at 5% equally divided among the four powers interested. The proceeds are to be utilized for the completion of the Canton-Hankow and the Hankow-Szechuen trunk lines. According to latest advices the lines to be constructed covered by the loan aggregate about 1300 miles of which 600 approximately represents the balance of the Canton-Hankow trunk. From Hankow to Ichang 400 miles, and from Ichang to Kweichow (Szechuen) 300 miles, comprise two sections of the Szechuen line. A British engineer will be in charge of the Canton-Hankow section; a German on the Hankow-Ichang section and an American on the Ichang-Kweichow. The construction involved is expected started within six months and all the lines with the exception of the Ichang-Kweichow are to be completed within three years. The loan runs for forty years and is secured by the revenues of the different provinces through which the lines pass. The agreement also provides for an additional £4,000,000 loan if required.

NEW RAILWAY DEPOT AT NEW WIJU.—It is proposed to build a new station at this point to cost 250,000 Yen.

JAPAN PARTICIPATES IN CONTINENTAL RAILWAY UNION—At the recent convention at Brussells the Japanese delegates secured the privelege of participation and a union ticket service will be available from September when tickets will be issued at Shimbashi, Hiranuma, Kyoto, Osaka, Kobe, Nagasaki, Shimonoseki and Moji stations to all parts of Europe.

ROLLING STOCK FOR THE KIRIN—CHANGCHUN RAILWAY.—The *Peking News* announces that the Tongshan Railway Shops are constructing the following for this line: six 17 by 23 cylinder Mogul engines; six tenders; two shunting engines; one private car; four composite cars; six brake vans; six 30 ton covered goods vans; twenty 30-ton low side cars; twenty 30-ton high side cars. Also a number of various goods cars are under construction. The following have already been delivered:—One shunting engine; twenty 30-ton low side cars; one tender; six brake vans. The same paper also contains this telegram from Mukden, dated May 24:—One locomotive, one tender, ten 30-ton cars and brake vans have gone forward from here by the South Manchuria Railway to Changchun. The entire stock went away without a hitch.

SOUTH MANCHURIA RAILWAY INSURANCE.—Ten leading fire insurance companies have agreed to cover freight risks in the warehouses of the company at Yinkow, Mukden, Tiehling, Kaiyuan and Szupingchieh at an ordinary rate of one per cent to a maximum value of 8,000,000 yen and to the value of 5,890,000 yen covering goods on Dairen wharves.

KOREAN RAILWAYS.—It is expected that the line connecting Taichon and Kuasan, Korea, will be open for general traffic by April next year.

EUROPEAN CONNECTIONS WITH PEKING.—A proposed scheme is reported underway to construct a direct line of railway connecting Paris with Peking so that St. Petersburg would be but 7½ days journey from the Chinese capital, Berlin 9 days, and Paris, 9½ days. No definite information about this proposed project is at present available.

THE KOWLOON-CANTON RAILWAY.—The total receipts of the British section for April amounted to $12,162.50 Mex. of which the fares amount to $10,919.59 and the freight receipts were $1,243.59.

SIBERIAN RAILWAYS.—Single track railways in South Siberia and Altai province have been proposed by the Russian Minister of Communications. The South Siberia line will start from the southern frontier of Altai Railway and connect with Nicholaisk and other Siberian points.

JAPAN'S LIGHT RAILWAYS.—Since the light railway subsidy law came into operation in August says the *Japan Times*, the charters obtained up to the middle of March reach a total of forty-seven, the lines contemplated extending for 827 miles at a cost of 38,936,000 *yen*. During the six weeks ending April 30th the light railway companies which obtained charters numbered eleven, the lines under contemplation reaching 146 miles, and the cost of construction being estimated at 5,195,000 *yen*. Besides the above other companies awaiting charters number over fifty. Of the companies which have already received charters, those whose cost of construction are estimated at over 1,000,000 *yen* number fourteen. Among these is the Bando Light Railway, which has under consideration a scheme for building 59.23 miles between Hachoji and Omama at a cost of five million *yen*.

MANILA RAILWAY CO.—The survey of a proposed line to connect Baguio with the northern trunk line of this company at about 35 kilometers south of San Fernando has been completed and estimates prepared. The completion of this branch will give direct railway connections between Manila and the Philippine summer capital.

PHILIPPINE RAILWAY GUARANTEE OF INTEREST ON BONDS.—A bill is now before congress providing for an amendment to the requirement in the original authorization that the issue of guaranteed bonds would only be made on 20 miles of completed line, so that in amended form the issue will be authorized on six miles of line.

SHENSI-HONAN RAILWAY.—The earthwork for a distance of 26 miles from Luyang in Honan is reported completed and bridges and stations are being built along the route. The line will be 160 miles long when completed.

THE LARGEST LOCOMOTIVE.—Engineering News describes the engine that holds for the present the record as a Mallet engine of the 2-10-20-2 class for handling 2,000 ton freight trains on long and severe grades.

The total weight of the engine is about 616,000 lbs., with 550,000 lbs. on the driving wheels (55,000 lbs. per axle), while the loaded tender (on six-wheel trucks) increases the total weight to 850,000 lbs.

The boiler is made in two sections united by a rigid separable joint. Beyond the smokebox is a tubular section 9 ft. long forming the superheater; this is divided into two compartments, one for superheating the live steam, the other for reheating the high-pressure exhaust on its way to the low-pressure cylinders. The firebox is of the Jacobs-Shupert type, without staybolts. The firebox proper and outer shell are each composed of pressed-steel channels, bent to horseshoe shape and riveted together through the flanges; transverse stay-plates or diaphragms of horseshoe shape are fitted between the two sets of channels, and are perforated to permit of free circulation in the water legs and over the crown.

These engines are notable for the size of their tenders, which are mounted on six-wheel trucks and have a total weight of 234,000 lbs. (including water and oil fuel). They are practically identical with those of the 4-4-6-2 Mallet passenger engines.

Three of these huge engines have been built at the Topeka shops of the Atchison, Topeka & Santa Fe Ry. by combining pairs of the 2-10-2 engines which have been a characteristic type on this road for some years. An order for ten new engines has been given to the Baldwin Locomotive Works.

OPENING OF THE CHUO LINE.—An interesting ceremony at Nagoya featured the opening of this Japanese line connecting Hachioji and Nagoya, a distance of 224 miles representing an outlay of Yen 35,000,000 and fifteen years effort. According to the Kobe Herald there are 95 tunnels of a total length of 113,378 feet. The expenditure on the tunnels per foot is estimated to be -Y-91.25. The tunnel on Sasago Pass is 2 miles and 71 chains long; this is the longest tunnel in Japan. There are 350 bridges on the line, their total length being 24,265 feet, the cost per foot being -Y-170.68. The Torii tunnel is situated 3,189 feet above sea level, which is the highest point reached on any Japanese railway. There are 506 small bridges and 47 stations on the line. In short, the Chuo line traverses mountaneous and hilly country almost exclusively and in consequence the work of construction was very difficult.

THE ICHANG WANHSIEN RAILWAY—Referring to the progress made on this railway the *Peking News* states that there are 30,000 men employed; construction trains are working out of Ichang for several miles; one tunnel 1000 feet long has been pierced and another 6000 feet in length is under way. The earthwork is well up to Kweichow for a distance of 100 miles. At Ichang several hundred acres of land have been raised, numerous godowns, machine shops and station buildings erected, and a certain amount of bunding done at the wharves. The line runs inland from Ichang and comes out at the Yangtse river near Hsiang Ch'i, about 90 miles distant; it then follows the river for some 30 miles, when it will go inland again along a route which has not yet been finally determined upon. The country to be traversed is very mountainous, and it is estimated that the section to Wanhsien will take some 15 years to complete.

KIRIN—CHANCHUN RAILWAY—The estimated outlay for the current year is placed at yen 500,000 covering road and building construction and rolling stock. It is estimated that there will be a force of 50,000 coolies steadily employed during the year. A temporary mountain line is proposed over the Tumenling Pass to be used until the tunnel there is completed. Seventy per cent of the earthwork is reported completed and it is expected that the rails will be laid to Kirin by the end of the year. At present there are now in operation of the line 2-78- ten and 2-38 ton locomotives, 70 construction cars, 10-30 ton freight cars supplied from the Tongshan Shops.

SUPPLY OF RAILWAY MATERIAL.—Messrs. J. Reid and Co., Ld., England, have received and order for the supply of 500 cwts. of pig lead and 1,300 cwts. of white lead to the East Indian Railway.—The Anderson Foundry Company, Limited, have a large contract for the supply of 92,610 tie bars with cotters and keys to the same line.—The Vacuum Brake Company, Limited, London, have completed a large order for the supply of their vacuum brake fittings for rolling-stock to the Burma Railways.—Messrs. Glenfield and Kennedy, Kilmarnock, have supplied this line with five sets of washing—out apparatus for locomotive engines and Messrs. J. Blakeborough and Sons, Limited, seven 6-inch pillar water cranes for locomotives.—The Burma Railways have placed an order with the Metropolitan Amalgamated

PHILIPPINE MINING NEWS

THE PARACALE DISTRICT.—During the month there has been unusual interest aroused in the proposed consolidation of a number of valuable placer properties in this section and the progress of negotiations with a group of Melbourne capitalists in connection with the development of this consolidation.

Mr. A. Burlingame Johnson of Manila has taken an active part in this new mining project. He secured an option on the ground being worked by the Paracale Gold Dredging Co. under a long lease. This ground includes about 500 acres and the progress made in the development has long been unsatisfactory to the owners. We understand that some sacrifice was made by the owners in order that the lease might be purchased by the promotors of the consolidation. Mr. Johnson recently returned from Melbourne accompanied by a representative of Melbourne capitalists and an expert and an examination of the property is now being made. If the report is satisfactory active operations will begin at once. It is understood that negotiations are also under way to include the Paracale Extension and the Stanley Group in the consolidation. These properties have been very favorably reported on and the ley group has been to a large extent developed by New Zealand capital. The Stanley group has suffered from a serious fiasco. New Zealand capital undertook to instal a dredge under a working agreement with the owners. After the dredge was installed, the New Zealanders discovered that their agent had failed to secure the necessary signatures to the agreement and after unsuccessful attempts to adjust matters, advices from New Zealand are to the effect that the dredging company has gone into liquidation. There has been much criticism of those interested in the ground whose signatures were inadvertantly omitted from the contract and who refused to come to a reasonable understanding after the dredge had been installed. So far as we have been able to learn the equipment was adapted to the ground and the values were satisfactory. Altogether it was a very unfortunate outcome and injured the reputation of owners of ground in Paracale abroad where the complete details of the history of the Stanley were unknown.

Upon the result of present negotiations with Melbourne capital rests the immediate future of the industry in Paracale and so far as all expert report in available the properties being considered are very desirable.

R. C. and W. Company, Birmigham, for the supply of the underframes and other iron-work required for the construction of 219 metre-gauge covered goods wagons.—Messrs. Stableford and Company Limited, Coalville, rolling-stock manufacterers, have executed a large order from the Burma Railways for the supply of duplicate or spare parts for carriages and wagons —Contracts for the supply of 2,000 steel tyres for metre gauge carriage and wagon wheel had been given to Messrs. Steel, Peech and Tozer, Limited, and to Messrs. Cammel, Laird and Company, Limited, London and Sheffield.—Messrs. Pintsch's Patent Lighting Company, Limited, have completed two large orders for the supply of incandescent gaslight fittings for rolling-stock to the Bengal-Nagpur Railway. —Messrs. John Spencer and Sons, Westminster and Newcastle-on-Tyne, have supplied this railway with 2,150 volute and 948 spiral springs for rolling-stock. The Electric Construction Company, Limited, have an order from this line for the supply of electric meter field frames and Messrs. Grice and Son, Limited, for locomotive brass boiler tubes.—The Bengal Coal Company has obtained the contract for the Ceylon railways for 90,000 tons.—The East Indian Railway Company are obtaining from England thirty complete locomotive engine tenders, six-wheeled type with a water capacity of 3,500 gallons each and 140 cwts. of coal. *Railways and Shipping.*

The Philippine Dredge on the Malaguit is maintaining its usual output of over 200 ounces a month and all in all has averaged 50 ounces per week during the last four months. We understand that American capitalists are negotiating for this property and that Australian capital is making inquiries.

The Paracale Consolidated is also negotiating with Australian capital and we were informed recently that everything appears favorable for early activity under an option agreement.

MINDANAO PLACERS.—Messrs. Cole and Hanlon have been testing properties in Northern Mindanao and are expected to return to Manila in a few days. An unconfirmed report is that the owners received a telegram from them to the effect that the values found were satisfactory.

SURVEY OF BENGUET DISTRICT.—Paul E. Fanning, mining engineer of the Division of Mines is making a geological survey of this region.

THE GOLD DEPOSITS OF THE PHILIPPINES.—Mr. H. G. Ferguson of the Division of Mines is the author of an interesting pamphlet covering the history of the industry in the islands in very desirable form.

THE BATAN COAL MINES.—Reports from the mines are to the effect that the new coal bunkers there are nearing completion and the output is increasing.

BENGUET MINERS ASSOCIATION—At a recent meeting it was decided to request the government for the appointment of a warden for that district.

FAR EASTERN ENGINEERING, CONSTRUCTION, FINANCIAL AND COMMERCIAL NEWS

ELECTRIC RAILWAYS, LIGHT POWER, TELEGRAPHS, TELEPHONES, AEROPLANES, ETC.

AEROPLANES FOR CHINA —H. E. Yin Chang, Minister of War has ordered several aeroplanes for the purpose of developing a detachment from the Imperial Bodyguard.

THE SHANGHAI MUTUAL TELEPHONE CO., LTD.—The total available for distribution among the shareholders for the year ended March 31, 1911, was Tls. 89.979.55 disposed of as follows:

To	Shareholders Four Taels per share, 14,540 shares............	58,160.00
,,	Shareholders. Bonus, One Tael per share...........	14,540.00
,,	Directors' Fees.....................	2,400.00
,,	A fund for equalization of dividends...........	10,000.00
,.	Carry forward to next year's account.............................	4,879.55

OVERLAND WIRELESS IN INDIA.—It is announced that wireless experts are undertaking an investigation of conditions in India with a view to installing a gigantic system of overland wireless in India designed to connect all the units of army in India. When completed it will be under the control of the Military authorities, and will operate over an area of 2,000 square miles.

F. M. S. POSTS AND TELEGRAPHS.—The report for the year 1910 shows a total of units carried of 18,328,218 an increase of over 2,000,000; 329,365 telegrams were dispatched and 441,759 received showing increases of 65,930 and 174,615 respectively.

At the end of the year there were 1,556 miles of telegraph and telephone line under the department and 5,135 miles of wire in all in the Federated Malay States of which 3,117 were telephone. This includes 965 miles of telephone wire used by the police but does not include the lines of the railways. The department also operates 242 miles of telegraph line in Johore.

The revenue from all sonrces for the year amounted to $836,364 an increase of $279,676 over the previous year and the expenditure was $629,950.

THE SHANGHAI ELECTRIC CONSTRUCTION CO.—The result of the operation of the Shanghai electric tramways show a profit of £. 7,584 as for the year ended December 31, 1910 compared with a loss of £. 949 for the previous year. The average fare per passenger for 1909 was ¾d, and for 1910 ⅔d.

Total expenses work out at 4.54d. against 4.31d. and the working profit £10,544, or 1.26d. per car mile, against £4,176, or .50d. per car mile. The expense ratio for 1910, which has lately been further reduced, is 78.2 per cent. against 89.48 per cent. The car miles run amount to 996,368 against 1,979,001, and passengers carried amount to 18,715,215 against 11,772,715. In working out these figures we have compared the 12 months to December 31, 1910, with the figures for the same period in 1909. While the car mileage has been stationary, number of passengers has increased over 50 per cent, but this is mainly due to shorter fare sections and low fares. Each ticket for however short a distance is counted as a passenger.

PEAK TRAMWAYS CO., LTD.—This company declared a dividend of 8% and carried forward $1,833 to next account for the year 1910. The management has arranged to add six extra cars on week days and an addition of six cars sundays to relieve the congestion at certain hours of the day and to popularize the Peak in the evening.

TELEFUNKEN WIRELESS FOR DAVAO.—The Insular Government upon the recommendation of the wireless board has purchased Telefunken equipment for the establishment of a station at the port of Davao. The purchase was made through Messrs. Germann & Co., of Manila.

CULTIVATION AIDED BY ELECTRICITY IN KOREA.—The Ginseng Monopoly Bureau has been experimenting at the Kaisong station in this line of endeavor by utilizing the electrotropism of the plant.

The current passed through the stem by means of wires supported by the covering frames over the fields twice a day, that is, at 2 a. m. and 2 p. m. If the method proves successful, it is expected, the crop will increase by ten per cent. in value.

MANILA ELECTRIC EXTENSION. The extension of the line on Taft Ave. is progressing. When completed it will connect Bagumbayan near the City Hall with Vita Cruz in the southern limits of the city and prove a boon to the residents of a large section included in South Manila. Cars are already running on a portion of Taft Avenue South from Nozaleda.

GENERAL ELECTRIC COMPANY.—The report of the General Electric Company for 1910, just issued, shows a profit for the year of $10,855,692. Cash dividends paid were $5,214,368, and the surplus on Dec. 31, was $23,022,705.

Sales in 1910 amounted to $71,478,558, the largest for any year since the organization of the company. The orders received, $71,182,391, exceeded those received in the year ended Jan. 31, 1907, the largest previous year, by nearly 18 per cent., and were 105 per

cent. greater than for the year ended Jan. 31, 1905. The total number of orders and contracts received during the year was 338,272, also a record. Unfilled orders at the end of the year amounted to $15,500,000.

"The outlook for the future is promising," the report says. "The business of lighting and power companies is growing rapidly; electric railway companies are improving their service and extending their lines in keeping with the increasing population. Steam railway companies are electrifying their shops, terminals, and branch lines. The use of motors and other electrical appliances for industrial purposes is extending as their utility and value are more thoroughly understood and demonstrated."

The 5 per cent. debenture bonds of the General Electric Company are convertible into stock at par on and after June 1, 1911, and a circular has just been issued instructing holders desiring to convert bonds into stock to collect the coupon due on June 1 in the usual way and to send the bonds themselves to the Farmers Loan and Trust Company or the American Trust Company, Boston.

The General Electric Company does a large business in the Far East and is allied with a Japanese Company.

JAPAN'S ELECTRIC RAILWAY ASSOCIATION.—The Empire Electric Railway Association, the joint organization of the electric railway companies throughout the country, held its semi-annual general meeting recently. Mr. Nakashoji, Vice-Minister of Communications. Mr. Hirai, Vice-President of the Railway Board. Mr. Nakatani, Director of the Electric Bureau, and several other high officials of the railway board were present.

EASTERN EXTENSION TELEGRAPH.—The directors of the Eastern Extension Australasia and China Telegraph Company report, for the half-year ended Dec. 31, 1910, that the gross receipts, as shown in the revenue account, amounted during the period to £336,976, against £315,034 for the corresponding half-year of 1909. The working expenses, including £22,607 for maintenance of cables, absorb £154,300, against £143,674 for the corresponding period of 1909, leaving a balance of £182,675. From this is deducted £2,355 for income-tax payable in England, £417 for extraordinary expenses as shown in the revenue account, and £15,084 for interest on debenture stock, leaving as the net profit for the half year £164,854. After adding £72,763 brought forward from the previous half-year, there is an available balance of £237,617. One quarterly interim dividend of 1¼ per cent, has been paid for the half-year, and it is now proposed to distribute another of like amount on thei 7th inst., making, with the interim dividends paid for the first half-year a total dividend of 5 per cent. It is also proposed to pay a bonus of 4s. per share, or 2 per cent., making a total distribution of 7 per cent. for the year 1910. The sum of £75,000 has been transferred to the general reserve fund and the balance of £27,617 carried forward. An agreement has been entered into by the Imperial Chinese Government with the Eastern Extension and Great Northern Telegraph Companies for an advance to the Board of Communications of £500,000, at 5 per cent. interest, on account of the moneys payable by the companies to the Imperial Chinese Telegraph Administration under their existing agreements. The advance has been obtained to enable the Board of Communications to reorganise, improve, and develop the telegraph and telephone services throughout the Chinese Empire. The wireless telegraph installation referred to at the last general meeting as then being in course of erection at the company's Keeling-Cocos station, to enable telegrams to be exchanged between passing ships and that remote place, was opened for public service on March 2, last. The negotiation with the British Government for extending the wireless service to the company's Singapore, Hong Kong, and other stat ons are still proceeding.

EASTERN TELEGRAPH COMPANY.—The report of the directors for the half-year ended Dec. 31, 1910, states that the revenue for the period amounted to £670,147 15s. 5d., from which are deducted £219,231 0s. 9d. for the ordinary expenses, and £45 558 10s. 7d. for expenditure relating to maintenance of cables. sundry differences in exchange, and income tax payable abroad, leaving a balance of £405,358 4s. 1d., to which is added £59,590 7s. 1d. brought from the preceeding account, making a total available balance of £464,948 11s. 2d. After providing for income tax payable in England, interest on mortgage debenture stock, and dividends on the preference stock, which in all absorb £81,186 1s 4d , there remains a balance of £383,762 9s. 10d., out of which the directors have placed £180,000 to the general reserve fund, and have paid an interim dividend of 1¼ per cent. on the ordinary stock, amounting to £50,000. The directors now recommend the declaration of a final dividend on the ordinary stock of 1¼ per cent. and a bonus of 2 per cent., amounting together to £130,000, both payable on May 17, free of income tax, and making, with the three previous payments on account, a total distribution of 7 per cent. for year ended Dec. 31, 1910. It is proposed to carry forward the balance of £23,762 9s. 10d. to next account.

SINGAPORE ELECTRIC TRAMWAYS.—The report for the year ending Dec. 31, 1910, and the accounts show an excess of revenue over expenditure of £31,013, after charging debenture interest, depreciation, and royalty, being £1,843. Compared with the year 1909, tramway revenue shows an increase of £3,-622; there were an increase of 268,332 passengers carried and 14,502 car miles run.

GREAT NORTHERN TELEGRAPH COMPANY.—Report for 1910 shows an increase in net revenue of £23,400 and dividend 18 per cent.

WESTERN ELECTRIC CO.—The last report of the directors cover 13 months instead of the previous one, the end of the year being advanced from November 30 to December 31, as follows:

The sales of the Company for the 13 months ending December 31, 1910, were $68,375,150, as compared with $45,575,138 for the previous year of 12 months, an increase of 38 5% per annum. This increase has been well distributed over the different lines of merchandise and among the various classes of customers.

There have been no such increases in prices during the year as might have been justified by the increased cost of labor and material.

It is our policy to look for increased gross profits in the direction of reduced manufacturing costs and expenses rather than by increases in the selling prices.

For 13 months ending December 31, 1910, the number of orders received in America was 896,000 as compared with 695.000 for 12 months of 1909, an increase of 19% and the value of an order for 1910 was $72.00 as compared with $62.00 for 1909.

During the year the work of concentrating at the Hawthorne plant the manufacturing work formerly carried on at the New York City and Clinton Street, Chicago, Plants has been continued. Additional buildings authorized during 1909 and 1910 and now in use aggregate 235,000 square feet of floor space. The manufacturing plants have been worked to their full capacity during the year. For 1911 additions at Hawthorne have been authorized amounting to about $1,000,000 to provide for further concentration and additional facilities for the business. The condition of the Plant is fully up to the high standard which the Company has maintained in the past.

During the year the Company sold its Clinton Street and Polk Street properties for $3,247,204.09. These properties were carried on the books at $2,759,971.14. The profit $487,232.95 has been carried to Reserves. Pending the erection of buildings now under way at Hawthorne the south half of the Clinton Street property has been rented for a period of 2 years to January 1, 1913.

On January 1, 1911, the number of employees was 23,464 as compared with 17,835 at December 1, 1909.

In 1906 the Board of Directors established a Pension Fund for the benefit of employees retired after 20 or more years of service. There are now 45 ex-employees on the roll and the average pension paid is $713 64 per annum.

The total current assets, including sundry investments, less all liabilities except First Mortage 5% Bonds were at January 1, 1911, $42,659,123, which is more than two and four-fifths times the total bond issue authorized and outstanding of $15,000,000.

To take advantage of the favorable bond market it was deemed wise to sell $6,250,000 First Mortage 5% Bonds held as security for the 5,000,000 2 year 4½% collateral trust notes issued January 1, 1910. The proceeds from these bonds were used to take up these notes on January 1, 1911, and to provide for the future needs of the Company.

PUBLIC WORKS, DOCKS, WHARVES, BUILDINGS ETC.

PHILIPPINE BUREAU OF PUBLIC WORKS.—The expenditure for the fiscal year 1910-11 is estimated at ₱8,800,000 and the total expended during the first half ended December 31, 1910, was ₱4,134,867,12 while on that date there were 88 contracts entered into involving a total expenditure of ₱3,000,000. Road and bridge funds disbursed during the six months amounted to ₱1,890,420 and 129.1 kilometers of first class road completed. The total of roads under maintenance measure 2501 kilometers, an increase of 587 kilometers over the previous term. Of this length 1451 kilometers are under isolated caminero maintenance.

Plans have been prepared for 61 bridges and culverts, for which the total estimated cost is ₱1,553,600, and construction was begun on 22 important structures which will cost, approximately, ₱369,000.00.

Construction has been authorized on 97 barrio school buildings scattered throughout all parts of the archipelago, the estimated cost of which is ₱679,009.

The Consulting Architect has completed plans for 17 buildings in the City of Manila and 22 buildings in the various provinces, for which the total estimated cost is ₱7,540,-900.

The Division of Building Maintenance has expended ₱287,971.16, and has available for expenditure a balance of ₱243,556.57. The Department has under construction 13 important repair and construction jobs.

The San Miguel, Tarlac, irrigation project is the only one under construction at the present. It is hoped that this project will be completed not later than August, 1911.

Plans for the Los Baños project are nearing completion, and it is anticipated that construction upon this will begin in the near future, also on repairs to the existing works on the Friar Lands Estates and construction on the Binday Bridge project.

The important projects under investigation upon which it is hoped to begin work within a reasonable length of time are:

(1) The Ambalangan-Dalin System; (2) Dingras Project-Ilocos Norte; (3) Orion Project Bataan; (4) Polillo Project-Rizal; (5) Santa Barbara Project-Iloilo; (6) San Miguel-Leon Cordova Project-Iloilo.

All of these projects are awaiting contracts with the owners of the land involved and completion of plans and specifications. Reports have been rendered upon 30 irrigation, water supply, and river control projects during the half year closed. These reports cover 43,460 hectares. The most important general survey under way is that covering the flat land north of Manila Bay known as the Pampanga River project. The surveys to date

cover about 20,000 hectares of this project. There are now in existence about 50 river gaging stations and data are available covering 30 rivers and streams for a period of one year. The total funds made available for the Irrigation Division by various Acts are ₱2 346-775. The total amount allotted to December 31st is ₱1.891,110.14; balance unallotted ₱455,664.86. The expenditures for the first six months exclusive of general expense charges were ₱290,663.28. The balance cash on hand on December 31st was ₱1,489,193.84.

This Department has operated 7 Deep Well Rigs and 7 Jet Rigs; 13 Deep Wells have been completed of which 9 were successful. The average depth of these wells is 883 feet and the average cost ₱4.70 per foot.

40 Jet Wells have been completed of which 25 were successful. The average depth of these wells is 155 feet and the average cost ₱3.46 per foot.

We now have official records of 566 completed wells, as follows:

Drilled by Bureau	248
Drilled by Provinces	289
Drilled by Military	29
Total	566

In addition to this it is believed that 34 will be a conservative estimate of wells completed of which we have no record, making the grand total in the Islands at the present time, approximately, 600.

SPECIAL PROJECTS.—Damages to the Benguet Road from floods and typhoons during the first six months of the fiscal year amounted to about ₱40,000, being much less than the preceding season.

Approximately 10 kilometers of road were resurfaced, many narrow places widened, and some of the dangerous short turns have been straightened.

The total estimated expenditure on this road for the fiscal year for maintenance and for permanent improvements, including two suspension bridges is, approximately, ₱192,-000 as compared with ₱358,585.82 spent the preceding fiscal year.

CITY OF BAGUIO.—The new City Hall was constructed at a cost of, approximately, ₱40,000. A new dormitory and 23 additional cottages were under construction and ready for occupancy by the time the season opened. The estimated cost of these buildings is ₱160,000.

The new city water supply system is installed and giving satisfaction. Approximately ₱140,000 have been expended in maintenance and construction of roads and bridges within the city limits.

GOVERNMENT MATADERO AT MARIVELES—The Philippine Government is considering plans for the establishment of an isolated matadero near Mariveles for the reception and slaughter of imported cattle. The difficulty experienced in protecting the islands from cattle disease and at the same time make fresh meat available at reasonable prices has been a serious problem and it is expected that present plans will meet the situation.

TOKYO WATER SUPPLY—Negotiations are under way between the Tokyo Council and the Yamanashi prefecture authorities to secure a large tract of forest land for the purpose of protecting the sources of the Tama river from which Tokyo secures its supply of water. Otherwise it will be necessary to create a reserve forest for this purpose.

NEW CEBU CUSTOM HOUSE—The three story building under construction will be formarly opened July 4. The construction is of reinforced concrete and cost approximately ₱200,000.

TOKYO SEWER SYSTEM—Work will soon commence on this extensive system which when completed will cost over 33,000,000 yen in the Asakusa, Kanda and Shitaya district. The work in these districts alone will cost about 6,000,000 yen and is expected completed in 1915. The other sections will be started as soon as feasible.

ANTI-MALARIAL WORKS IN THE F. M. S. —The Public Works department spent approximately $46,000 in anti-Malarial works particularly in drainage of swamps and ponds.

F. M. S. ROADS—The Director of Public Works recognizes the necessity of providing for the increased speed and weight of vehicles in the construction and maintenance of roads. The width of metalled road is being increased from 12 feet to 15 feet and a maximum of 18 feet, and bridges are being built to meet the increased weights and speed of motors and motor trucks.

THE WHANGPOO CONSERVANCY.—The report for the quarter ended Mrach 31 shows a total expenditure of Tls. 164,231.35 and a balance available carried forward of Tls. 104,911.

HONGKONG'S NEW THEATER.—The Victoria Theater with a seating capacity of 800 was opened May 26. This building is so arranged that an unobstructed view of the stage is provided from every seat; the lighting system is extensive and throughout the appointments are adapted to comfort and convenience of theatergoers.

CHINNAMPO WATERWORKS.—Work on the projected waterworks which will cost 420,000 yen began early this month.

MACAO HARBOR WORKS.—Messrs. Macdonald & Co. of Hongkong have secured the contract for the dredging of the Channel 40 meters wide and 12 feet deep in the harbor and to cost $160,000.

SHIPBUILDING, MERCHANT MARINE AND FISHERIES

TRANSFER OF THE S. S. AMERICAN MARU. —The Osaka Shosen Kaisha has purchased this steamer from the Toyo Kisen Kaisha for the Kobe—Formosan service. The American Maru is of 11,000 tons displacement and was built at Newcastle-on-Tyne thirteen years ago. It is understood that the Toyo Kishen Kaisha had placed an order with the Mitsuibishi yards at Nagasaki for a vessel to take the place of the American Maru which will be ready by August this year.

STEAM TRAWELER FOR HONGKONG.—The steam trawler *Hoi Fung*, 195 tons gross register, built in England for the Hongkong and South China Steam Fisheries Co., Ltd., sailed on April 28th for Hongkong. She is expected to call at Gibraltar, Port Said, Colombo and Singapore, on the voyage out this month.

JAPANESE PURCHASE FOREIGN STEAMERS. —The steamer Bucenta 3593 tons gross, of the Bucknall line and the Liverpool steamer Ching Wo, 3883 tons gross, have been purchased in England for delivery in the Orient.

STEAM TRAWELERS FOR JAPAN.—According to the *Japan Times* there are now 38 steam trawlers in operation off the coast of Japan. Ten trawlers are being built at the Osaka Iron Works and five at other yards and the Oriental Whaling Company has decided to purchase five at a cost of 3000,000 yen. With others to be built or purchased abroad. It is believed that the number of trawlers owned in Japan will rise to eighty next year. It is only three years ago that the first was imported.

JAPANESE NAVAL CONSTRUCTION.—The Mitsu Bishi Shipbuilding Yard at Nagasaki is about to engage two thousand workmen in connection with the construction aof 27,000-ton cruiser for the Japanese Navy. The keei of the cruiser will be laid early in 1912, and the vessel is expected to be ready for launching in the Spring of 1915.

SALE OF THE WRECKED ASIA.—The wreck of the P. M. S. Asia, as she lies on Heachu Island, Taichu Group, was sold by auction at the offices of Messrs. Hopkins, Dunn and Co., Shanghai, last month. There was a large attendance of prospective buyers from the Coast ports, Wenchow, Ningpo, Foochow, etc., and competition was keen, bidding starting at Tls. 1,000 and reaching Tls. 8,200 before the vessel was knocked down to a Chinese buyer from Foochow. For the cargo, Tls 2,800 was realized.

STEAMER TO BE LENGTHENED AT HONGKONG DOCK.—The Hongkong & Whampao Dock Co., Limited, has secured the contract for the lengthening of the S.S Luis Rafael Yangco owned by the Yangco interests of Manila.

JAPANESE NAVAL CONSTRUCTION.—The torpedo-boat destroyer *Yamakaze*, which has been building at the Mitsubishi Dockyards had her trial trip this month. Tests of separate parts of the ship will be held in July when she will go to Sasebo for her armament. The *Yamakaze*, together with the *Umikaze*, will be attached to the Yokosuka Naval station. The *Umikaze*, which is now under construction at the Maizuru docks, is reported to have proved quite satisfactory after a series of trials. On one trial run, she developed a speed of over 33 knots.

MITSUI BUSSAN KAISHA FLEET.—The first of four steamers ordered by the Mitsui Russan Kaisha for work in connection with the Miike collieries, the *Kinkasan-naru*, was launched by Sir Baylton, Dixon & Co., last month. The vessel is of the cantileverframed type, and is 393 ft. 6 m. long by 58 ft. 7 in. broad and 29 ft. 7½ in. deep. She has a deadweight carrying capacity of about 8,200 tons. Engines with cylinders 26 in., 42 in. and 70 in. in diameter, by 48 in. stroke, are to be fitted by Messrs. Blair & Co., Limited.

MINES, MINERALS AND THE METAL TRADE, MACHINERY, ETC.

F. M. S. MINING.—According to the report of the Senior Warden, Mr. W. Eye Kenny-the total yield of tin for the year 1910, amounted to 736,898 piculs compared with 818,887 for 1909, a decrease of 81,989 piculs. The price of tin averaged $77.51 for the year and $87.20 at the close of the year. The output of gold was 16,769 ounces valued at $574,686.

THE KUANTAN TIN MINING CO.—At an extraordinary meeting this company decided to wind up its business, the report for the year showing a dropping off in net profit from $6,787.76 to $3,000 and there being every evidence that the tin bearing ground under lease was exhausted. This company has paid dividends amounting to 125% and on winding up voluntarily there should be a dividend of 35% additional.

RAUB OUTPUT.—The output of gold for the four weeks ended May 24 amounted to 697 ounces.

AMERICAN OIL MACHINERY FOR BURMA. —Two hundred tons of American oil boring machinery has been purchased in America by the Burma Oil Co. of Rangoon. Among the consignment are 100 carloads of iron pipe and 100 tons of wire rope, fifty ordinary boilers, and thirty-five engines, etc. This purchase was made after an investigation of the machinery and methods employed by the California oil companies.

ORSK GOLD MINING CO.—This company has taken over a group of claims privately worked by Russians and during the last 3 years have paid expenses of testing the property with the gold taken out during the work. During the Summer of 1909-10 the company

operated a steam excavator plant built by the New York Engineering Co., with a capacity of 1000 yds. per day. A barge washing and screening plant has been added to wash the gravel dug by the excavator and marks another innovation in placer mining.

Duff Development.—The gold dredging return (two dredgers only) for the week ending April 29 amounted to 106 ozs., making a total of 1,101 ozs. since Jan. 1, 1911, against 1,380 ozs., for the corresponding period of last year.

Malayan Tin Dredging.—The prospectus of a company to work by bucket dredging is about to be issued. The capital to be offered is 80,000 shares of £1. Mr. H. D. Griffiths, general manager, Tronoh, has reported on the scheme.

Pekin Syndicate.—The total output for the first four months of the year amounts to 171,400 tons, showing an increase of 73,175 tons, while the sales and consumption together equal 183,300 tons, an increase of 46,300 tons, or 33·79 per cent.

Dutch Oil.—At the extraordinary general meeting of the Koninklyke Petroleum Maatschappy the proposal to increase the capital from fl500,000 to fl100,000,000 was carried unanimously and without discussion, so that in future the capital will be divided into 1,500 preference shares, 28,500 4½ per cent priority shares, and 70,000 ordinary shares each of fl1,000. The director, Mr. Deterding, replied to a question of one of the shareholders that it was the intention to extend the connections with the United States as much as possible. The branch offices of the company are doing a good busines, and have sold already in 1911 60,000 tons benzine at a price 50 per cent higher than could be obtained in Europe.

Tronoh Mines Improvement.—Last year showed a very substantial increase in the quantity of tin ore sold, but the price realized was, owing to the higher price ruling for the metal, largely in excess of the average for 1909. It appears that during 1910 2,945 tons of tin ore were sold, as contrasted with 2,158 tons during 1909, and the amount realized was £266,478, being an average of £92.18 per ton of ore as against £80·48 for 1909. From one section of the eastern lead, in ground outside the main lead, which has been thoroughly tested the general manager estimates a profit of over £130.000. After payment of dividends, amounting altogether to 7s. per share the available balance of profit was £32,902. The directors have decided to write off property account £12,919, carrying forward to this year the balance of £20,983.

The Siberian Syndicate Ltd.—At the annual meeting of this company special reference was made t› an expert report on the Atbasar Copper Fields in which the syndicate has large interests, to the effect that the prospecting developed about 20,000 tons of 12% copper ore.

The Amur Gold Industry.—Reviewing the situa·ion the *Mining Journal* says:
The area of the 560 gold placers in this eastern part of Siberia makes about 158,000 acres, of which 208 placers, occupying 58,000 acres, are being worked now. The total quautity of gold sand washed is 310,000 tons, and the result in pure gold was 159,229 ozs. with an average content of about half-an-ounce per ton of sand. In the neighbouring province of Yakutsk seventeen placers are being worked, and 300 tons of auriferous sand washed, yielding 44 000 ozs., average content 146 ozs. per to› of sand. The production in the Amur province has been registered since 1868 by the Government, and from the year up till November 1, 1910, the total production according to official sources has been about 7,000,000 ozs. This figure cannot be called exact for much of the gold escapes registration amounting to no less than 70 to 90 per cent. of the annual quantity officially declared. Of recent years small gold industries have grown up on the ground, which, with the introduction of the free circulation of gold on March 1, 1902, have grown considerably. Last year gold poaching was particularly rife, as many as 1,5000 thieves having appeared on the River Pimpon on the Upper Amur Gold Company's placers, and removed about 35,000 ozs. of gold from the sands, and these robbers were only shifted with the assistance of a posse of soldiers from Blagoveshchensk.

Siamese Secret of Bronze Casting in Siam.—Vice Consul General Carl C. Hansen of Bangkok gives the following formula discovered by Major Cerini in an old Siamese manuscript belonging to the late King as translated by that officer with his comment:

"Take 22 ticals (1 tical equal to one-half ounce avoirdupois) weight of pure tin, melt it at a slow fire, avoiding bringing it to red heat. Pour 2 ticals' weight of quicksilver, stir until the latter has become thoroughly absorbed and amalgamated; then cast the mixure in a mold, forming it into a bar. Take one catty in weight (80 ticals) of refined copper and melt it. Then gradually incorporate with it the amalgam, keeping in the meantime the fused mass well stirred.

"When this has been done, throw into the crucible a sufficient quantity of ashes obtained from the stem of the bua-bok (terrestrial rotus) creeper, so as to cover the molten metal. Remove the dross with an iron ladle;

FINANCIAL, COMMERCIAL AND MISCELLANEOUS.

Hawaiian Sugar Crop.—The report of one sugar company estimates its crop for 1911 at 50,000 tons as against 56,865 in 1910. In 1910 dividends amounting to $1,600,000 were declared and $661,000 carried to surplus account by this company.

Philippine Soap Co.—A company has been organized in Manila with a capital of ₱100,000 for the purpose of manufacturing all kinds of soap. Thomas J. Wolff is president, L. F. Goodale, secretary, and J. Williamson, treasurer.

Changchun Branch of the Hongkong & Shanghai Bank.—The bank has decided to establish a branch at Changchun, the terminal of the Changchun-Kirin Railway.

The Netherlands Trading Co.—This company has declared a dividend of 9%.

The Ta-Ching Bank.—At a General meeting of this institution the report submitted places the profits for the year of its forty agencies at Tls. 1,489,716 of which 487,716 is carried forward to surplus account, Tls. 200,300 to legal reserve; Tls. 80,120 is set aside for office expenses; Tls. 160,240 paid as bonus to employees; small percentages were paid as "rice money" to the Board of Finance; a 6% bonus to the officials and 1½% to the clerks, leaving a balance of Tls. 560,840 to be paid the shareholders as final dividend making a total for the year of 13%.

The University of the Philippines — The entrance examinations were held the latter part of May and registration in following departments were announced as follows: College of Liberal Arts, College of Medicine and Survery, College of Veterinary Science, College of Engineering, School of Fine Arts and Course in Pharmacy, June 1-3; the College of Agriculture to open June 12 and the College of Law, July 3.

The Higlands and Lowlands Rubber Co.—This company has paid a final dividend of 20% making 50% for the year.

Sugar Central in Negros.—Iloilo and Honolulu capitalists are interested in the establishment of a sugar central in San Carlos, Negros, that will represent an investment of ₱2,000,000.

Philippine Hemp.—The 1911 crop is estimated will reach 1,400,000 bales as against 1,340,000 in 1910 and 1,280,000 in 1909.

A. S. Watson & Co.—A. S. Watson and Co., propose to pay a dividend of 3 per cent. for 1910, to write off 25,000 and to carry forward $56,129. The net profits, for the year totalled $33.

The China Mutual Life Insurance Co. The report for the year shows a total of revenue from interest and dividends of Tls. 447,359·73 an increase of Tls. 71,991.21. The insurance fund amounted to Tls. 7,140,037, an increase of Tls. 977,428 A total of Tls. 971,563 was paid to policy holders during the year for claims, matured endowments, bonuses surrenders and annuities. The insurance fund as it now stands represents Tls. 240 for every Tls. 1,000 of insurance in force.

The Shanghai Life.—Business accepted and policies issued for the year amounted to Tls. 3,844,517 an increase of 15% and the total insurance force is Tls. 8,456,986. Revenue from premiums amounted to Tls. 761,216 and from interest, etc., Tls. 76,113 an incease of 34% and the total assets amount to Tls. 1,157,649 an increase of 40% The insurance fund reached Tls. 1,038,835 an increase of 44%.

The Cathay Trust.—The first annual report of the Directors of the Cathay Trust Lt. states that the profit amounts to Tls. 839,703.76. This it is proposed to appropriate as follows:—Directors' fees Tls. 7 000; Auditors' fees Tls. 1,500; writing off preliminary expenses Tls. 6,022.83; to pay a dividend of six per cent on the preference shares equivalent to Tls. 0.45 per share, Tls. 135.000; to pay a dividend of ten per cent and a bonus of fifty per cent on the ordinary shares, equivalent to Tls. 0.50 per share, Tls. 150,000; to place to equalization of dividends account Tls. 400,000; and to carry forward to next year the balance amounting to Tls. 140,130.93.

LONDON METAL MARKET

MAY 15, 1911.

	£	s.	d.		£	s.	d.
COPPER.							
Tough cake and ingot	57	0	0	..	57	10	0
Best selected	57	10	0	..	58	0	0
Electr olytic	57	10	0	..	58	0	0
Sheets and sheathing	69	0	0	..	—		
Flat bottoms	72	0	0	..	—		
STANDARD †Cash	53	3	9	..	—		
STANDARD †Three months	54	0	0	..	—		
Copper tubes, seamless per lb.	0	0	8¼	..	—		
Lake	58	10	0	..	59	0	0
* Less 3⅓ per cent. † Net.							
ALLOYS.							
Brass: Wire	0	0	6⅜	..	—		
,, Tubes (solid drawn)	0	0	6⅜	..	—		
,, Sheets	0	0	6⅞	..	—		
TIN.							
English ingots, f. o. b.	195	0	0	..	196	0	0
,, bars	196	0	0	..	197	0	0
,, refined	197	0	0	..	198	0	0
Straits... Cash	196	10	0	..	—		
Straits... Three months	189	5	0	..	—		
Australian spot	—			..	—		
Banka (in Holland) Cash	196	5	0	..	—		
Banka (in Holland) Three months	—			..	—		
LEAD.							
Spanish or soft foreign	12	18	9	..	13	0	0
English pig, common	13	1	3	..	13	3	9
,, L. B	13	10	6	..	—		
,, sheet and bar lead	14	12	6	..	—		
,, pipe	15	2	6	..	—		
,, red	15	12	6	..	—		
,, white	18	15	0	..	—		
,, patent shot	16	0	0	..	—		
SPELTER.							
Silesian ordinary brands	24	5	0	..	24	7	6
,, special brands	24	10	0	..	24	12	6
Sheet zinc	28	10	0	..	—		
ANTIMONY.							
Antimony	33	0	0	..	34	0	0
,, Crude	—			..	—		
,, Ore (basis 50%)	—			..	—		
QUICKSILVER.							
Flasks 75 lbs. warrants	9	0	0	..	—		
ALUMINIUM.	Per ton.				Per ton.		
98-99 per cent	62	0	0	..	65	0	0
NICKEL.	Per ton.				Per ton.		
98-99 per cent. guaranteed	167	10	0	..	171	0	0

PLATINUM.

Per oz. Troy, 166s. 6d.; nominal and subject to negotiation.

* Mining Journal.

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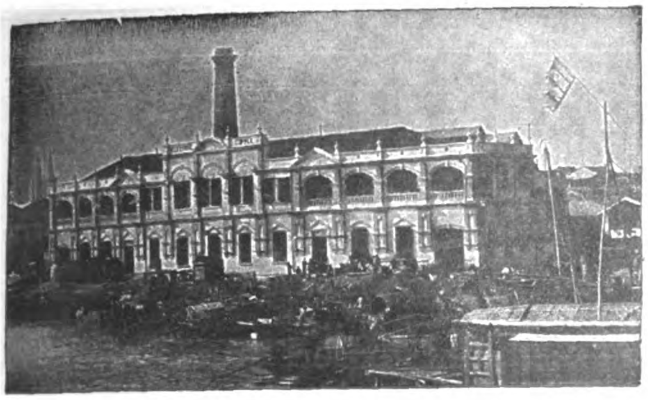

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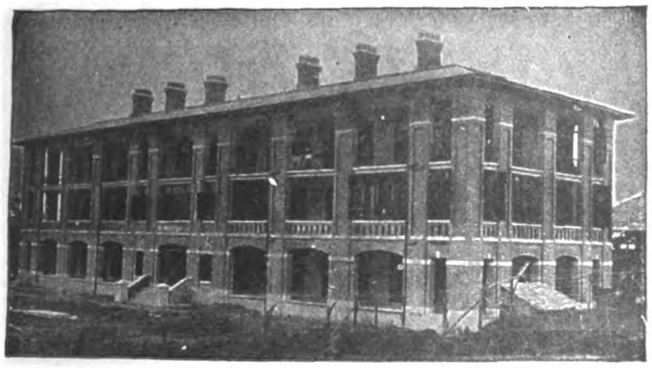

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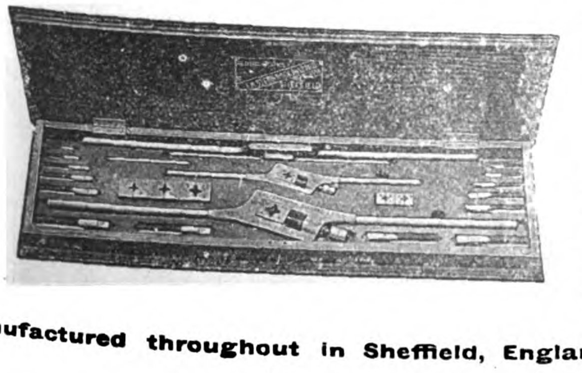

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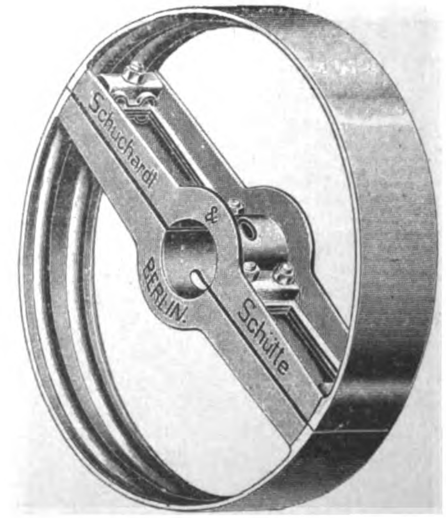

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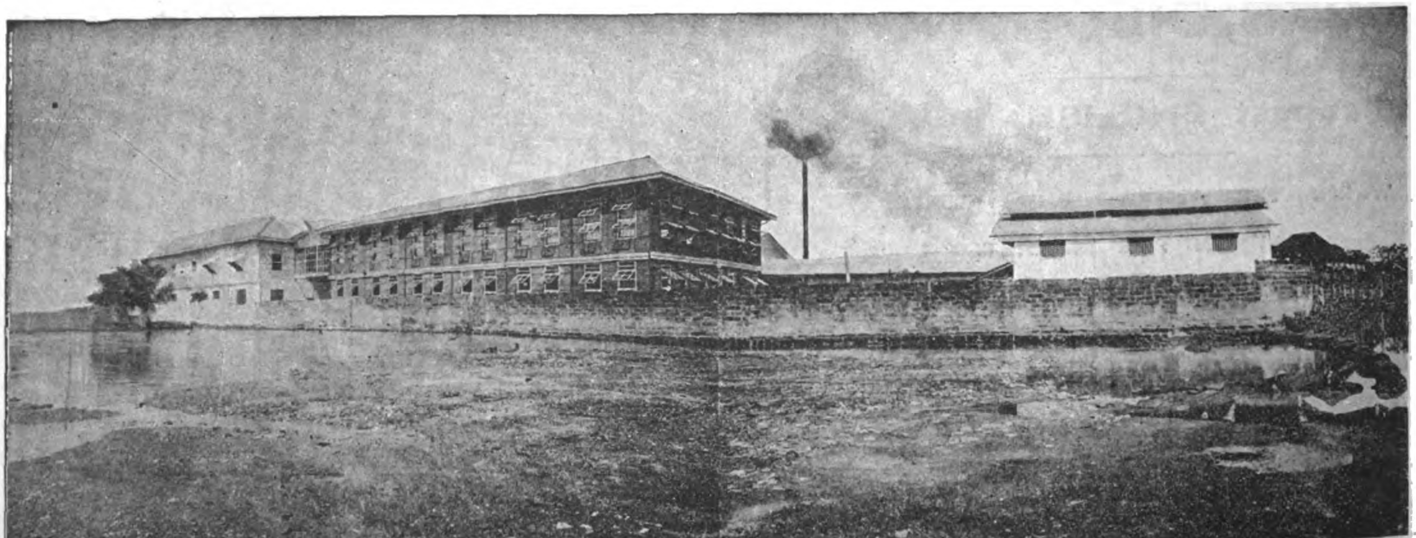

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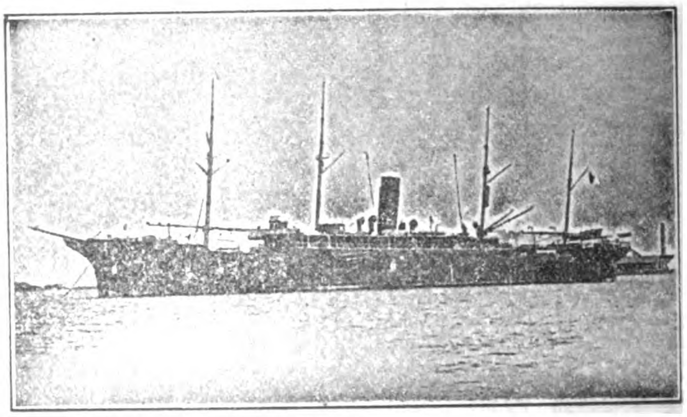

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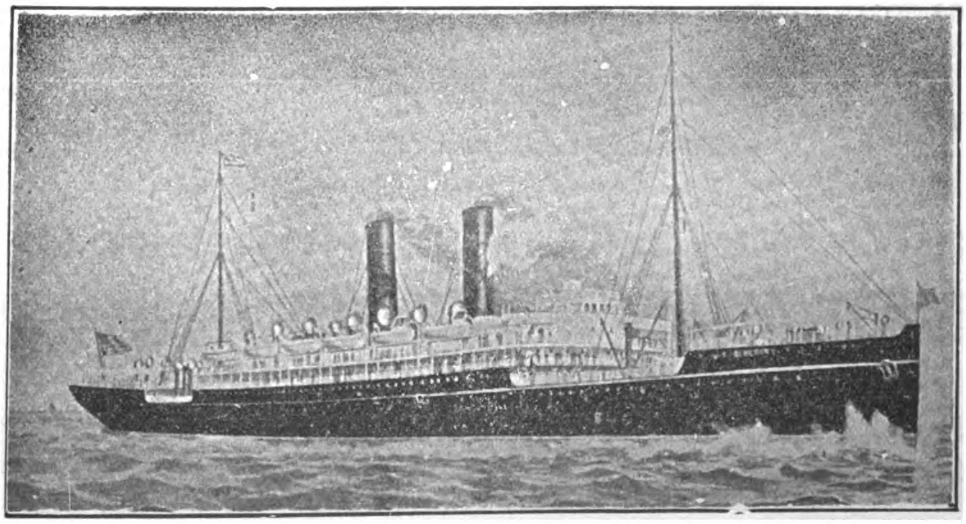

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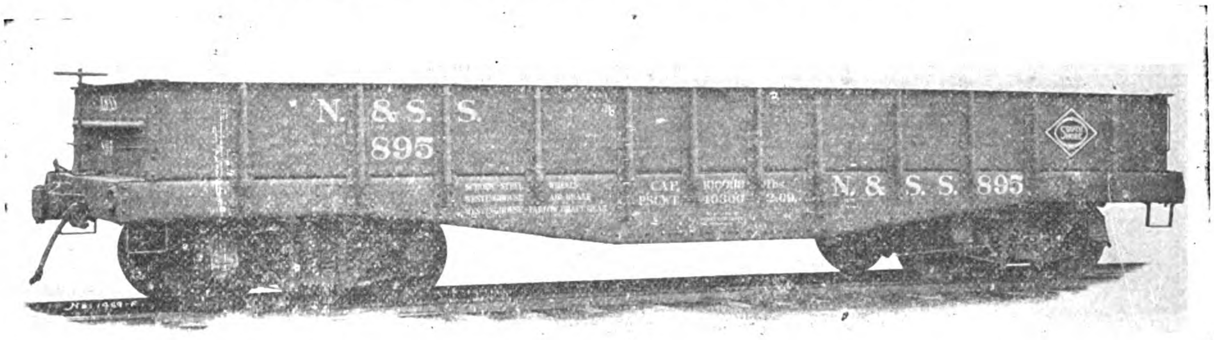

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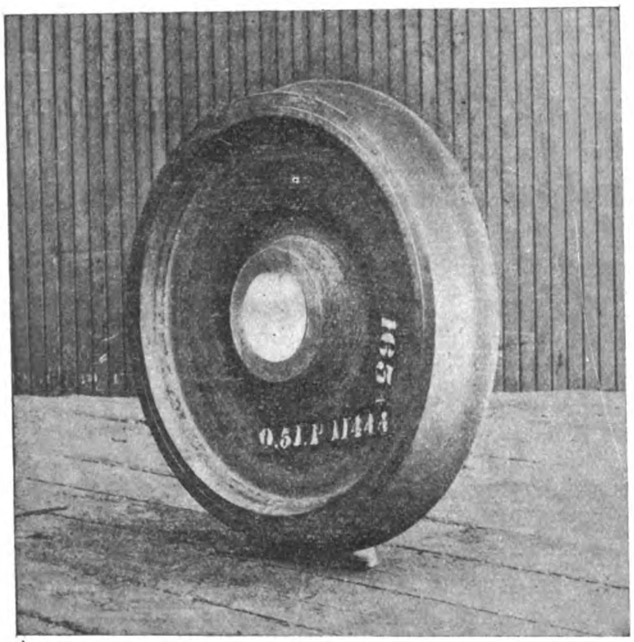

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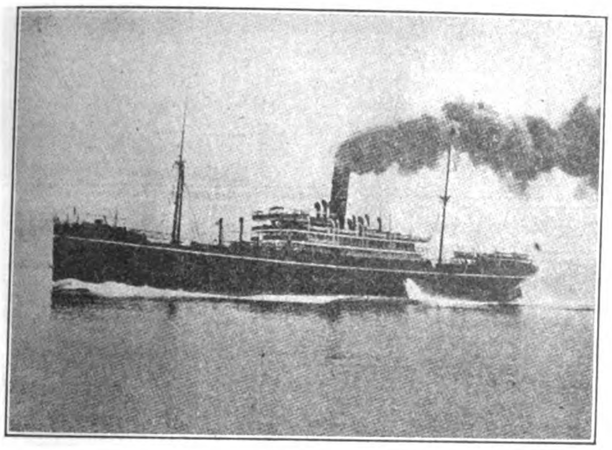

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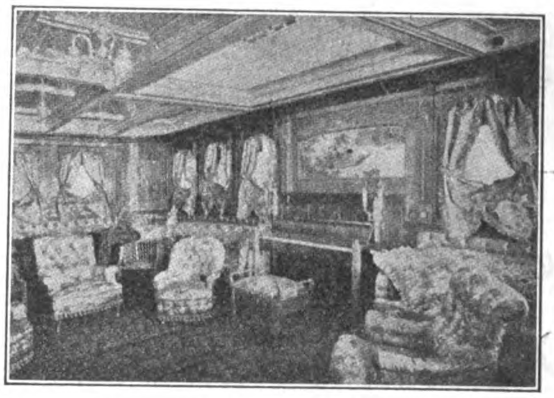

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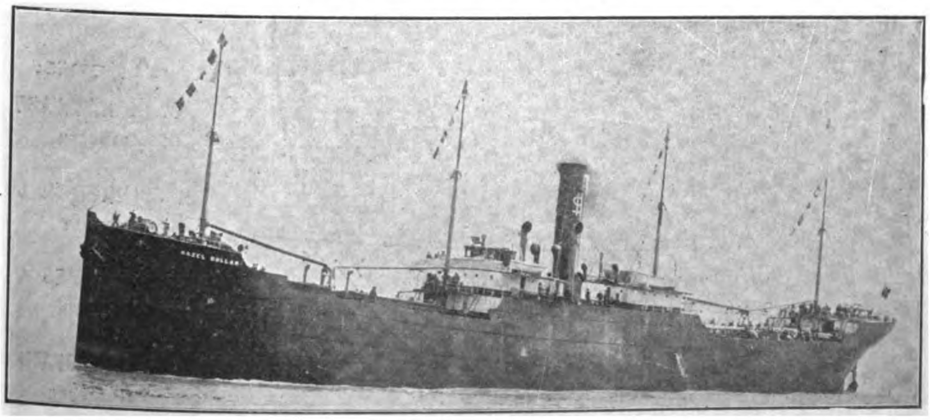

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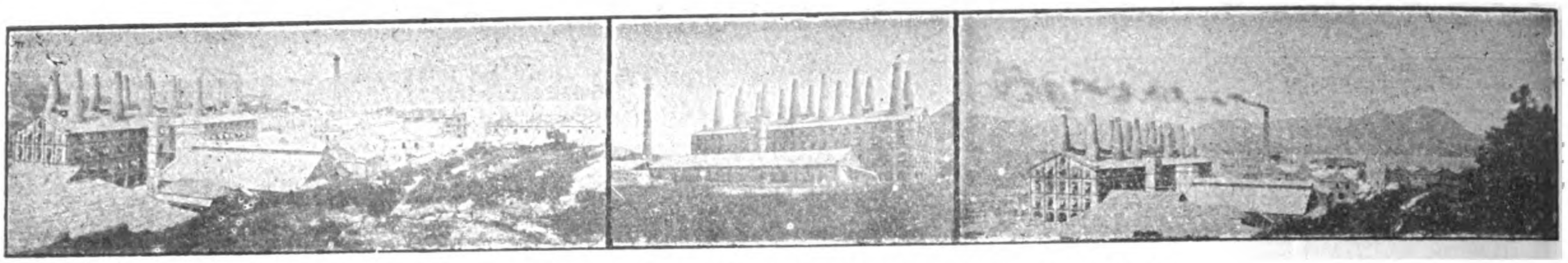

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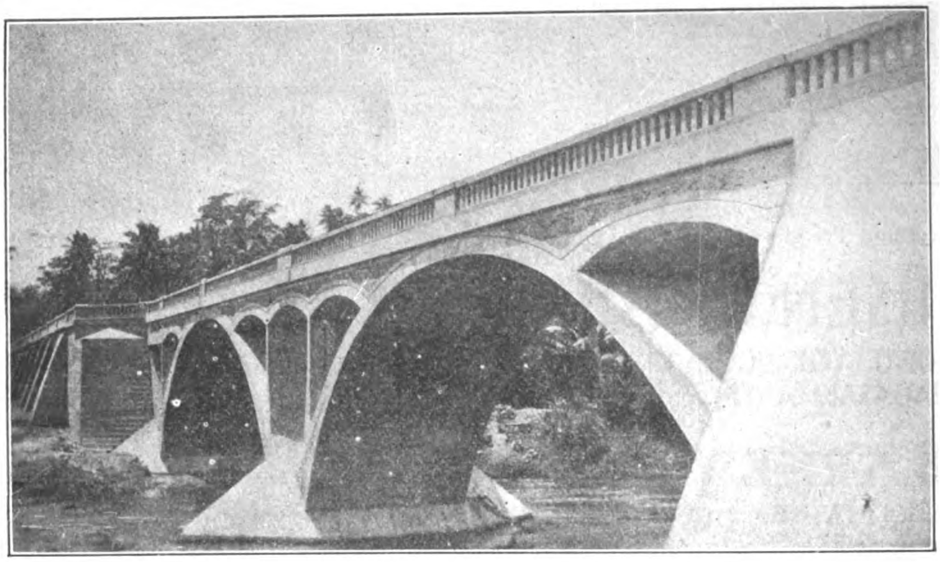

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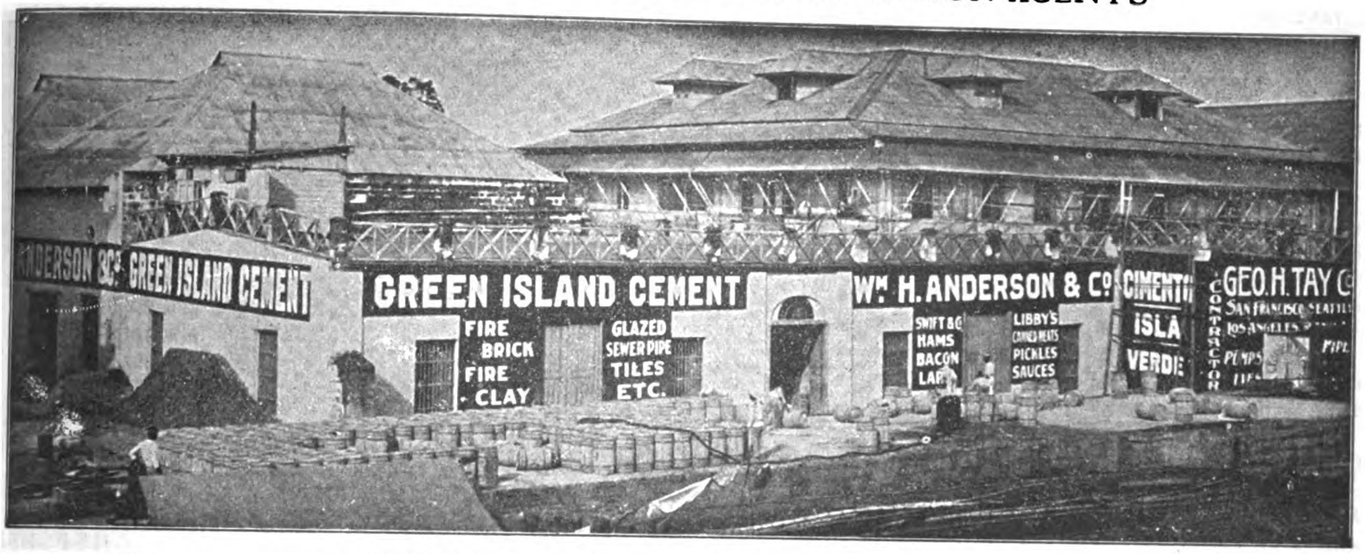

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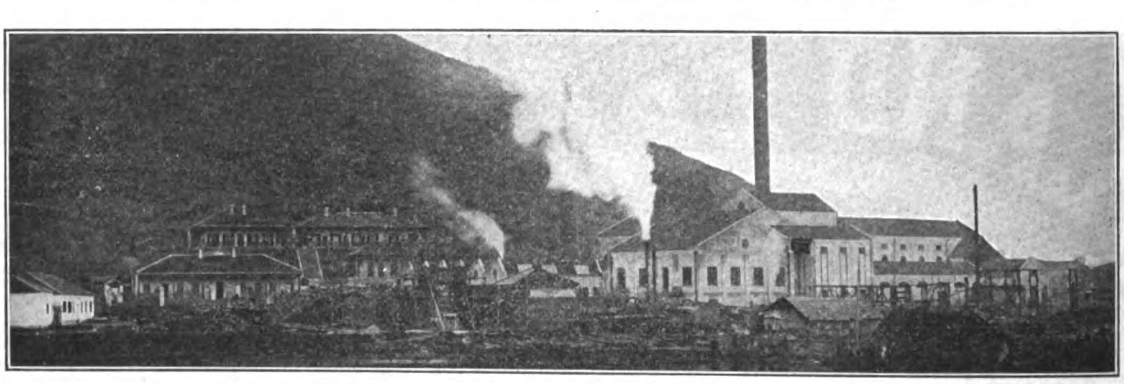

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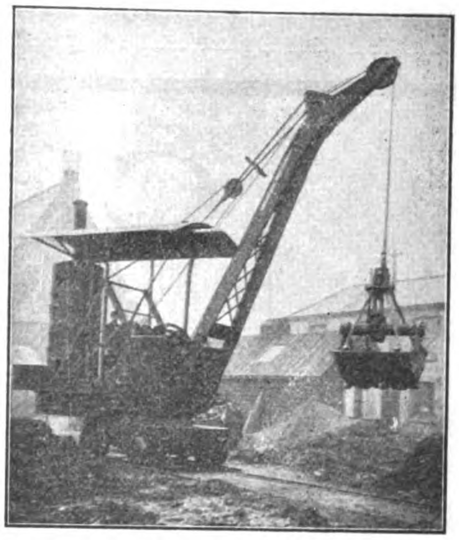

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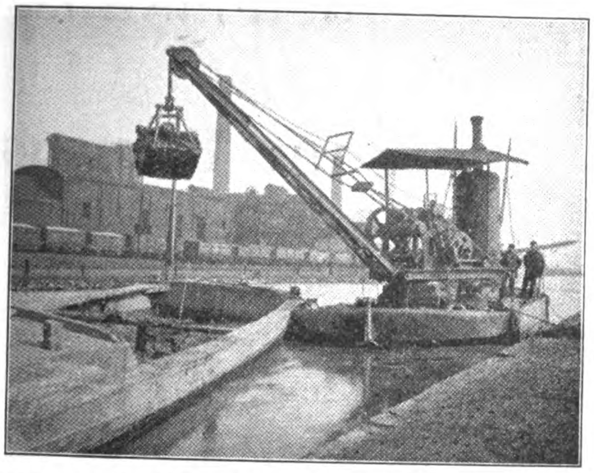

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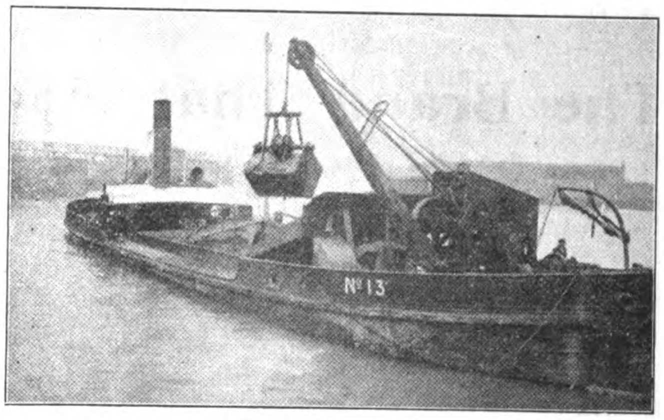

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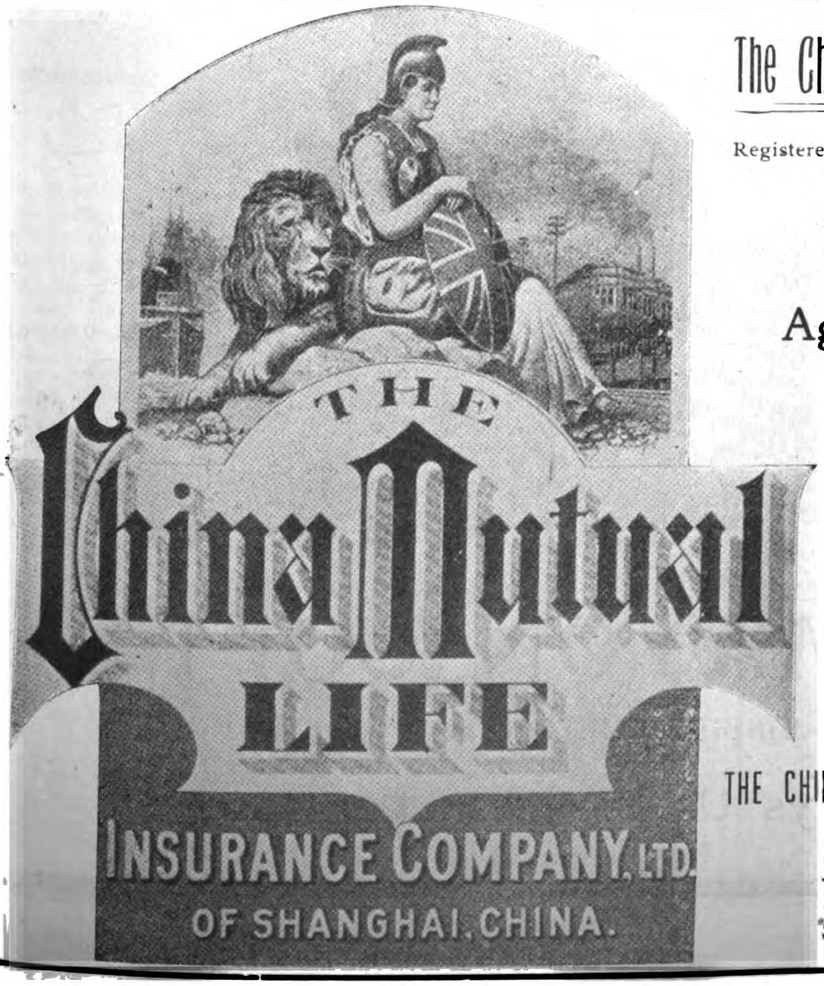

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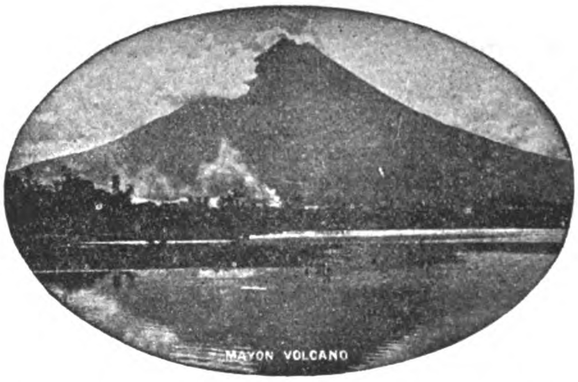

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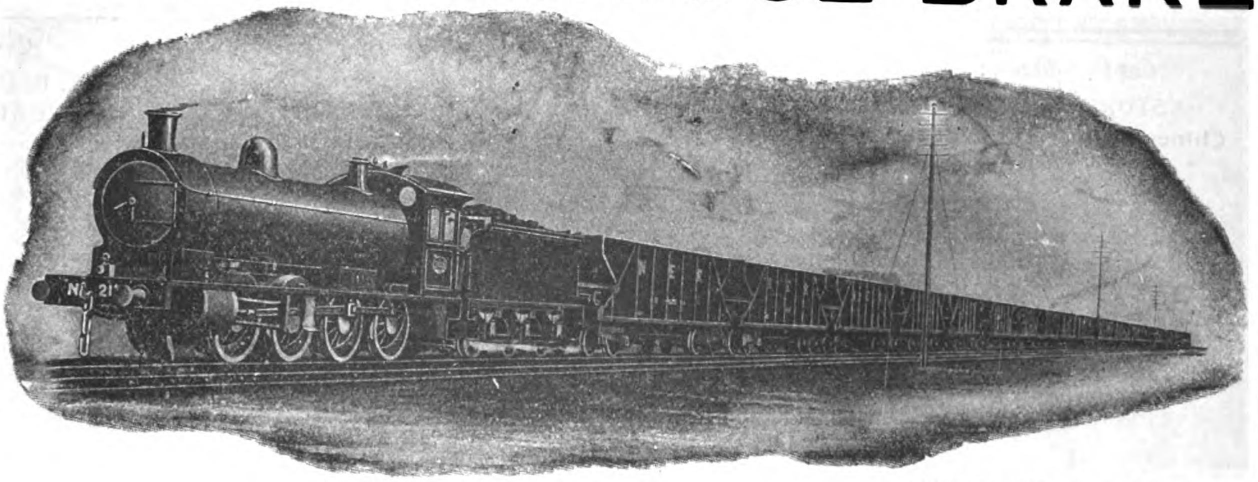

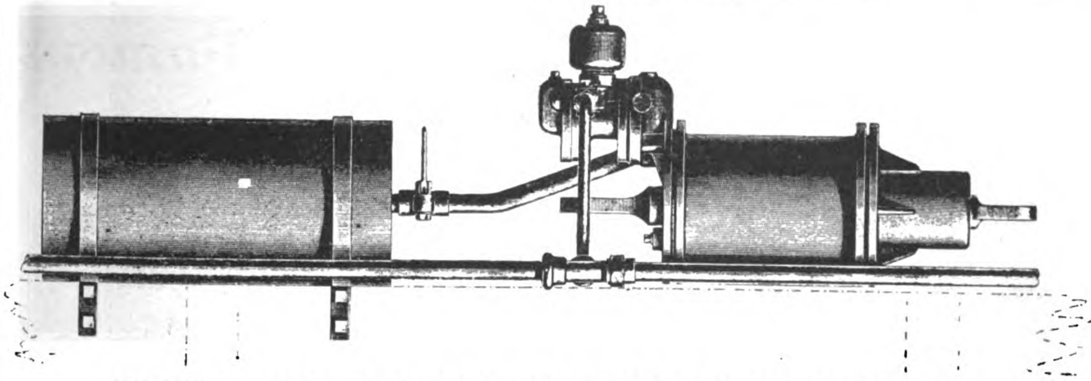

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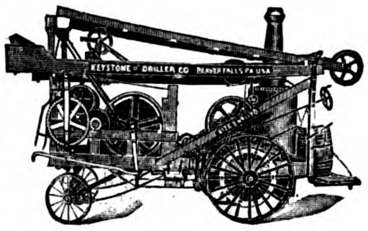

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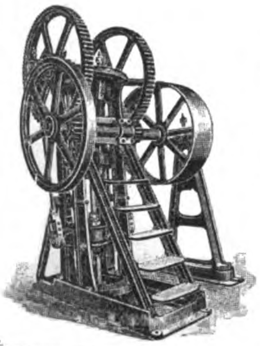

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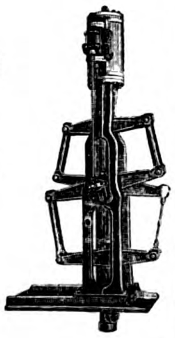

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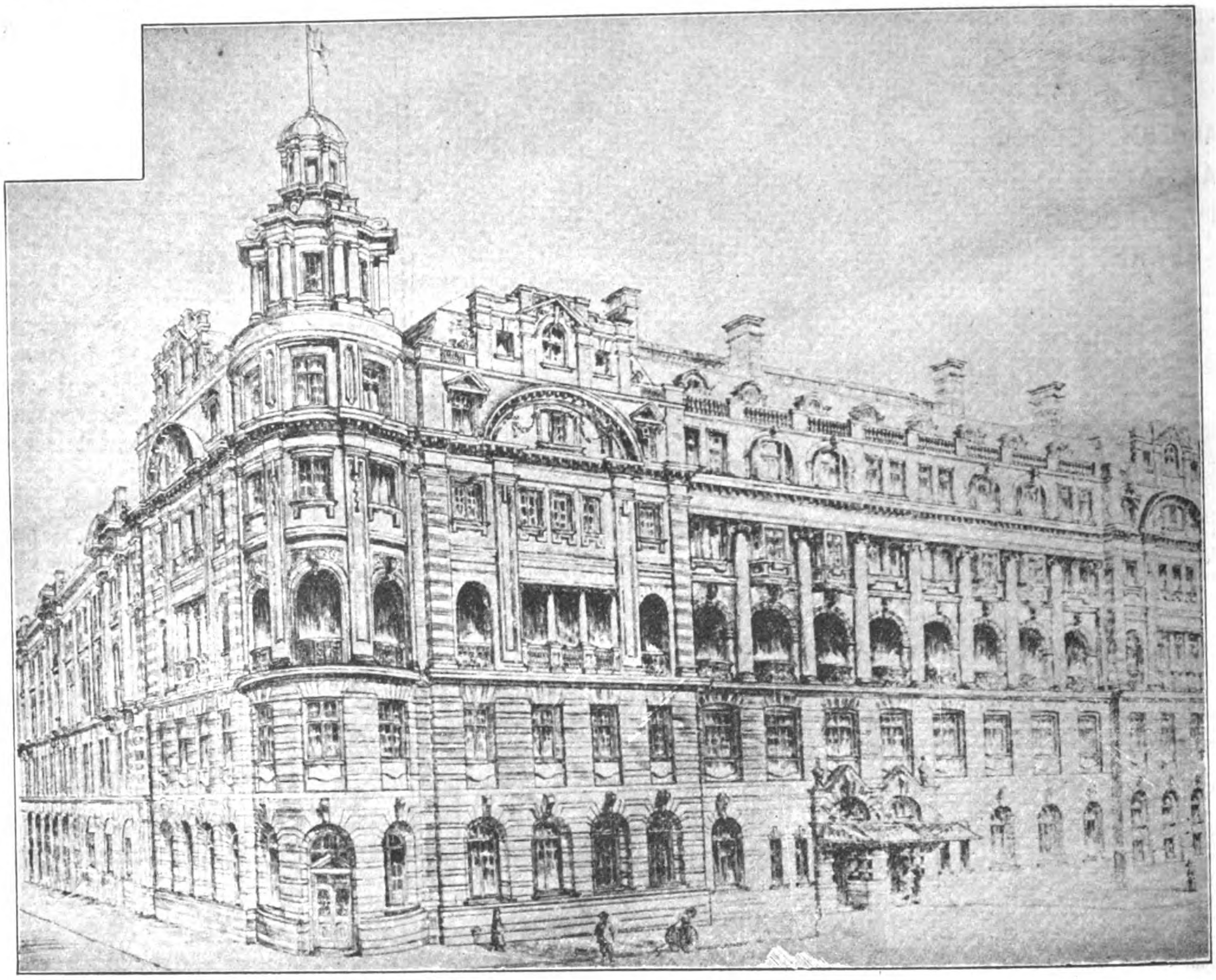

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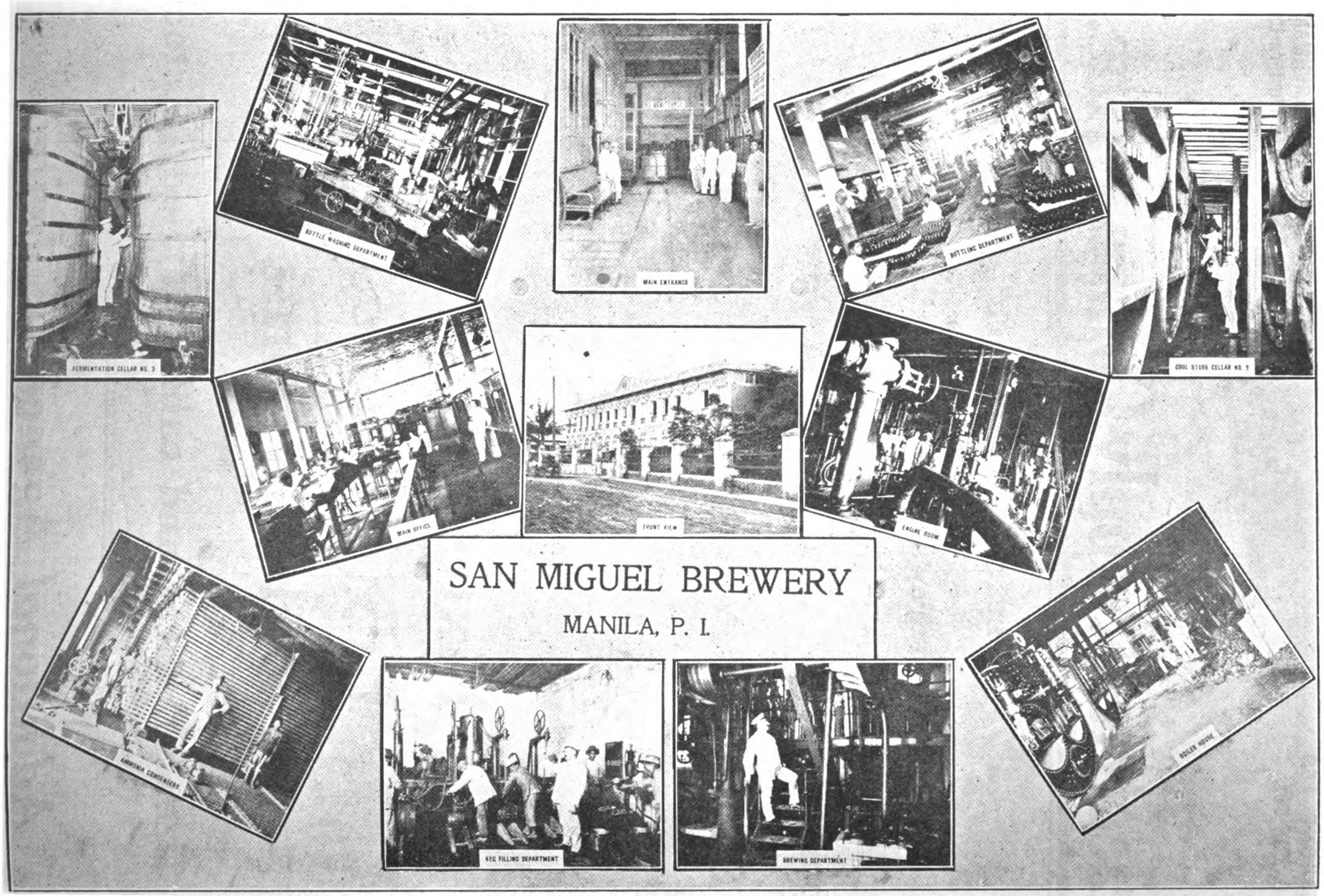

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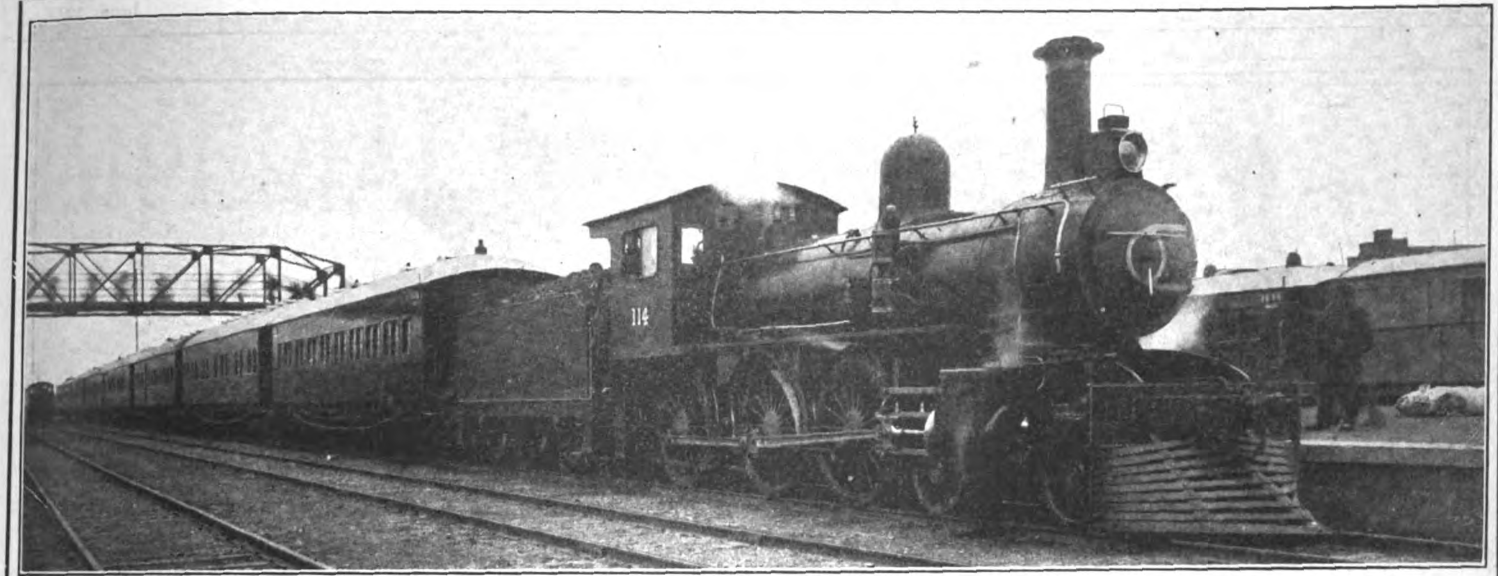

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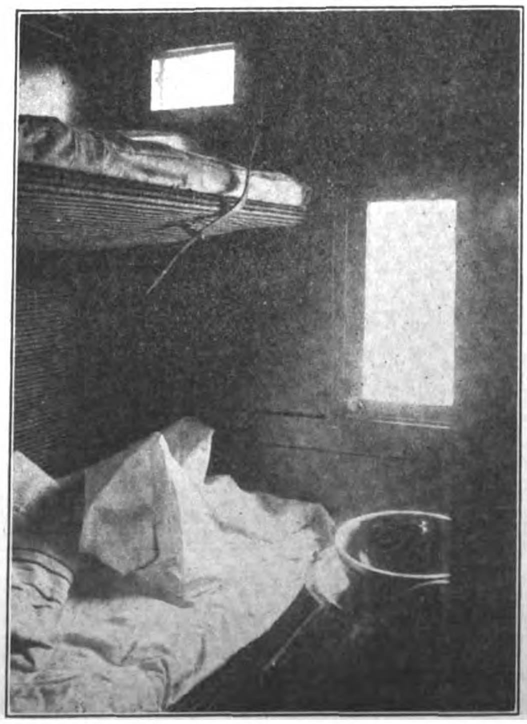

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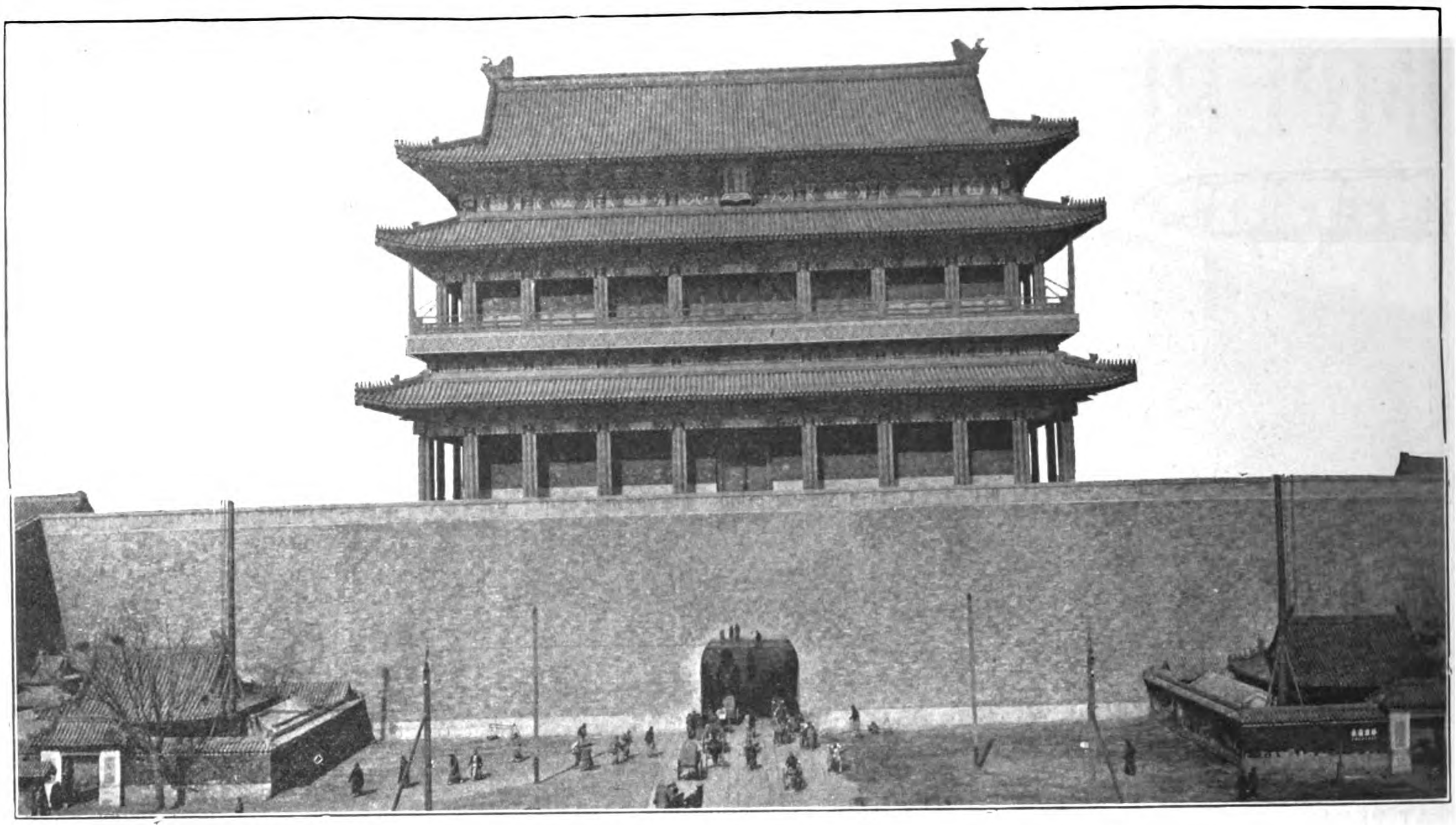

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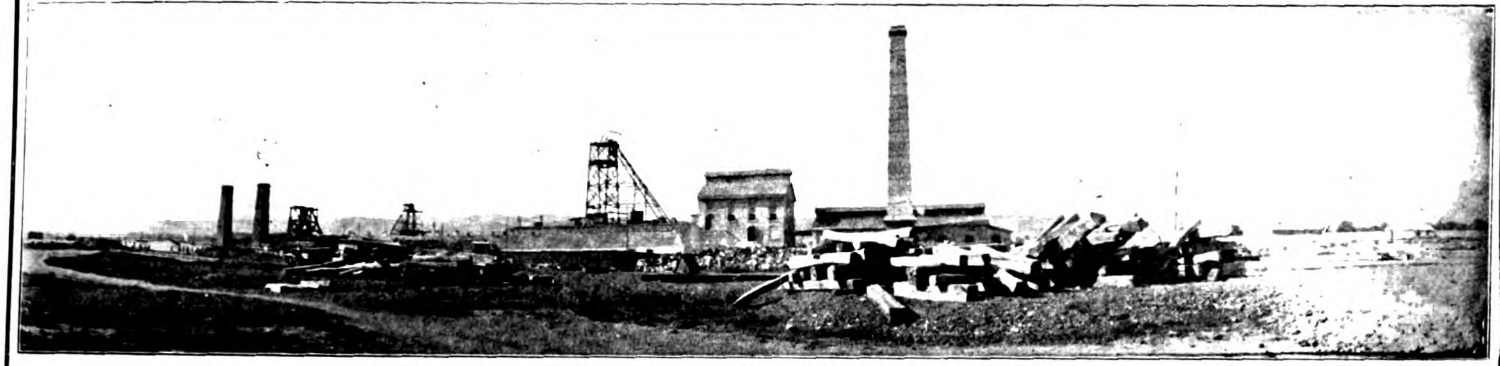
THE TAO-CHING RAILWAY

TAOKOU TO CHINGHUA

(Imperial Chinese Government Honan Line)



GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

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THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

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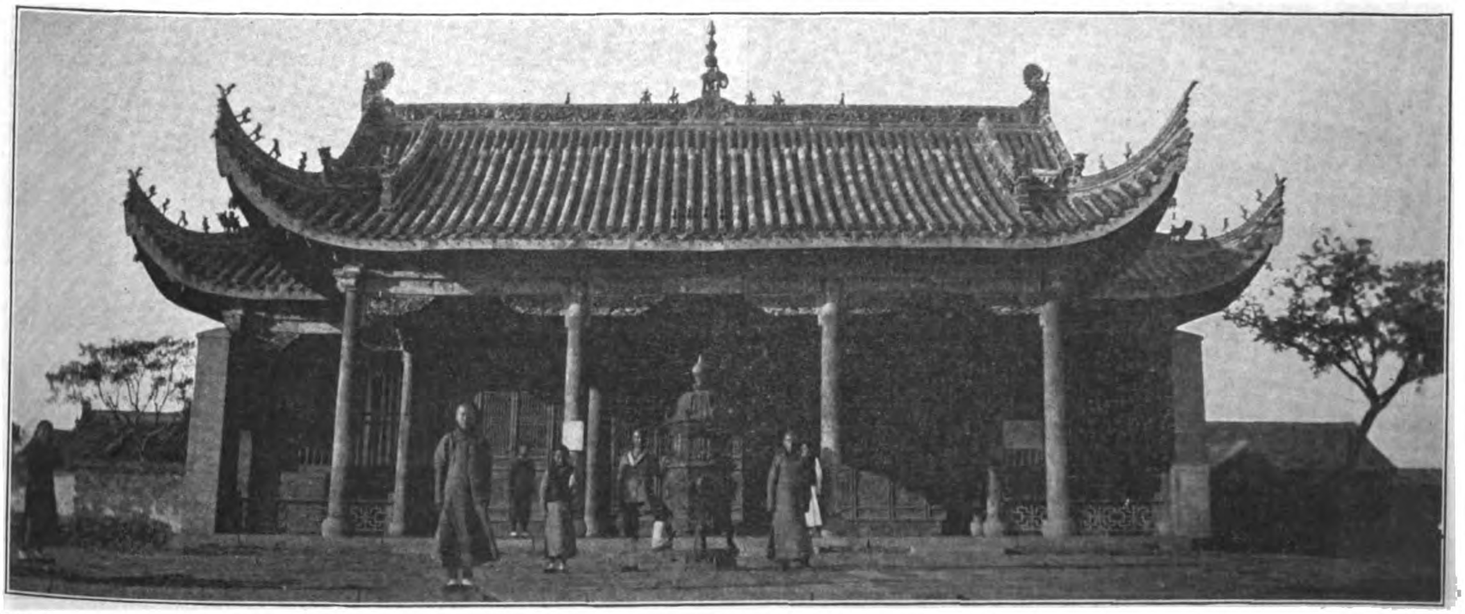
(KAIFENG-FU TO HONAN-FU)

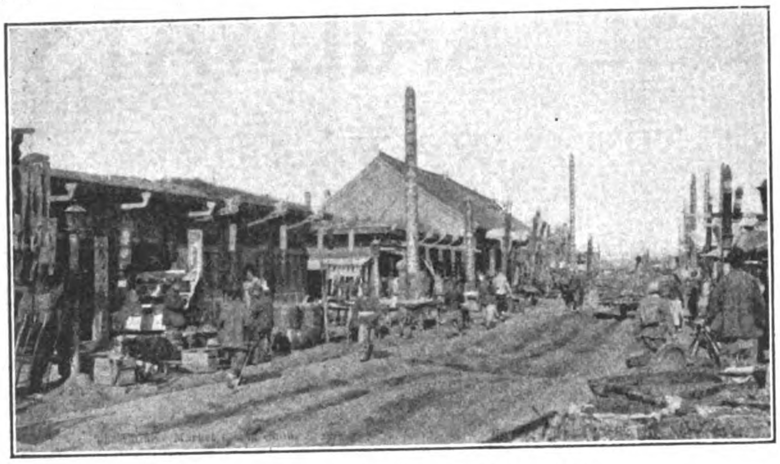
"THE FIRST SECTION OF THE PROJECTED CENTRAL TRUNKLINE"

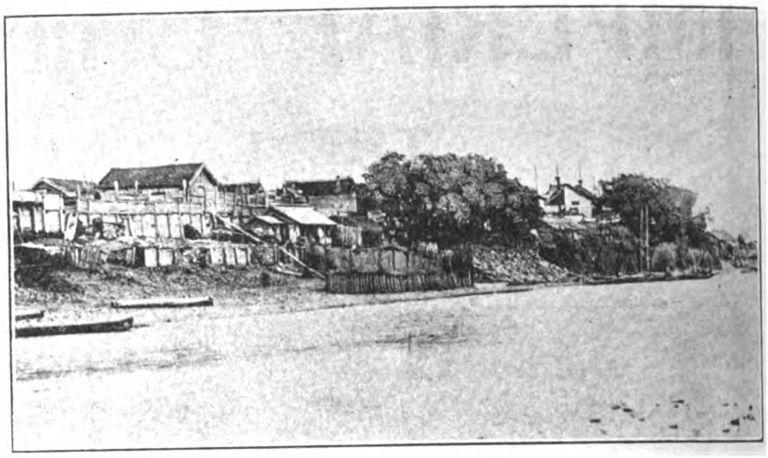


CHUNG-HUAN TEMPLE, KAIFENG-FU.

This line connects with the through service of the Peking-Hankow Railway at Tcheng Tchéou, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

IMPERIAL CHINESE RAILWAYS
KIRIN-CHANGCHUN LINE


CHINESE MARKET AT CHANG-CHUN


VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

TIME TABLE
The Kirin-Changchung Railway

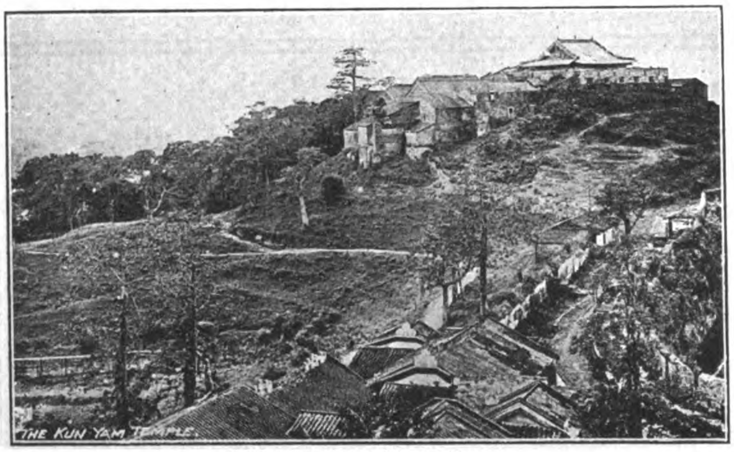
DOWN TRAIN

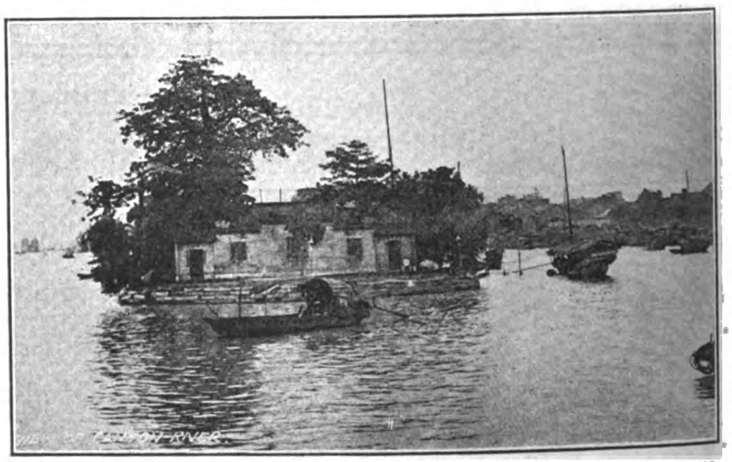
Station	*No.* 1	*No.* 2
	a. m.	a. m.
Changchung	7:00	12:00
Coran	8:17	1:17

UP TRAIN

Station	*No.* 2	*No.* 4
	a. m.	p m.
Coran	10:00	5:00
Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS
CANTON-KOWLOON LINE


THE KUN YAM TEMPLE


VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 24th APRIL, 1911, UNTIL FURTHER NOTICE.

Canton (Ta Sha Tou) to Shek Lung

Miles	STATION		Daily Passenger Trains. No. 1	No 3	No. 5
			A. M.	P M.	A. M.
	Canton (TAI SHA TOU)	dep	7.30	11.00	3.00
3.63	Shiek Pai	arr	7.39	11.09	3.09
		dep	7.42	11.12	3.12
7.90	Che Pi	arr	7.53	11.23	3.23
		dep	7.56	11.26	3.26
12.58	Wu Chung	arr	8.07	11.37	3.37
		dep	8.10	11.40	3.40
17.09	Nam Kong	arr	8.21	11.51	3.51
		dep	8.25	11.55	3.55
21.67	Sun Tong	arr	8.37	12.07	4.07
		dep	8.41	12.11	4.11
23.61	Tong Mei	arr	8.46	12.16	4.16
		dep	8.50	12.20	4.20
25.54	Nga Yeo	arr	8.55	12.25	4.25
		dep	8.58	12.28	4.28
29.00	Sien Tsun	arr	9.07	12.37	4.37
		dep	9.11	12.41	4.41
32.25	Shek Ha	arr	9.22	12.52	4.52
		dep	9.24	12.54	4.54
34.77	Shek Tan	arr	9.33	1.03	5.03
		dep	9.37	1.07	5.07
36.34	Shek Lik Kou	arr	9.43	1.13	5.13
		dep	9.45	1.15	5.15
40.15	Shek Lung	arr	9.58	1.28	5.28

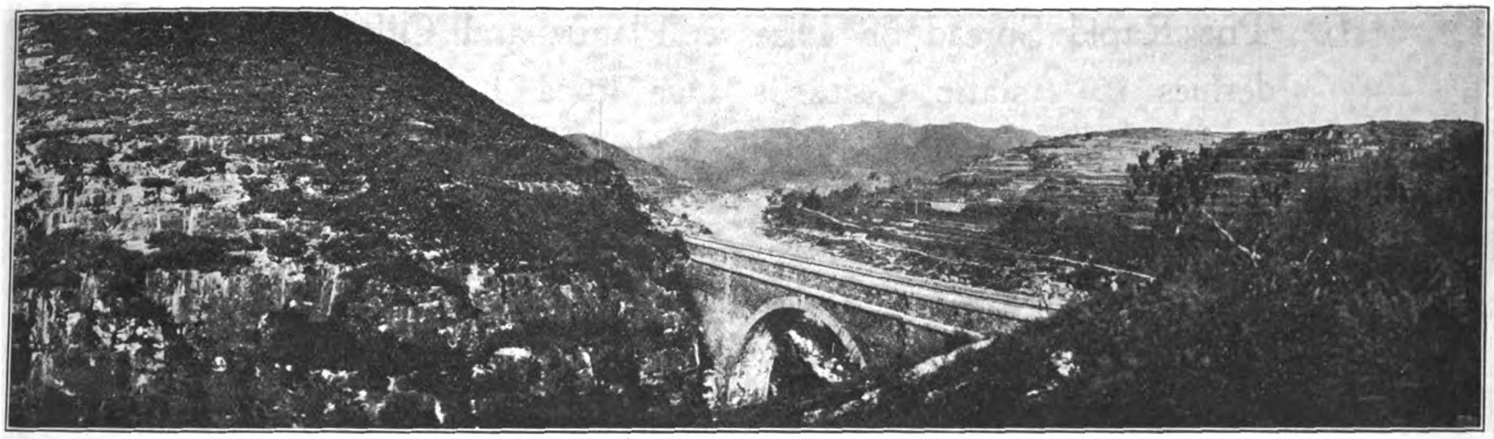
Shek Lung to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2	No. 4	No. 6
			A. M.	P. M	P. M.
	Shek Lung	dep	7.35	11.05	3.05
3.31	Shek Lik Kou	arr	7.48	11.18	3.18
		dep	7.50	11.20	3.20
5.38	Shek Tan	arr	7.56	11.26	3.26
		dep	8.00	11.30	3.30
7.90	Shek Ha	arr	8.09	11.39	3.39
		dep	8.11	11.41	3.41
11.15	Sien Tsun	arr	8.22	11.52	3.52
		dep	8.26	11.56	3.56
4.61	Nga Yeo	arr	8.35	12.05	4.05
		dep	8.38	12.08	4.08
16.54	Tong Mei	arr	8.43	12.13	4.13
		dep	8.47	12.17	4.17
18.48	Sun Tong	arr	8.52	12.22	4.22
		dep	8.56	12.26	4.26
23.06	Nam Kong	arr	9.08	12.38	4.38
		dep	9.12	12.42	4.42
27.57	Wu Chung	arr	9.23	12.53	4.53
		dep	9.26	12.56	5.56
32.25	Che Pi	arr	9.37	1.07	5.07
		dep	9.40	1.10	5.10
36.52	Shek Pai	arr	9.51	1.21	5.21
		dep	9.54	1.24	5.24
40.15	Canton (TAI SHA TOU)	arr	10.03	1.33	5.33

IMPERIAL CHINESE RAILWAYS

The Cheng-Tai Railway

(IMPERIAL GOVERNMENT SHANSI LINE—CHENGTINGFU TO TAIYUANFU)

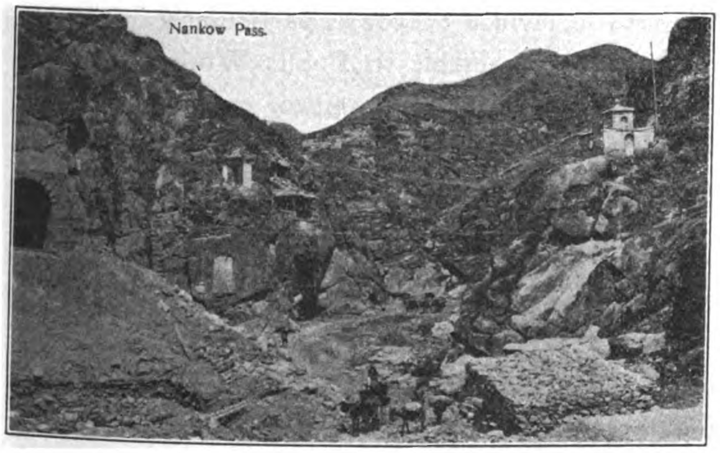


VIEWS ALONG ROUTE OF CHENG-TAI RAILWAY.

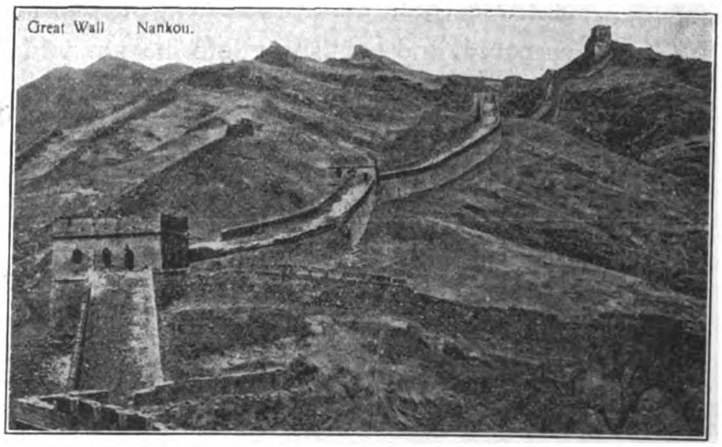
The trains of this line connect with the through service of the Peking-Hankow Railway, affording Travellers the opportunity of seeing the most picturesque part of China. The line passes through a mountainous section of country, rich in Mineral Resources to the Provincial Capital of Shansi at Taiyuanfu. This interesting city is a great educational center, and famous for the fine quality of its artistic embroideries.

The Peking-Kalgan Line

"THE ROAD TO THE GREAT WALL"



Nankow Pass.



Great Wall Nankou.

This line follows the ancient caravan route and military highway from Mongolia into China by the way of the historic Nankow Pass. This pass is the Key to Peking, and Kalgan is the gate of the Empire. From here the great camel caravans set out on their long journeys across Mongolia to Siberia and Central Asia. This old frontier mart, retaining its time-honored characteristics, one of the most interesting sights of the Old World, is made accessible by the new railway. The line also carries the passenger in two hours from Peking to Nankow, when the Great Wall of China and the Ming Tombs may be seen. A foreign hotel is operated by the railway authorities at Nankow, where chairs and guides may be secured for the Tombs.

TAOTAI JEME TIEN-YU, Director General

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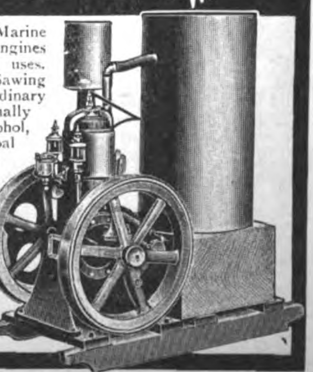

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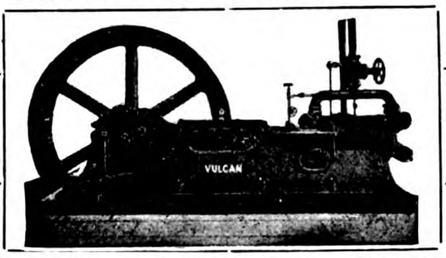
VUL  CAN

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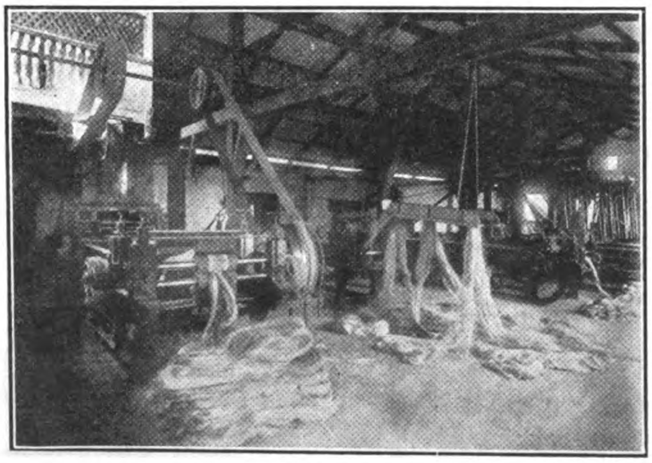

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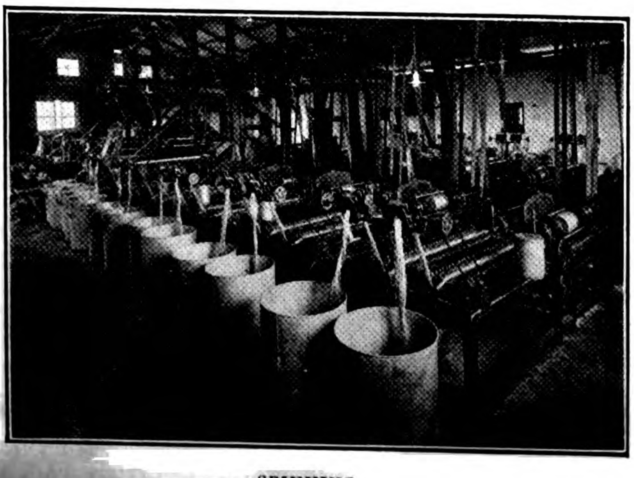

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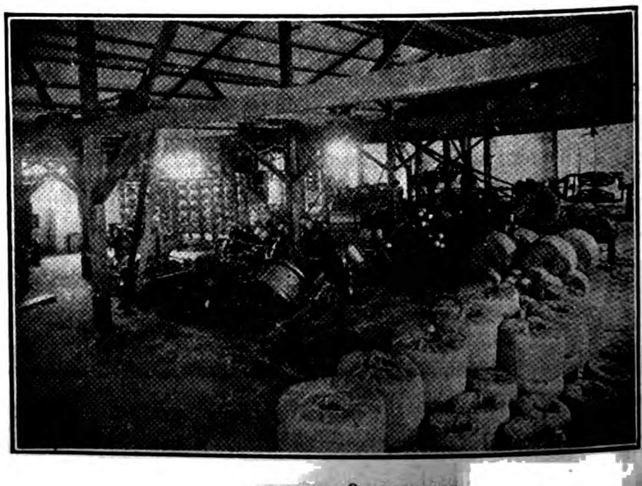

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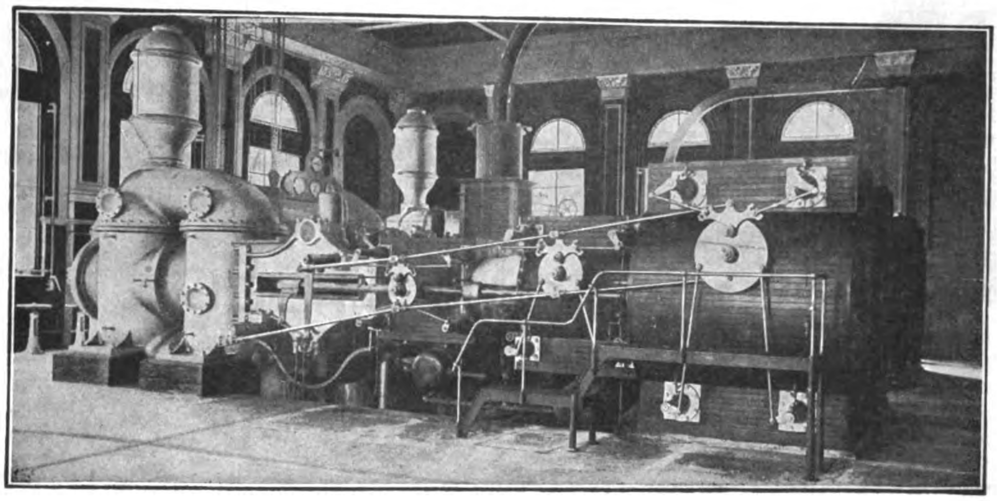

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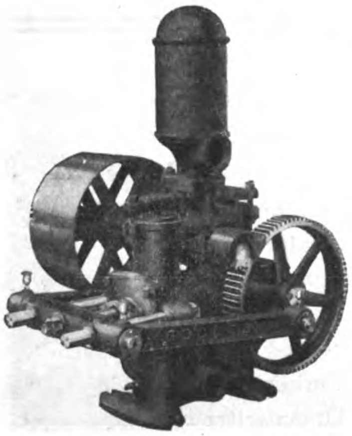

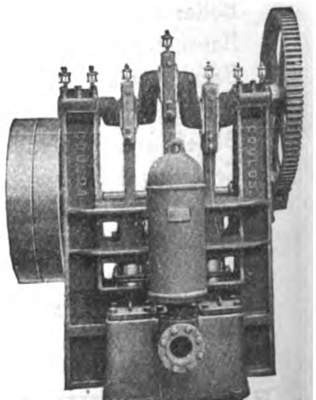

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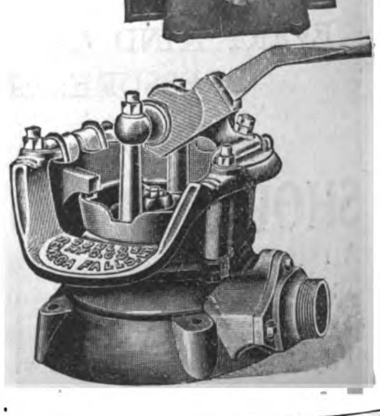

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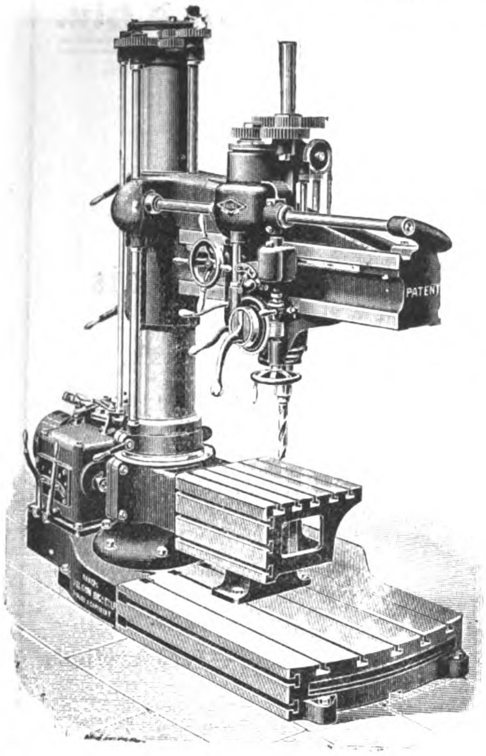

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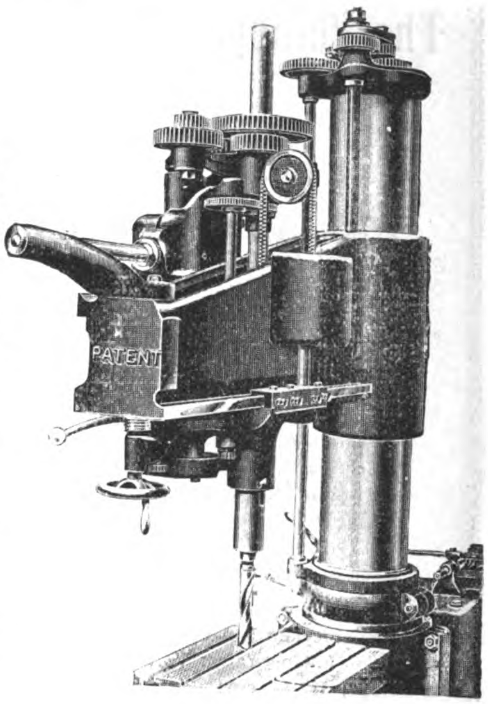

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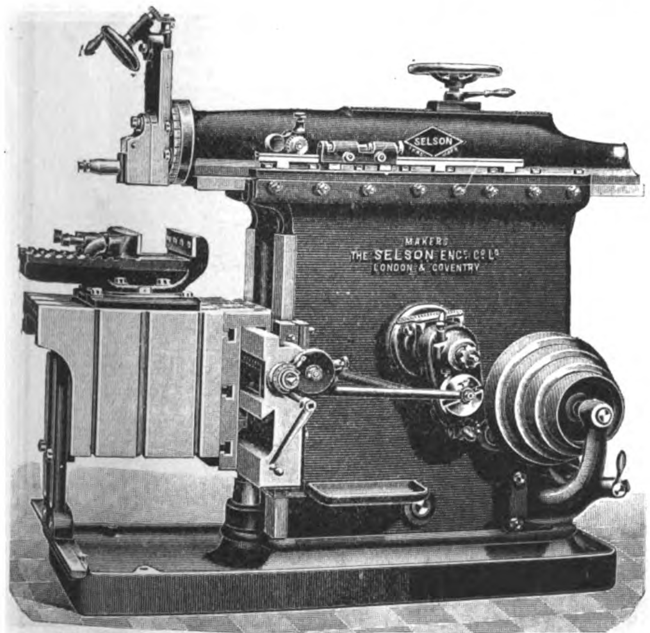

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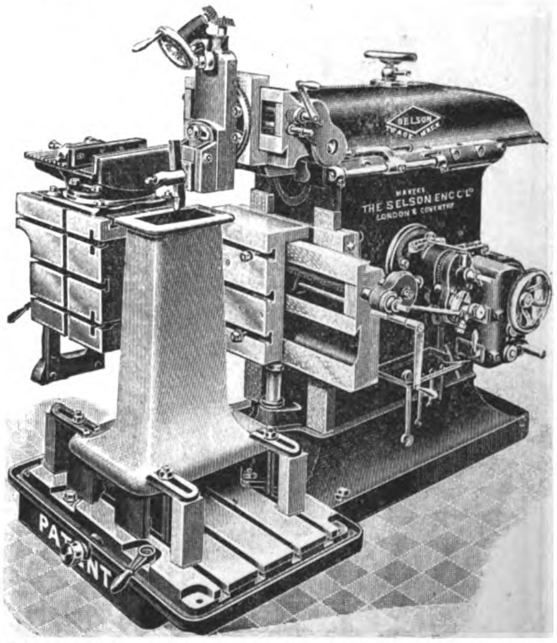

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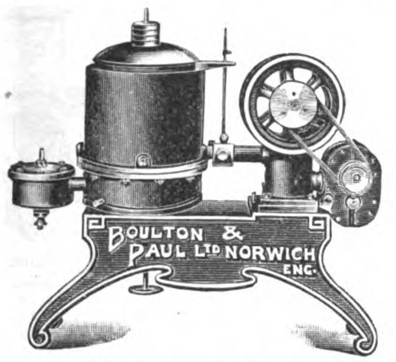

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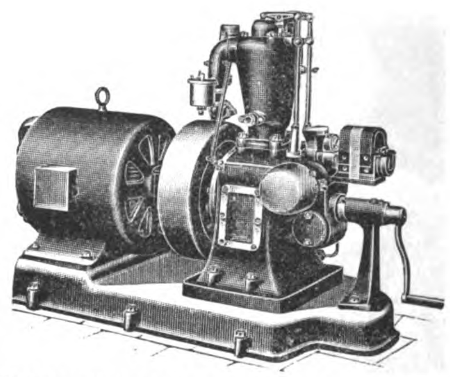

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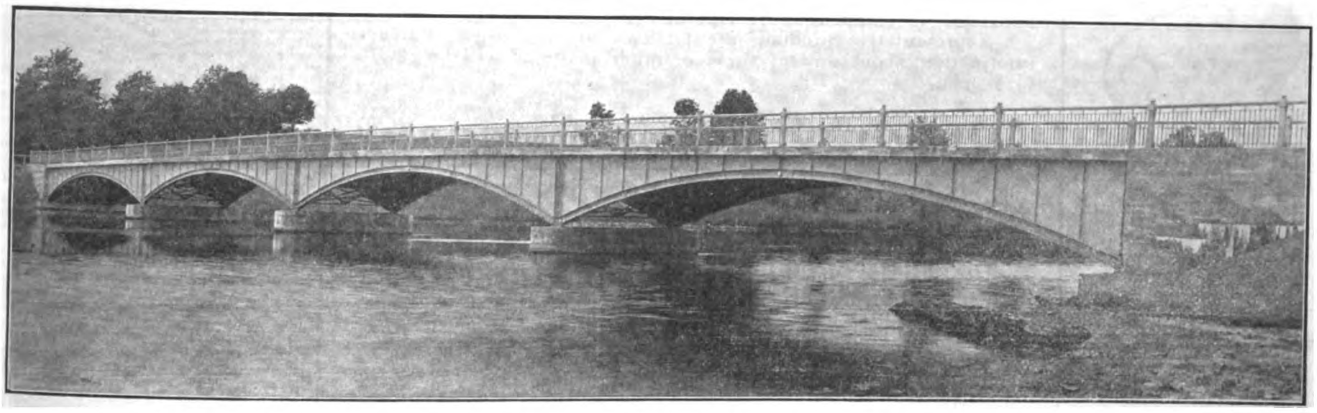

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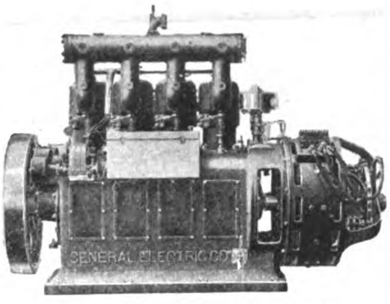

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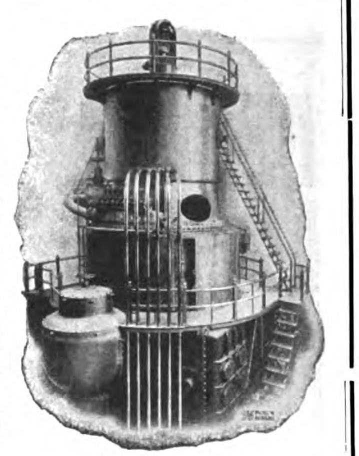

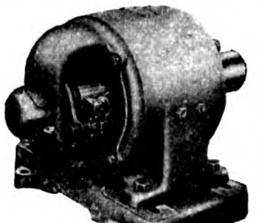

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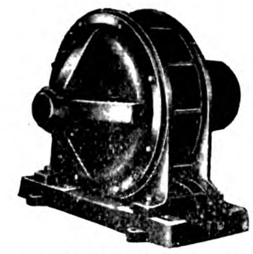

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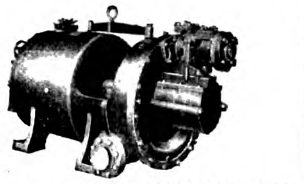

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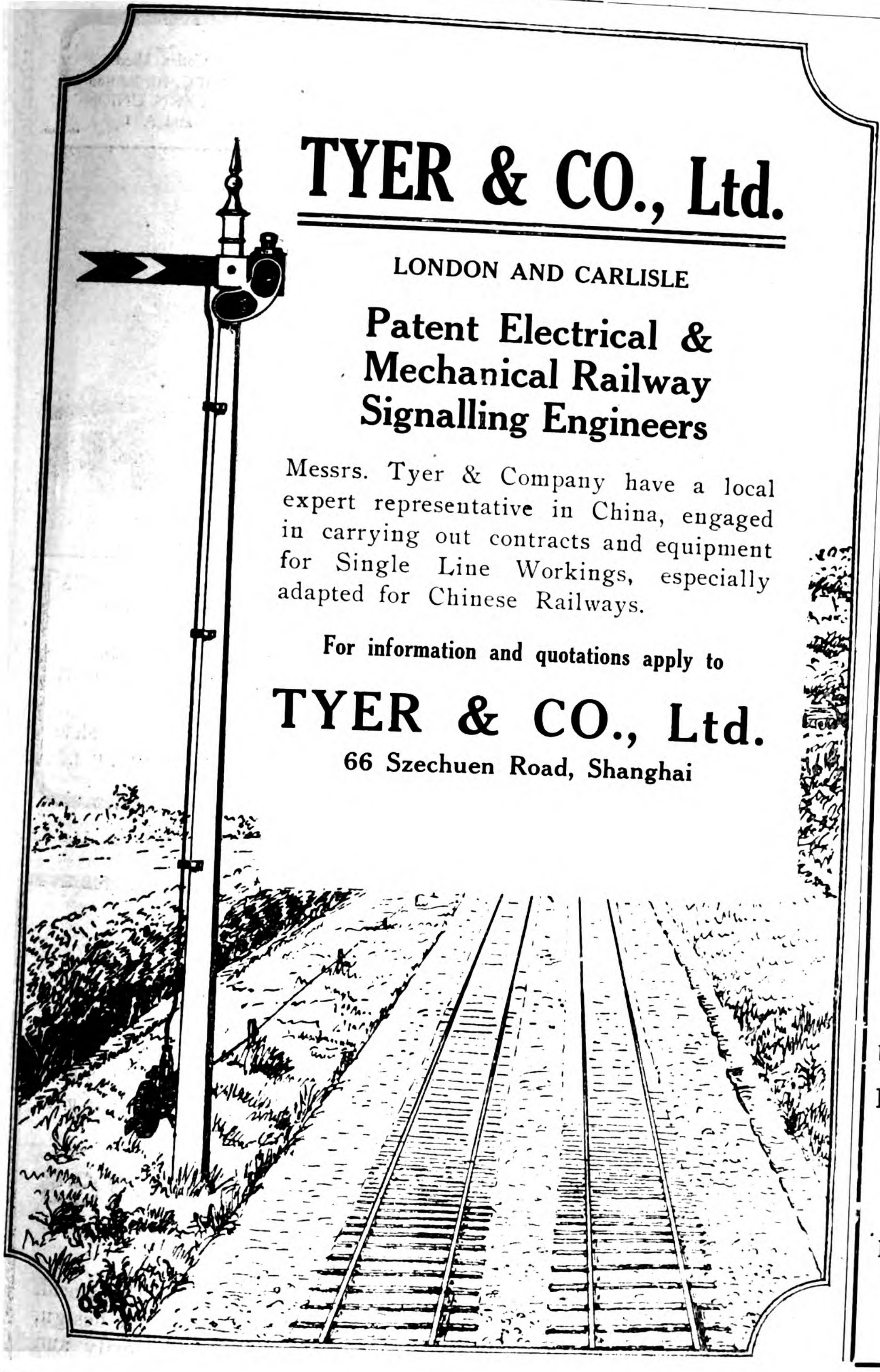

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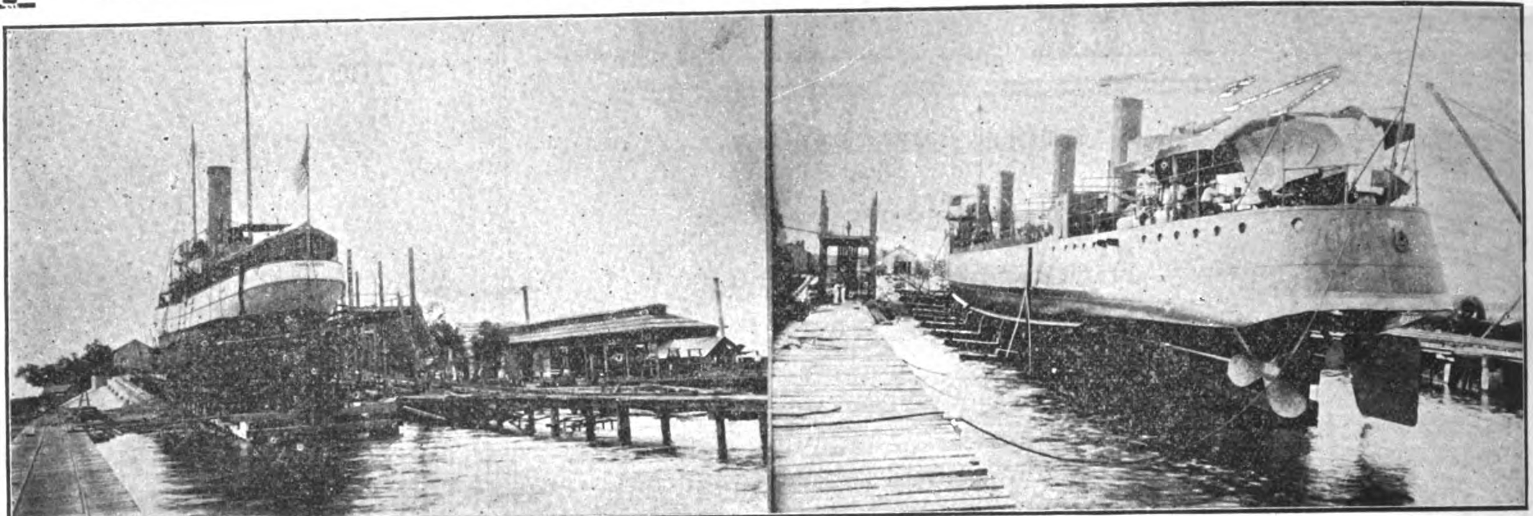

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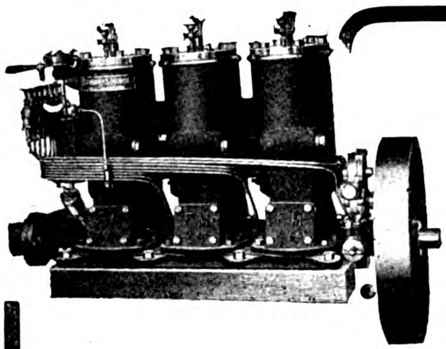

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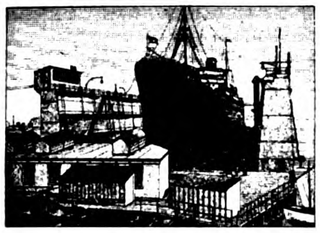

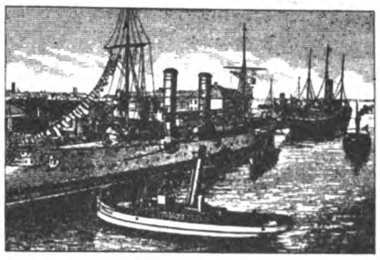

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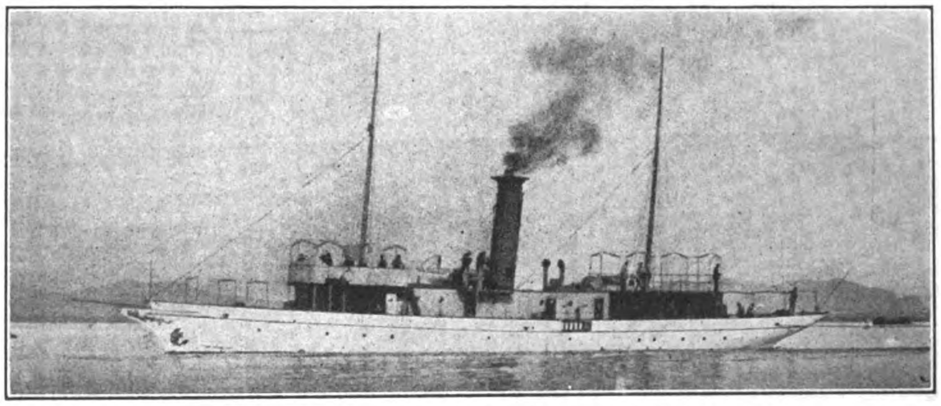

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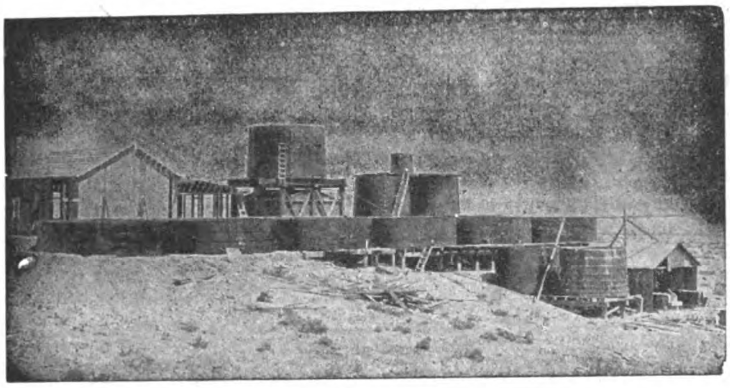

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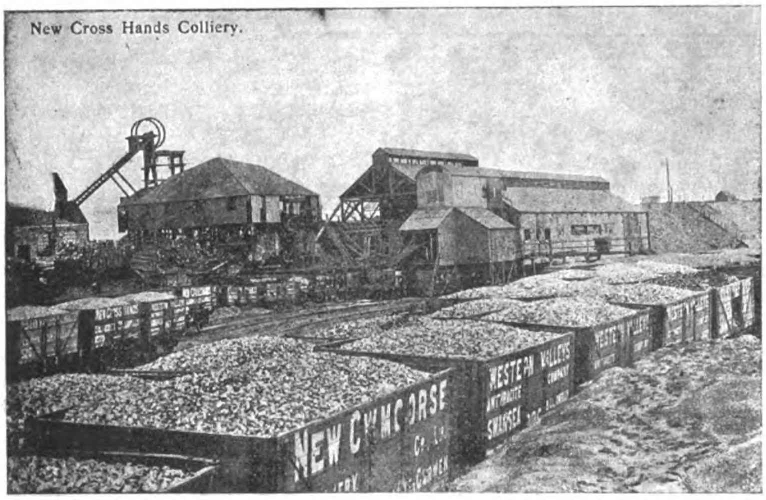
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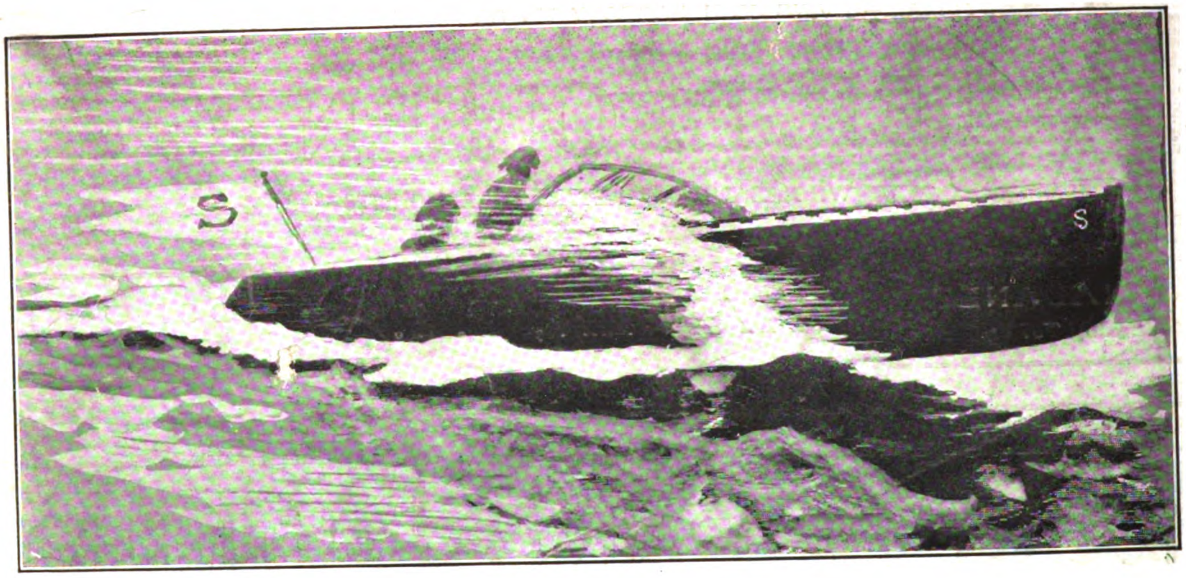

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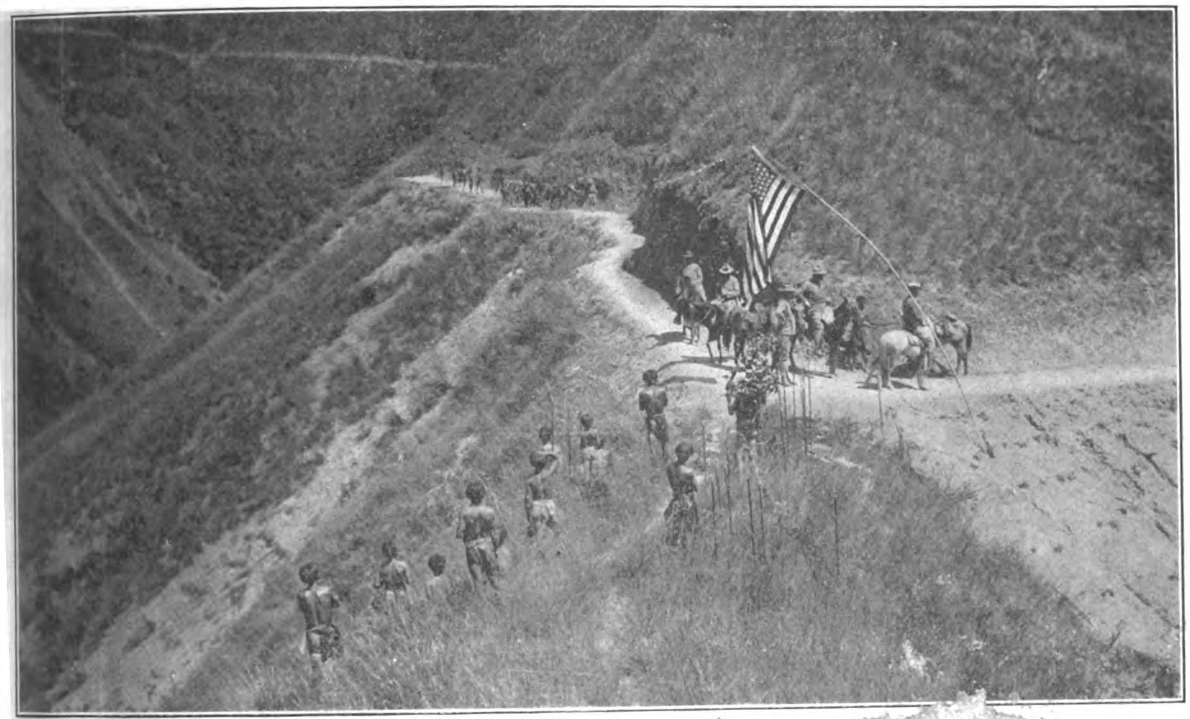

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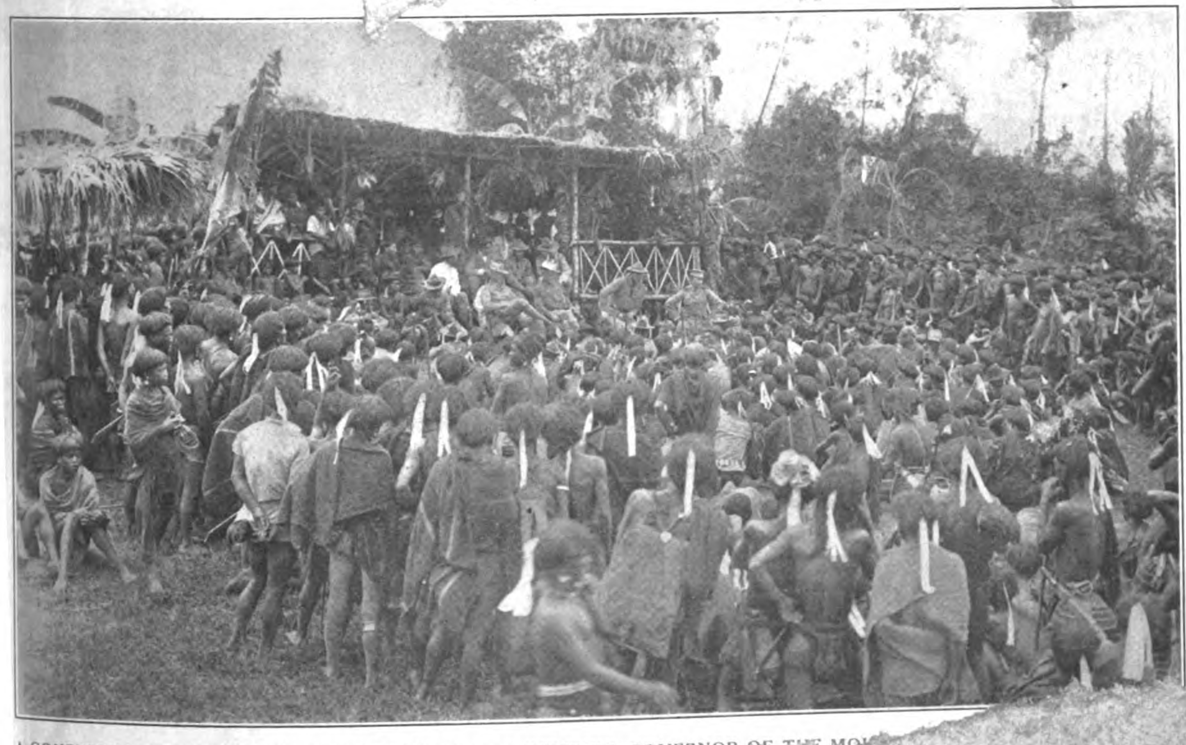

A CONFERENCE BETWEEN THE SECRETARY OF THE INTERIOR, GOVERNOR OF THE MO[illegible] GOVERNOR OF THE SUBPROVINCE OF IFUG[illegible]

Upon the annual inspection trips [illegible] Interior there are held great representative gatherings of the several non-Christi[illegible] of the past year and the plans for the coming year are freely discussed

Courtesy, [illegible]

The Hill Tribes of the Philippines

The Lanchow Mines

General News and Comment

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COMMERCE FINANCE

Hongkong and Shanghai Banking Corporation

DEPOSITORY OF THE GOVERNMENT OF THE PHILIPPINE ISLANDS

Capital (Paid in Cash).........$15,000,000
Sterling Reserve Fund......$15,000,000
Silver Reserve Fund...........$16,250,000
Reserve Liability of Prop'rs.$15,000,000

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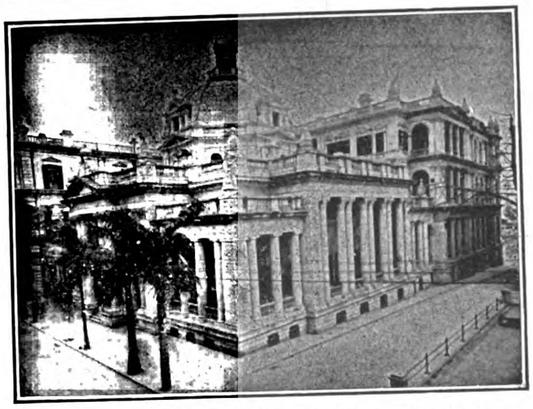

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AND FOR THE FUNDS OF THE GOVERNMENT OF THE CANAL ZONE
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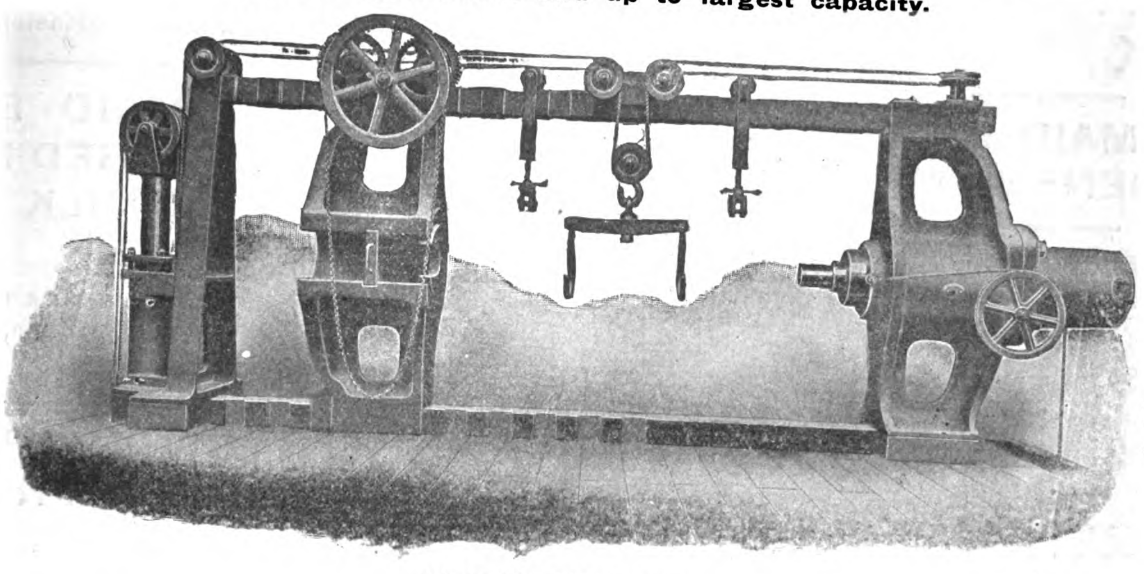

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Special Reserve Fund..........	Roubles 5,338,480.93
Capital contributed by Imperial Chinese Government.......	Kpg. $3,700,000
Reserve Fund..........................	Kpg. $6,015,000

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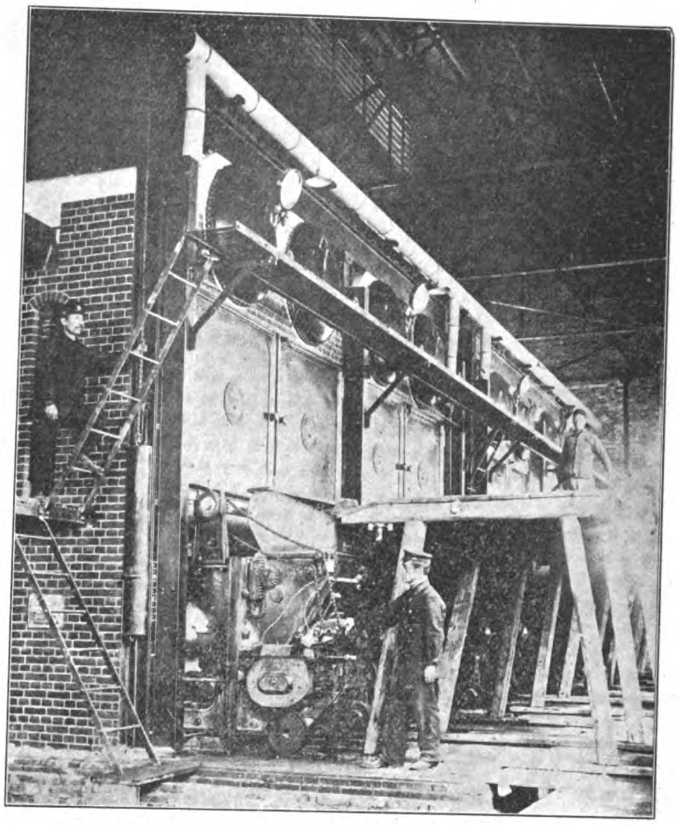

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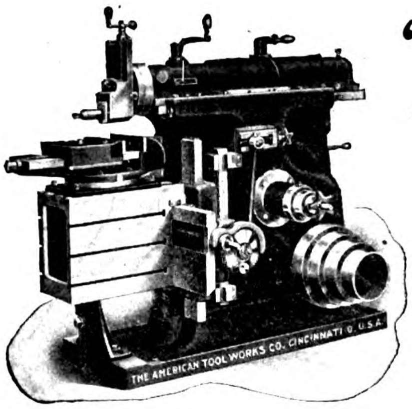
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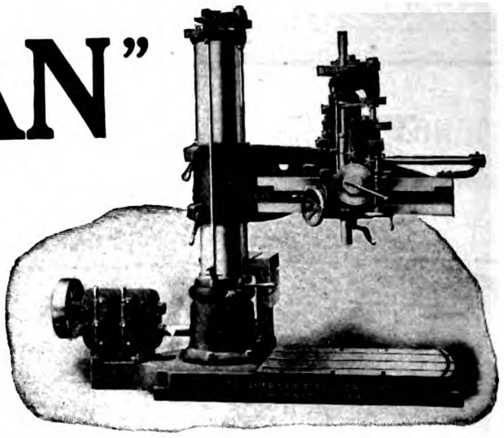
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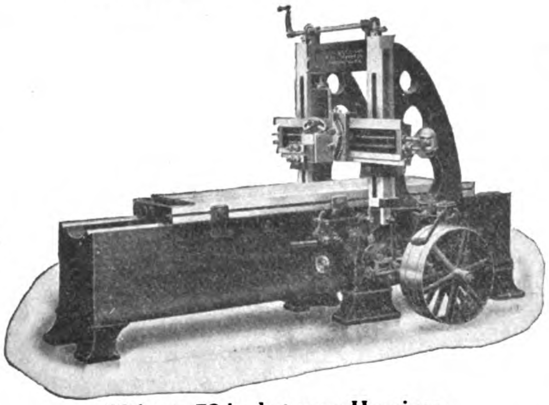
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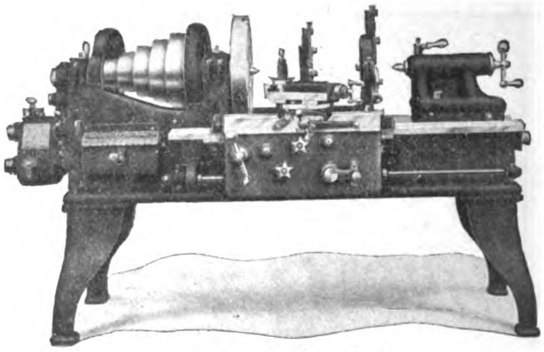
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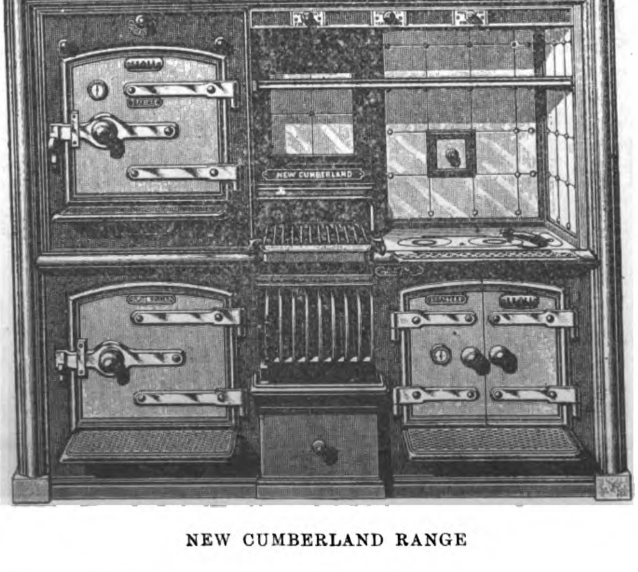
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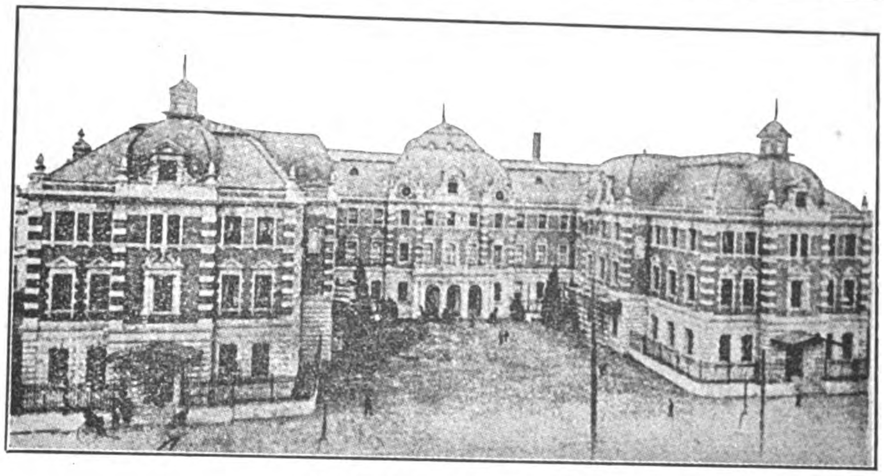

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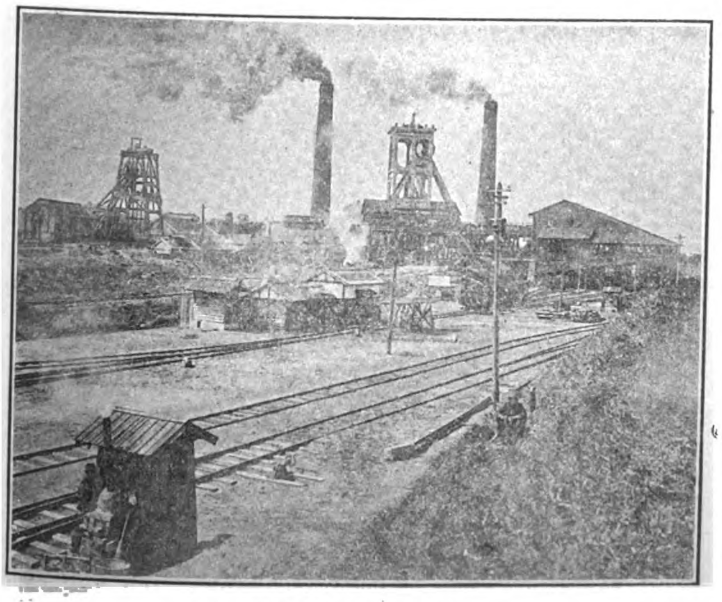

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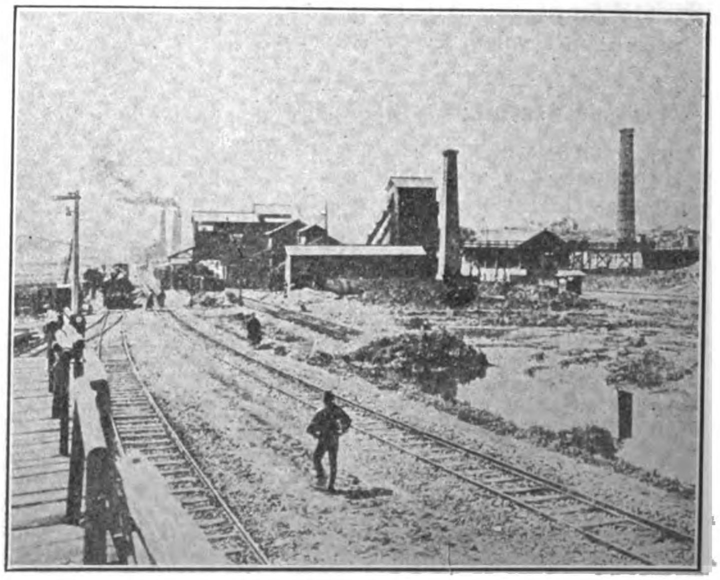

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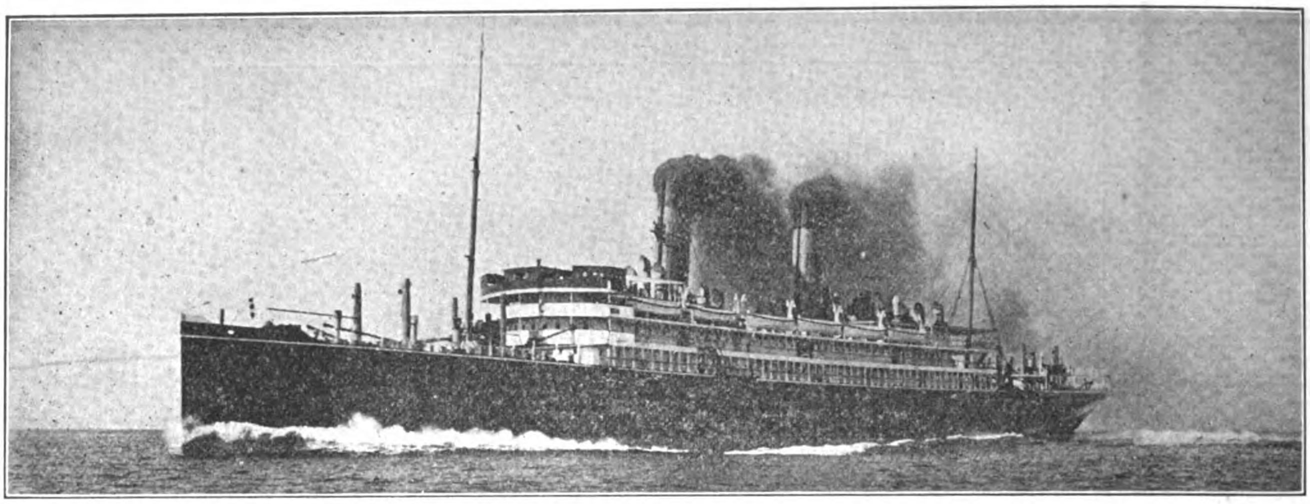

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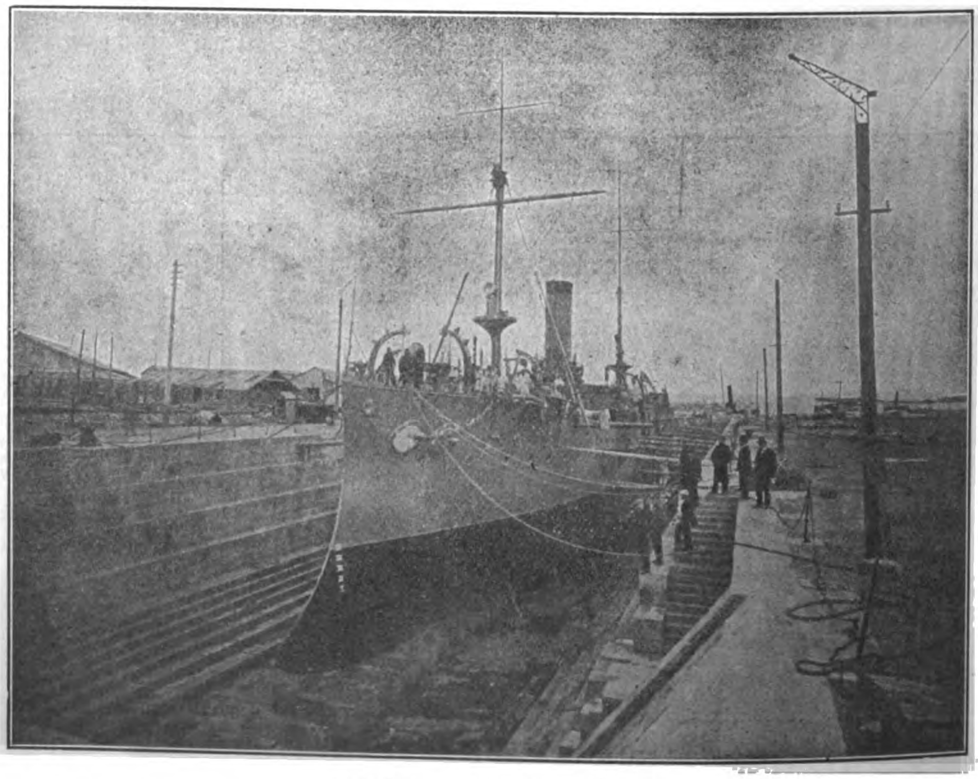

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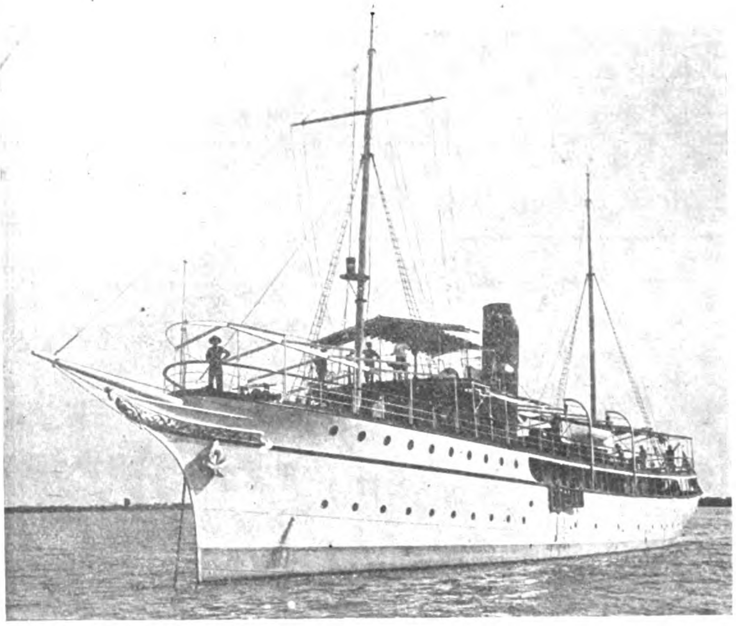

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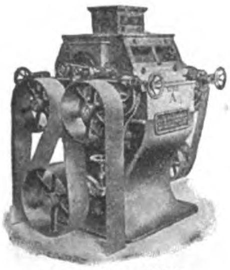
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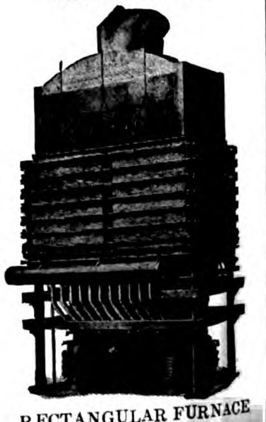
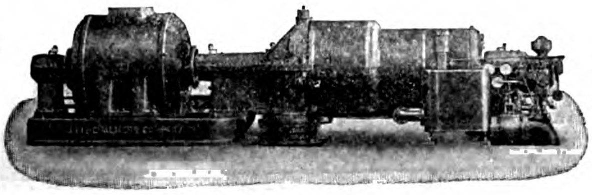
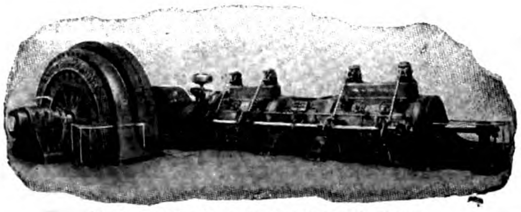

RECTANGULAR FURNACE


STEAM TURBINE UNIT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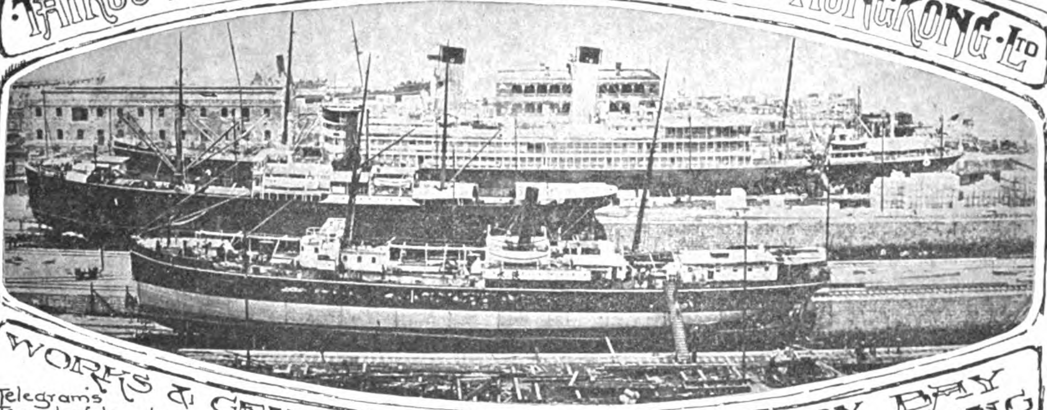

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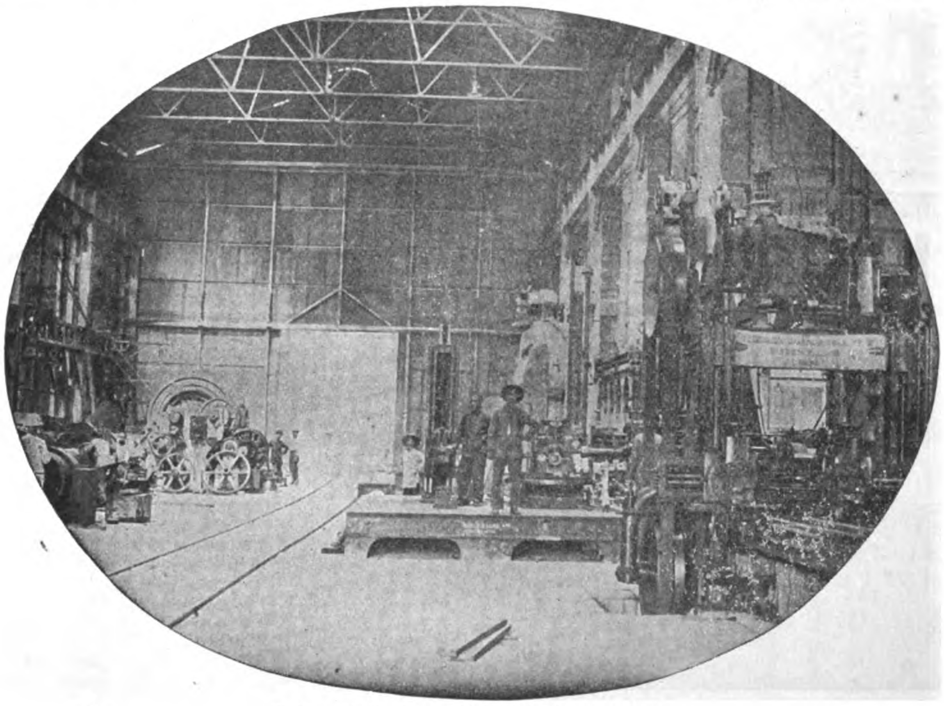

VIEW OF PORTION OF MACHINE SHOPS

AGENTS IN HONGKONG, CHINA AND JAPAN
Butterfield & Swire

THE POWER FOR THE ESTABLISHMENT is generated by Gas Producers, on the Mond System, supplying 4 Cockerill Gas Engines of 3,000 collective horse power, driving Electrical Generators, and is transmitted throughout the Works by means of Electrical Motors.

AN ELECTRIC DERRICK CRANE capable of lifting weights up to 100 tons, is erected on the Sea Wall, and 14 Electric Overhead Travelling Cranes ranging from 5 tons to 100 tons, are fitted throughout the Workshops.

AGENTS IN MANILA AND PHILIPPINE ISLANDS

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THE DOCK PUMPS consist of 2 sets of Centrifugal, Electrically driven, pumps, together capable of emptying the Dock with 35 feet of water on the Sill in 2¾ hours.

THE MACHINERY in the Engine Works is laid out for dealing with the heaviest classes of Engines.

THE SLIPWAY CARRIAGES are of the latest pattern by Morton of Leith, and the Winding Gear consists of large electrically driven winches operating massive wire cables.

TENDERS SUBMITTED AND ESTIMATES GIVEN FOR BUILDING AND REPAIRING ALL CLASSES OF VESSELS; ALSO FOR EVERY DESCRIPTION OF ENGINE AND BOILER, MECHANICAL, ELECTRICAL AND CONSTRUCTIONAL WORK

HONGKONG & WHAMPOA DOCK CO., LTD.

Telegraphic Address: **Manifesto Hongkong**
Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians.

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All classes of CONSTRUCTIONAL and GENERAL ENGINEERING WORK undertaken, also LOCOMOTIVES, RAILWAY ROLLING STOCK and PLANT, BRIDGES, etc.

COAST and RIVER STEAMERS, TUG BOATS and LAUNCHES, SHALLOW DRAFT VESSELS and STERN WHEEL STEAMERS.

AUXILIARY MACHINERY for MARINE and LAND Purposes.

LAND and MARINE BOILERS of all sizes and classes.

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We make a specialty of HIGH SPEED MOTOR BOATS for PASSENGER and CARGO Traffic.

ALL CLASSES of COCKS, VALVES and FITTINGS in IRON and BRASS supplied.

BOLTS, NUTS and RIVETS MANUFACTURED at SHORT NOTICE.

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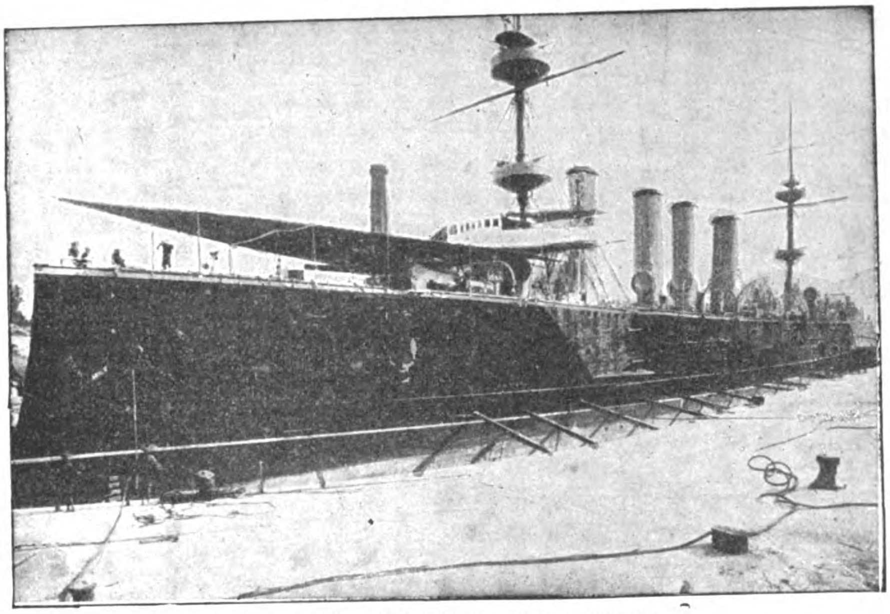
The Company possesses SIX GRANITE DOCKS and TWO PATENT SLIPWAYS and these are equipped for EXPEDITIOUS WORK. Our plant is of the most modern type throughout.

Ship Owners and Captains are assured that DOCKING and REPAIRS are carried out PROMPTLY and at MODERATE CHARGES.



H. M. S. POWERFUL IN NO. 1 DOCK, KOWLOON

The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	*Length on Keel Blocks*	*Entrance Breadth*	*Depth Over Sill at Ordinary Spring Tides*	*Rise of Tide*	
				Springs	*Neaps*
KOWLOON	*Feet*	*Feet*	*Feet*	*Feet*	*Feet*
No. 1 Dock, Kowloon	700	86 ft. top / 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon	240	60′	14′	7′ 6″	—
Patent Slip, No. 2, Kowloon	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock	466	85′ 6″	20′	7′ 6′	—
ABERDEEN					
Hope Dock	430	84′	23′	7′ 6″	—
Lamont Dock	333	64′	16′	7′ 6″	—

Please Address Enquiries to the Chief Manager, R. M. DYER, B. Sc., M. I. N. A., Kowloon Dock, Hongkong.

Telephone No. 13 K. Head Office, Kowloon.

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MANUFACTURING COMPANY

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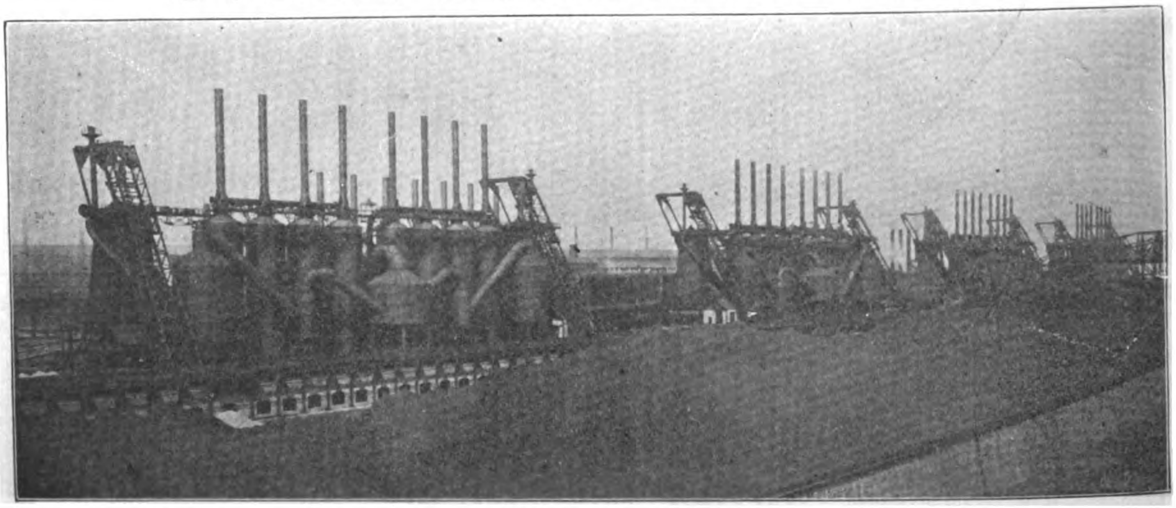

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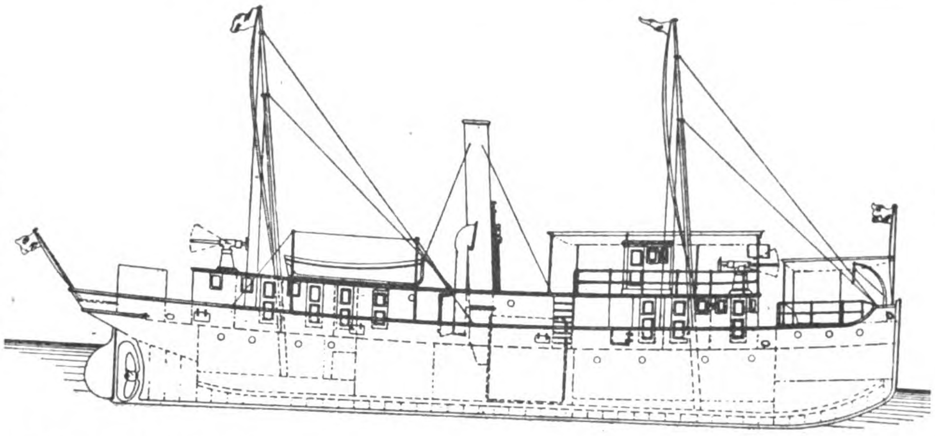

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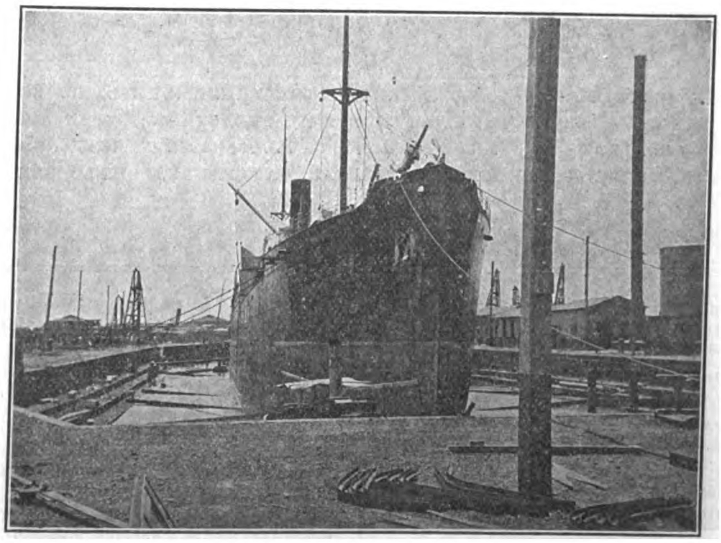
PROPRIETORS OF THE

YANGTSZEPOO DOCK

THE DOCK, WORKS AND OFFICE ARE LOCATED ON THE SHANGHAI SIDE OF THE RIVER, 15 MINUTES BY ELECTRIC TRAM FROM HEART OF THE CITY

THE WORKS ARE EQUIPPED WITH THE MOST MODERN MACHINERY, CAPABLE OF HANDLING THE LARGEST MARINE ENGINEERING WORK



VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK

LENGTH ON BLOCKS	455′0″
„ OVERALL -	469′0″
WIDTH, ENTRANCE	74′0″
„ SILL - -	64′0″
DEPTH ON SILL, (H. W. O. S. TIDES) - - -	21′0″
DEPTH ON 3′0″ BLOCKS (H. W. O. S. TIDES)	19′0″

PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.

WORKSHOPS LOCATED AT HEAD OF DOCK

OFFICE, DOCK & WORKS, 37 YANGTSZEPOO ROAD, SHANGHAI

TELEGRAPHIC ADDRESS: "SPEEDY." CODE: A.B.C., 5TH EDITION — TELEPHONE 703. — MANILA AGENT, F. L. STRONG

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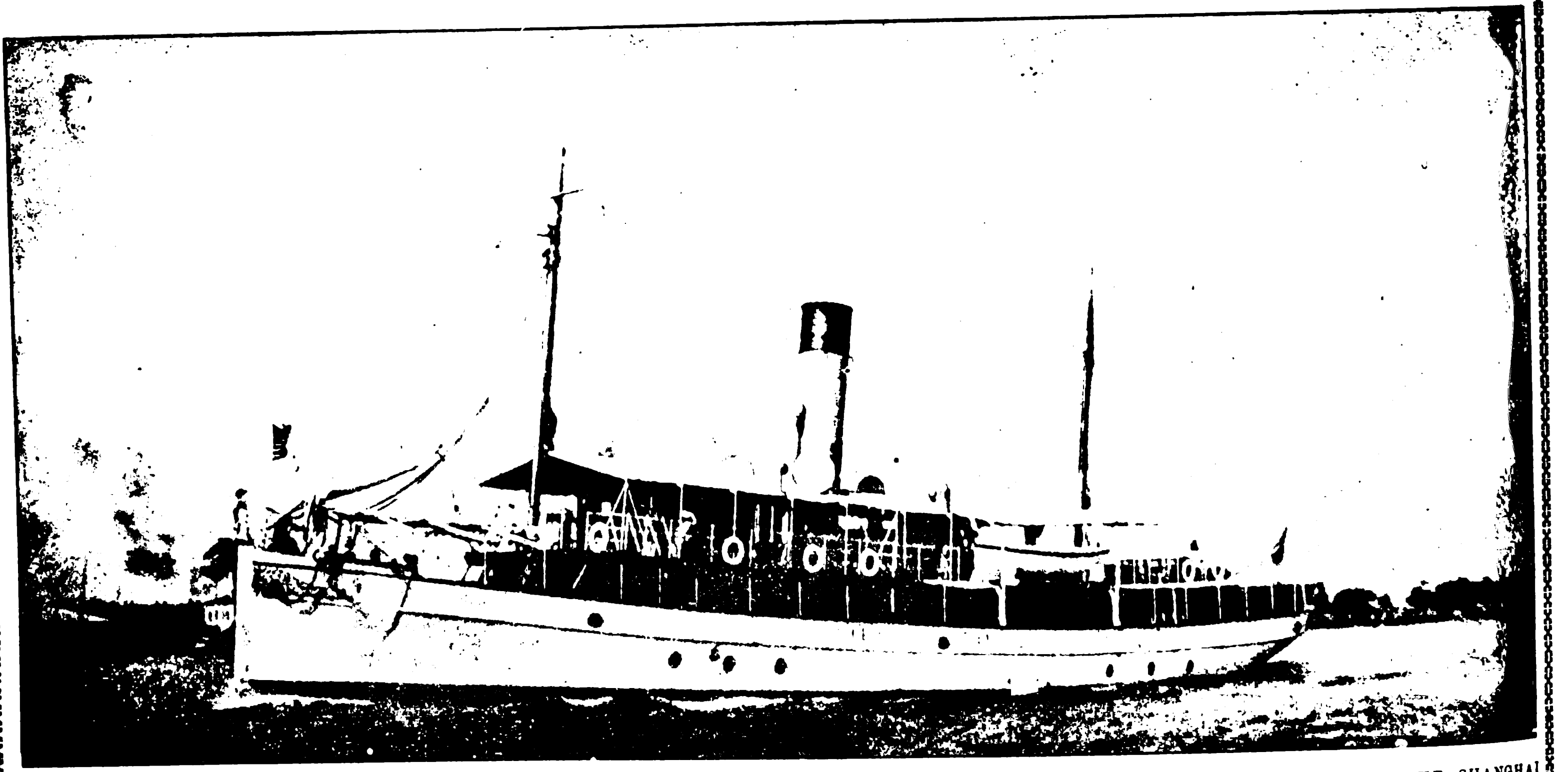

COMPOSITE COAST GUARD AND REVENUE CRUISERS FOR THE GOVERNMENT OF THE PHILIPPINE ISLANDS BUILT AND ENGINED BY THE SHANGHAI DOCK AND ENGINEERING CO. LTD.; LENGTH OVERALL—148; LENGTH B. P.—140; BREADTH—25; DEPTH—11′9″; SIZE OF ENGINES: H. P. CYLINDER—18″; L. P. CYLINDER—36″; STROKE—21″; I. H. P. 600. S. S. BALALAC, BASILAN, BUSUANGA, CORREGIDOR, LEYTE, LUZON, MASBATE, MINDANAO, MINDORO, NEGROS, PALAWAN, PANAY, POLILLO, SAMAR, TABLAS.

The Docks are five in number, ranging in length from 355 feet to 532 feet on the Blocks, and breadth of entrance from 53 feet to 77 feet, with a depth of water on the sill of from 16 feet to 24 feet.

The Dock charges are very moderate.

The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

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Every description of repairs and renewal work undertaken and expeditiously executed.

Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools, Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and engineering accessories generally.

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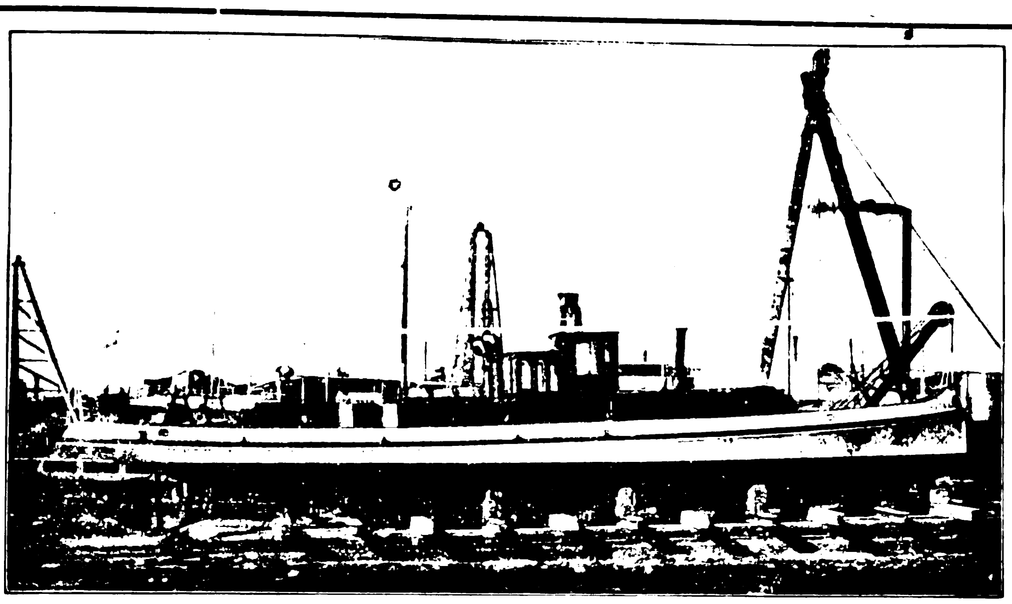

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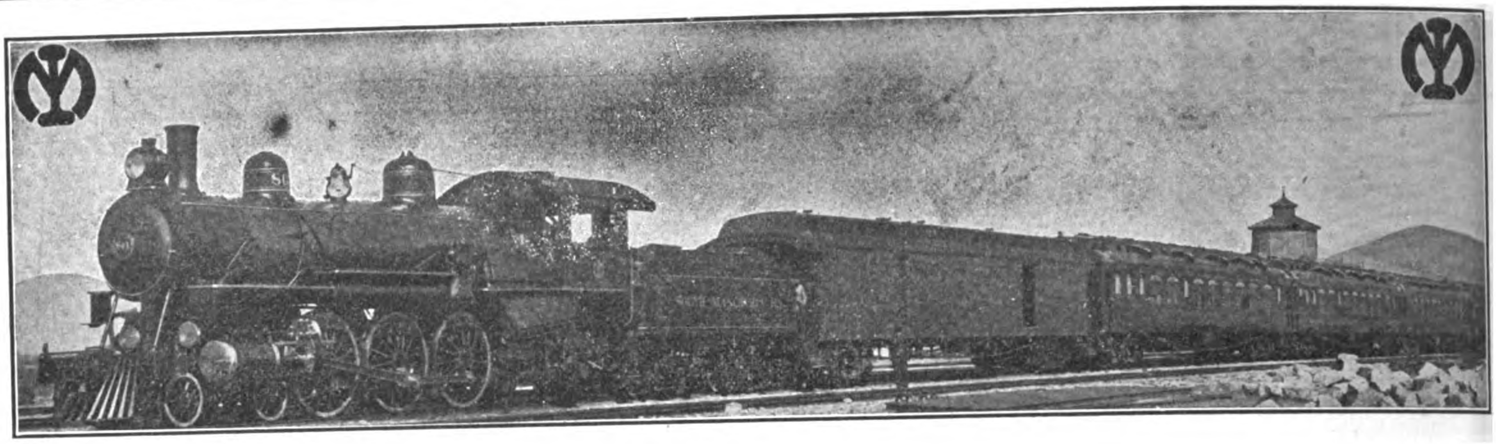

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,, St. Pet'burg (via Viatka)	10 days.
,, Berlin	11 ,,
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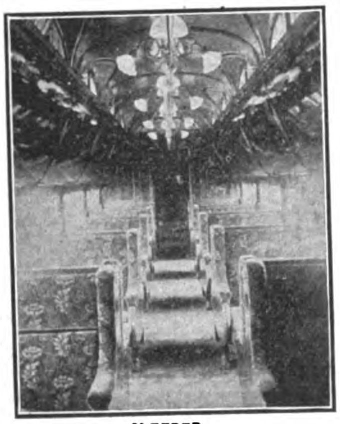
SHORTEST, QUICKEST AND CHEAPEST ROUTE BETWEEN THE FAR EAST AND EUROPE VIA DAIREN



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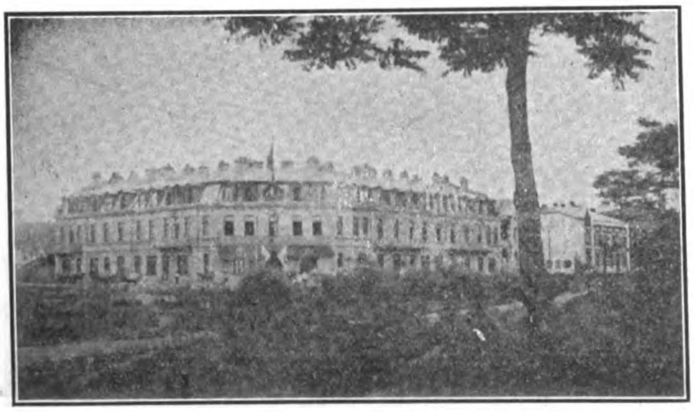

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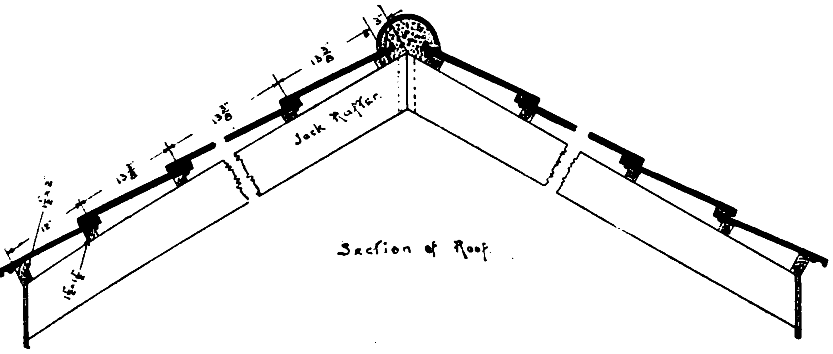

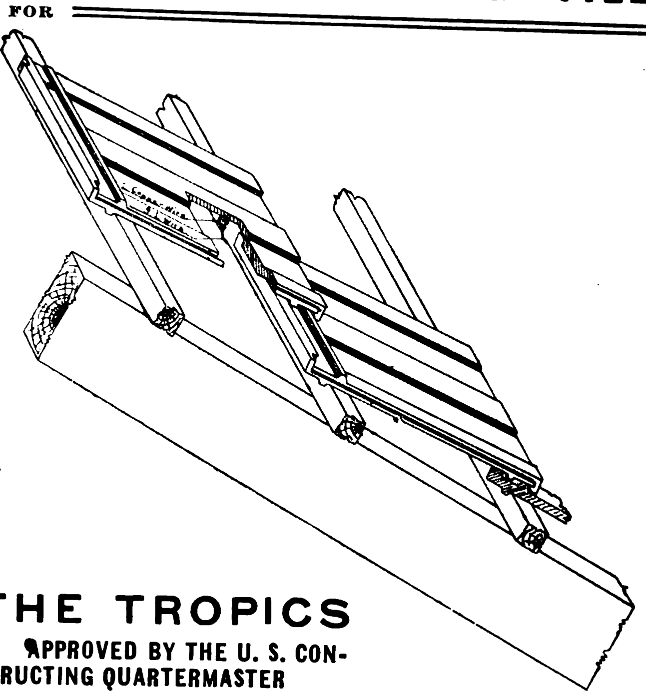

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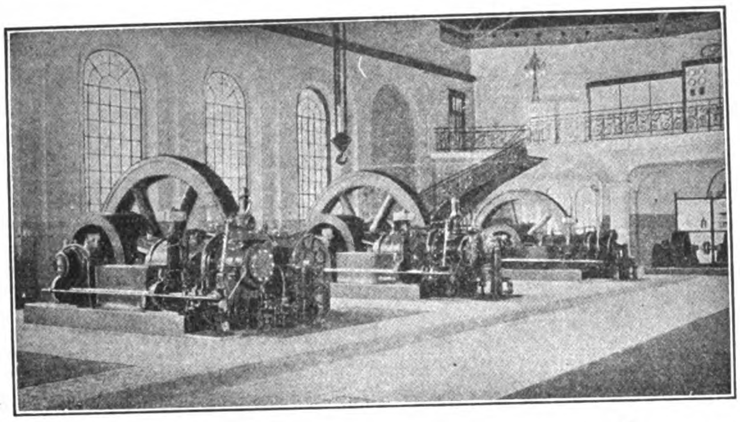

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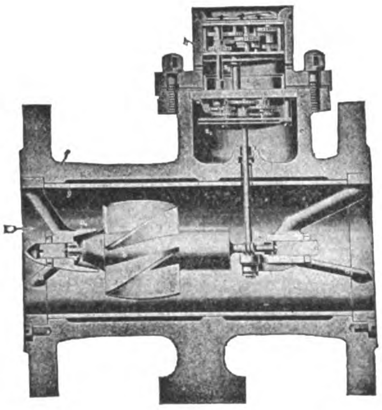

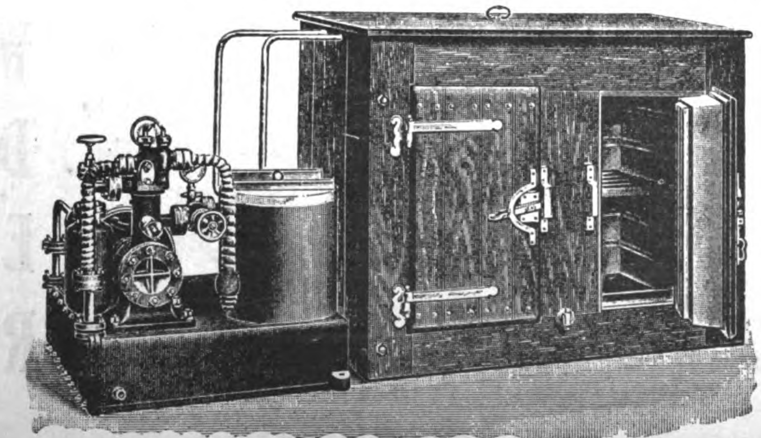

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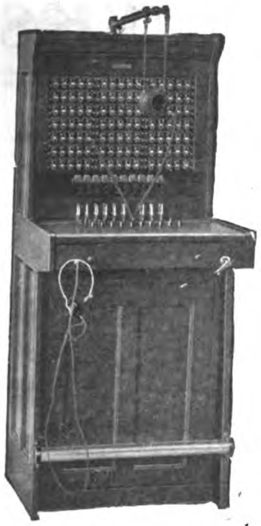

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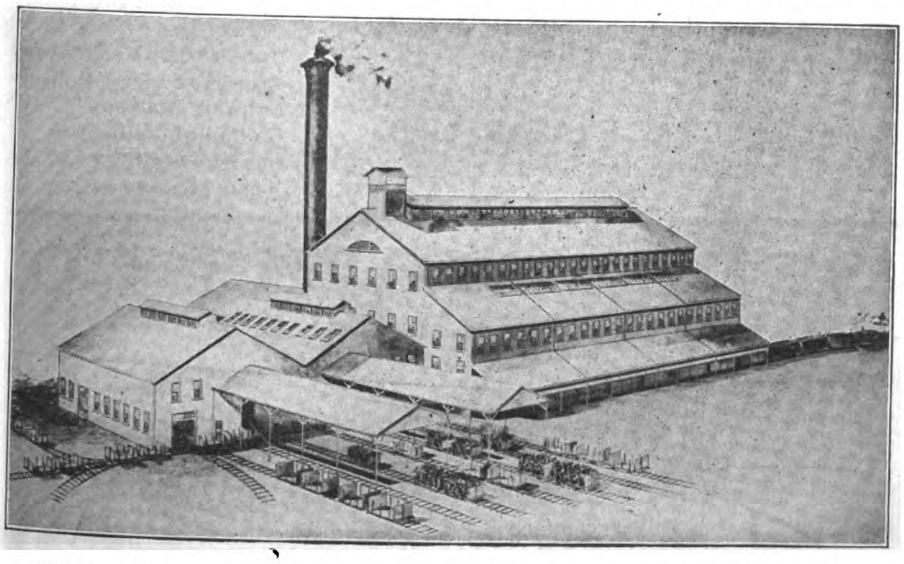

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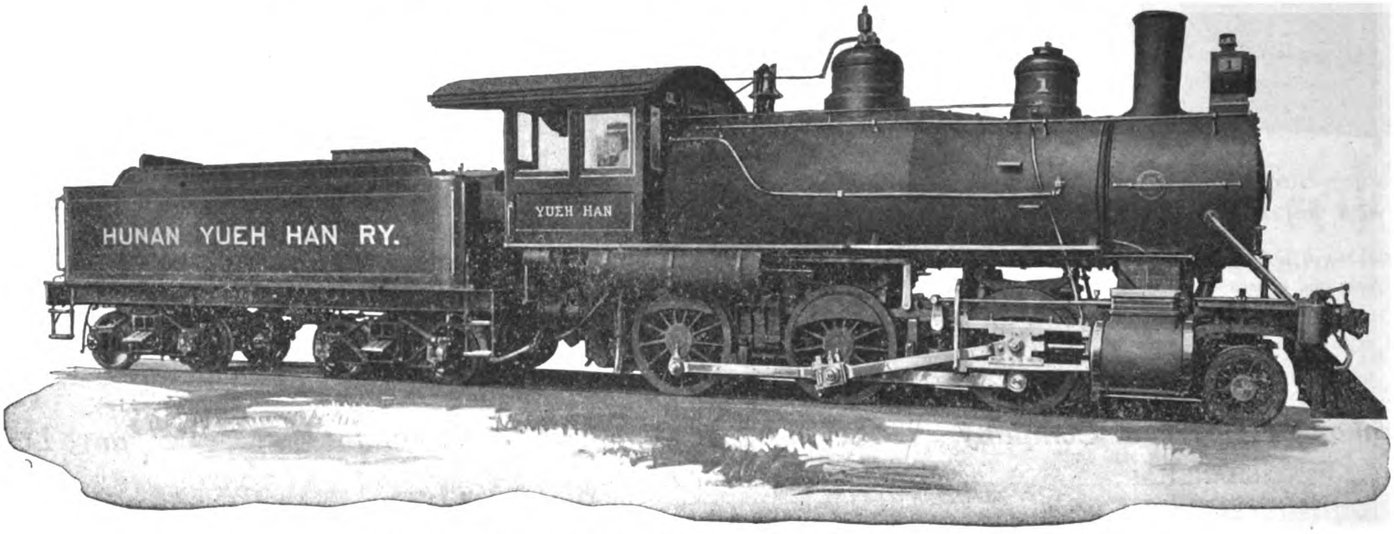

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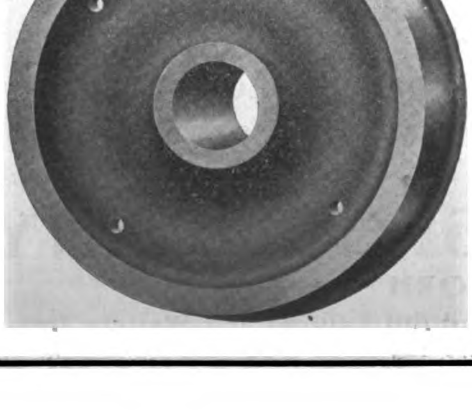

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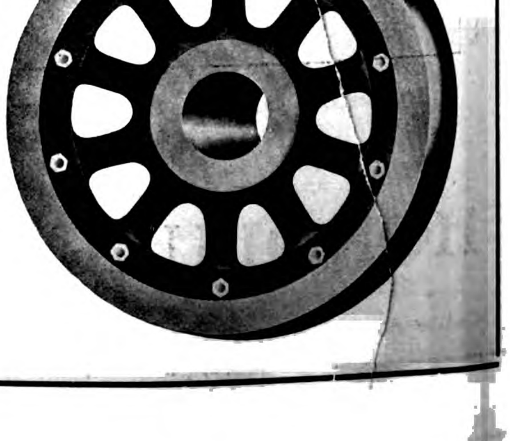

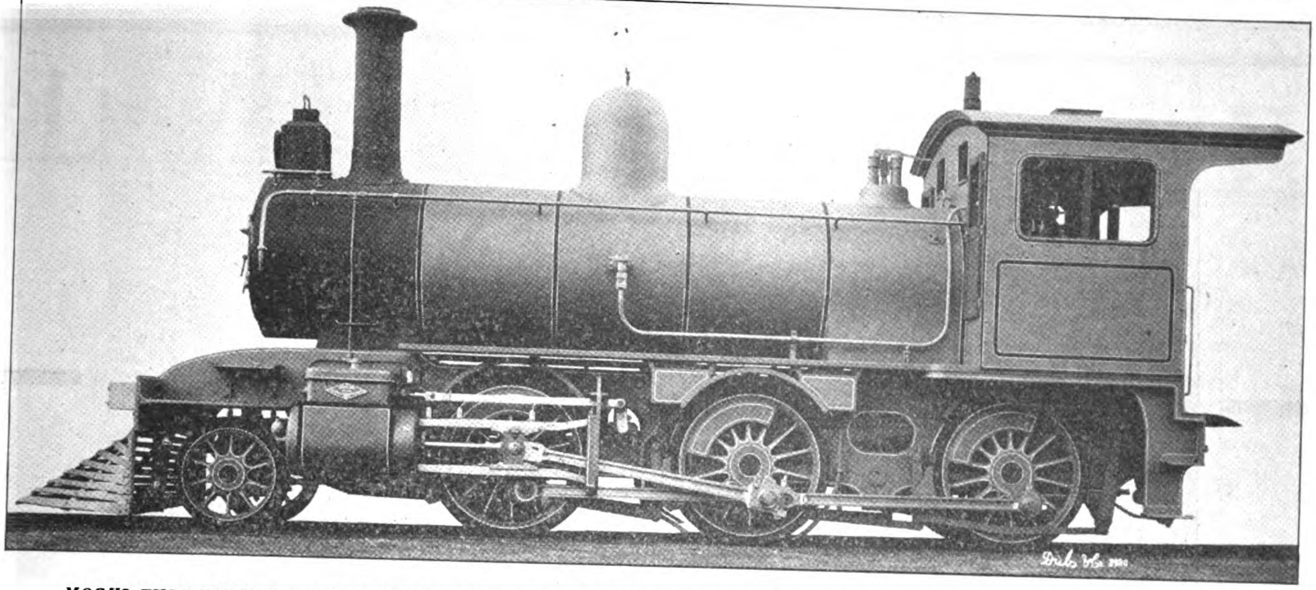

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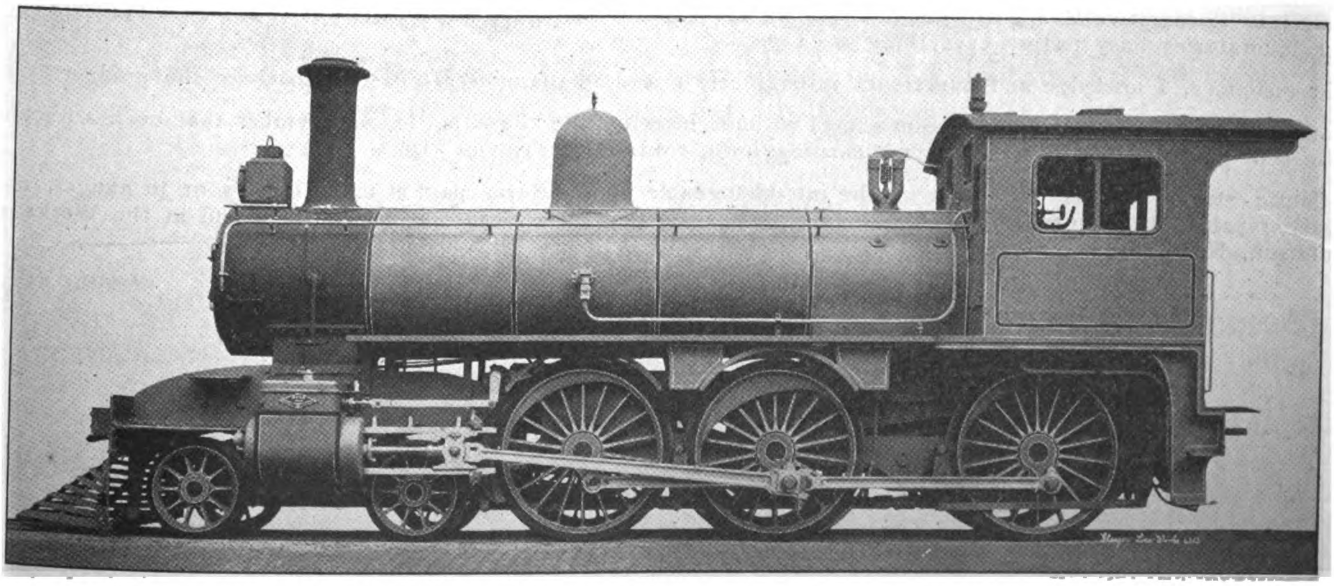

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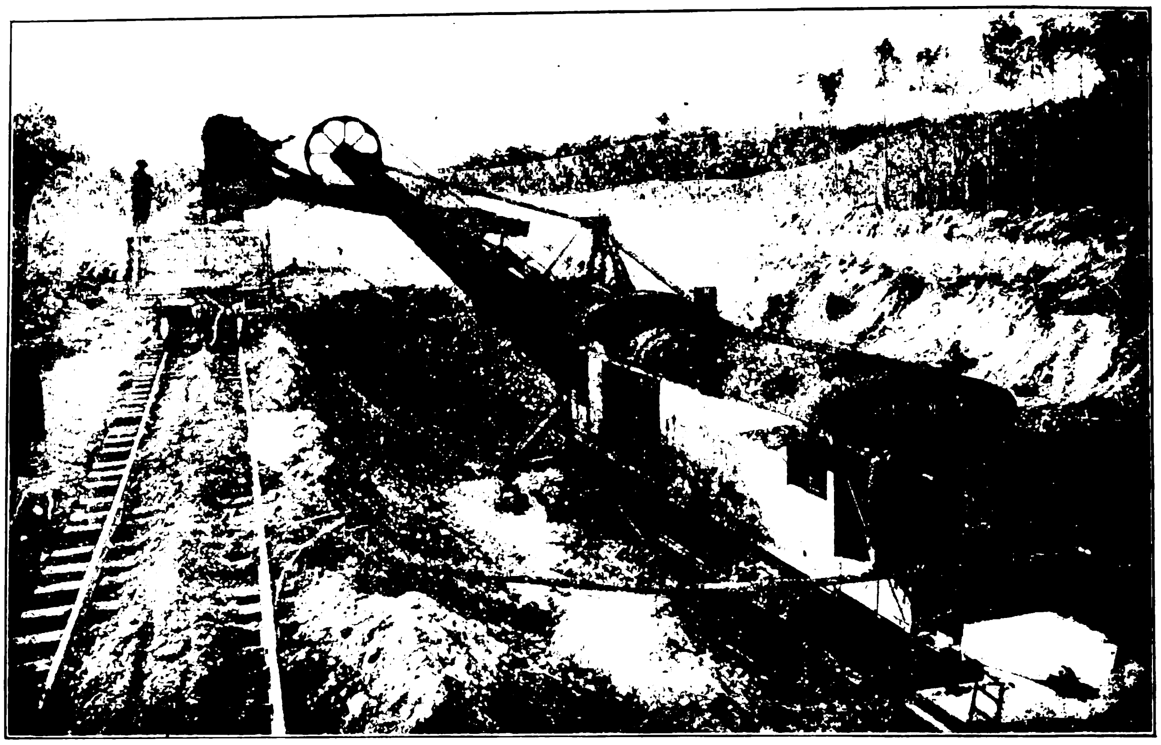

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At work in Grade Reduction on Seaboard Air Line Railway, near Richmond, Va.

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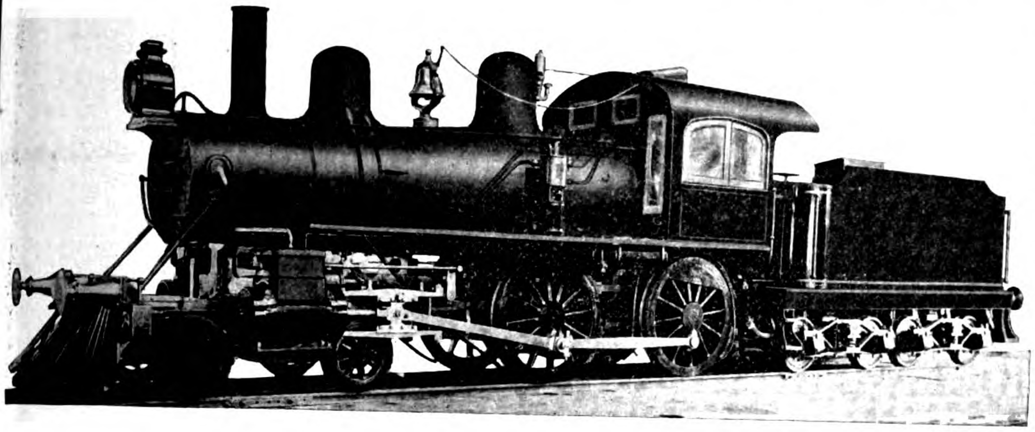

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Tractive power 13770 lbs.

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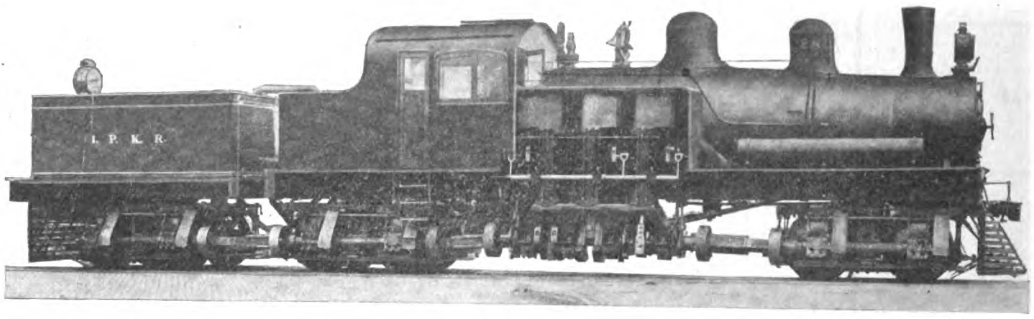

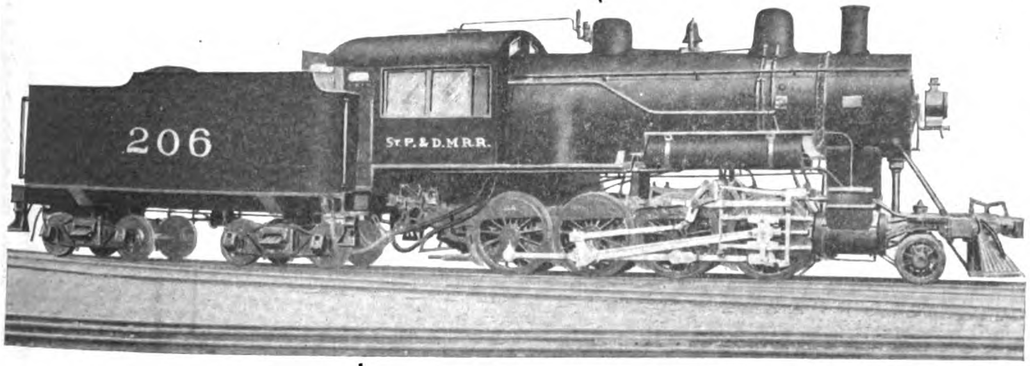

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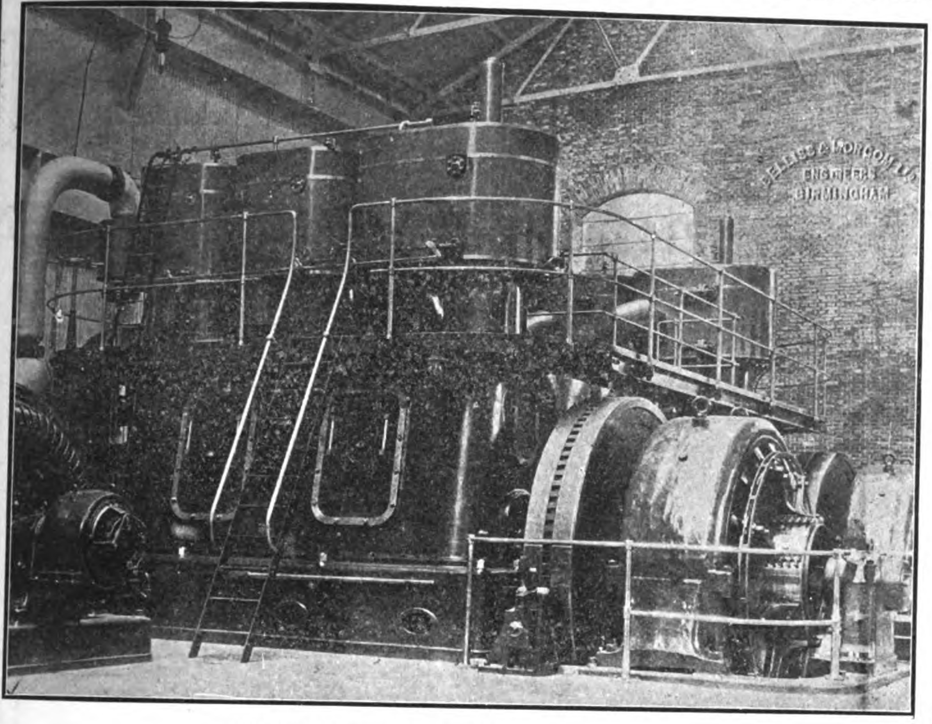

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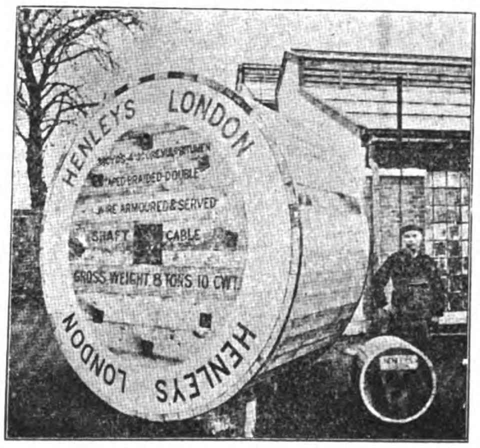

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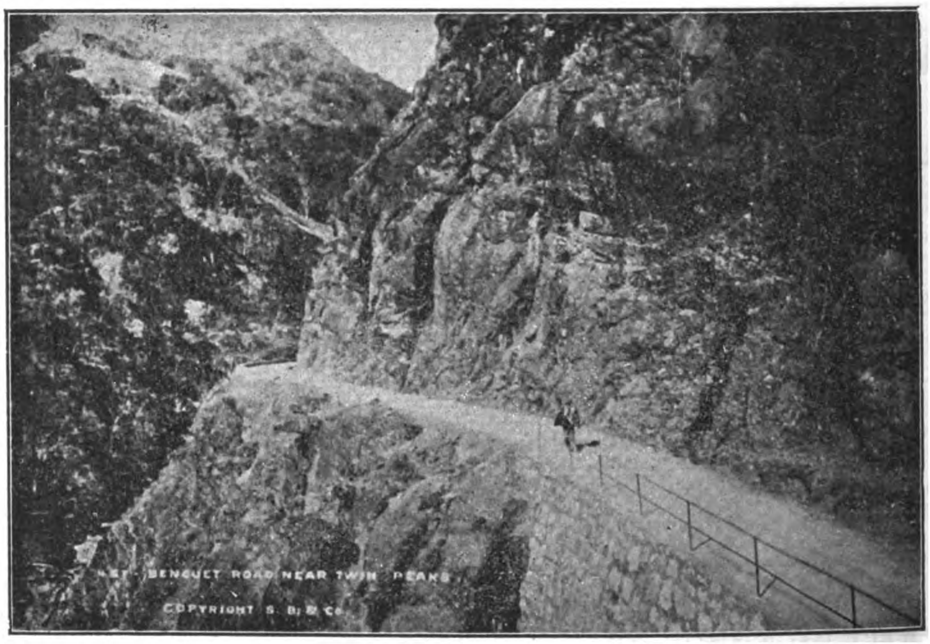

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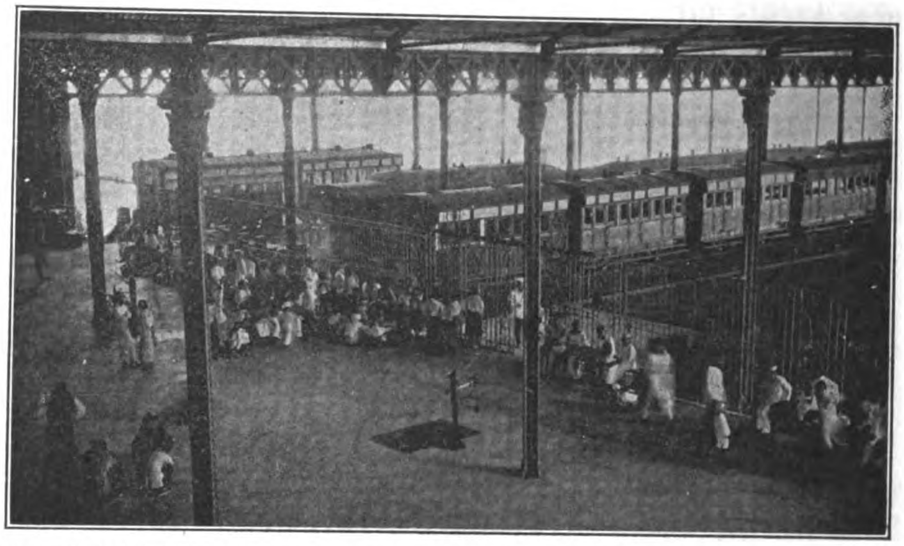

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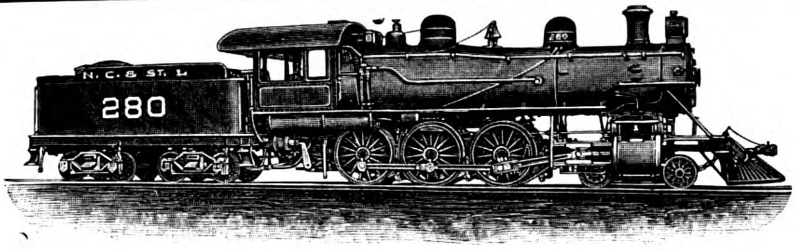
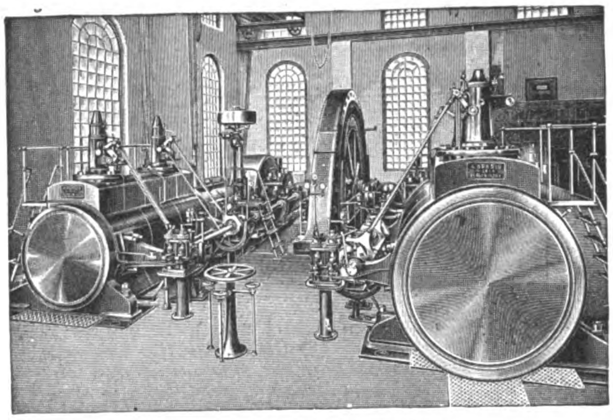


BALDWIN LOCOMOTIVE



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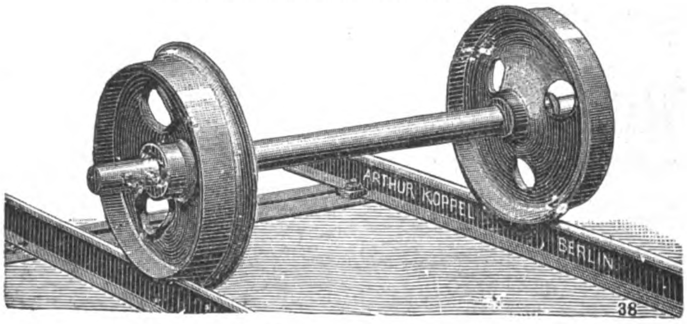
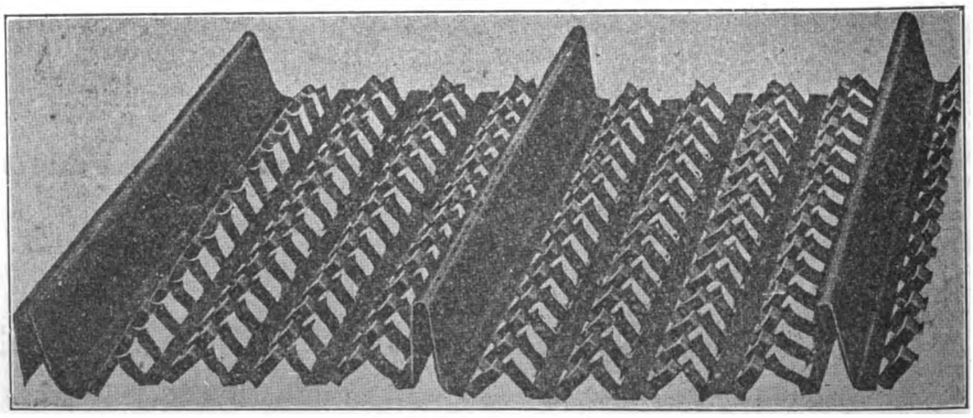


RAILWAY WHEELS AND AXLE



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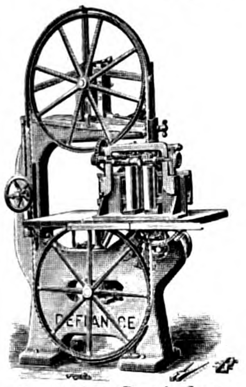

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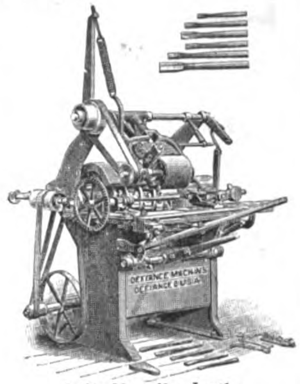

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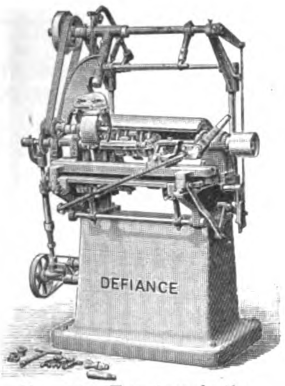

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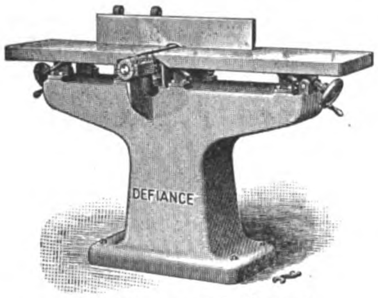

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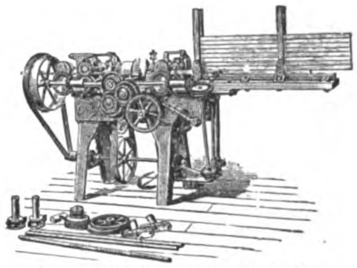

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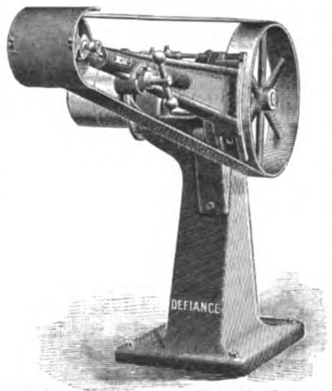

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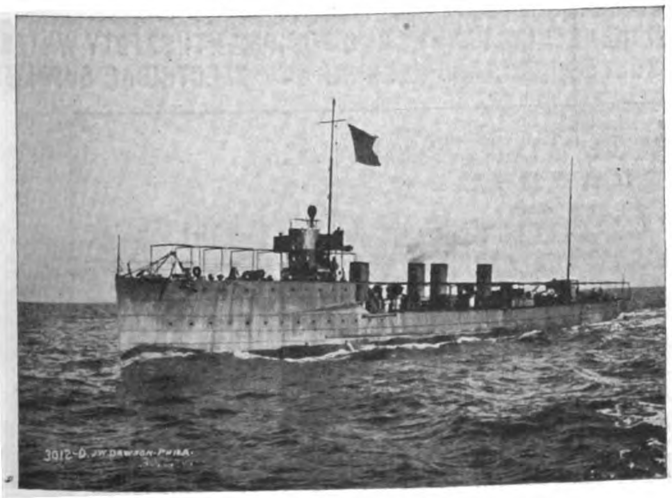

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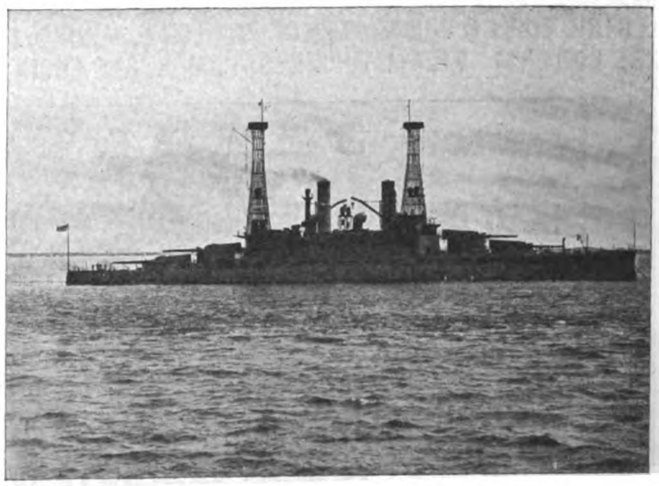

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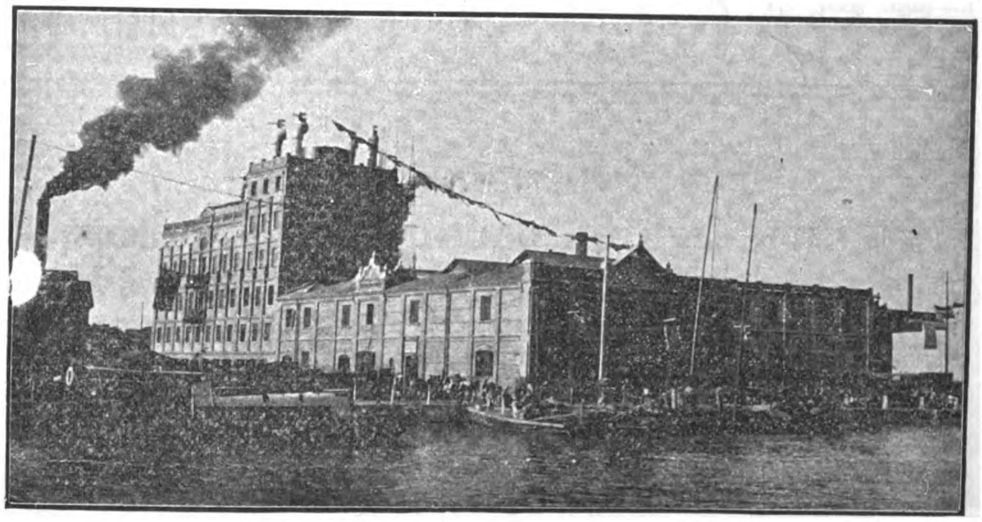

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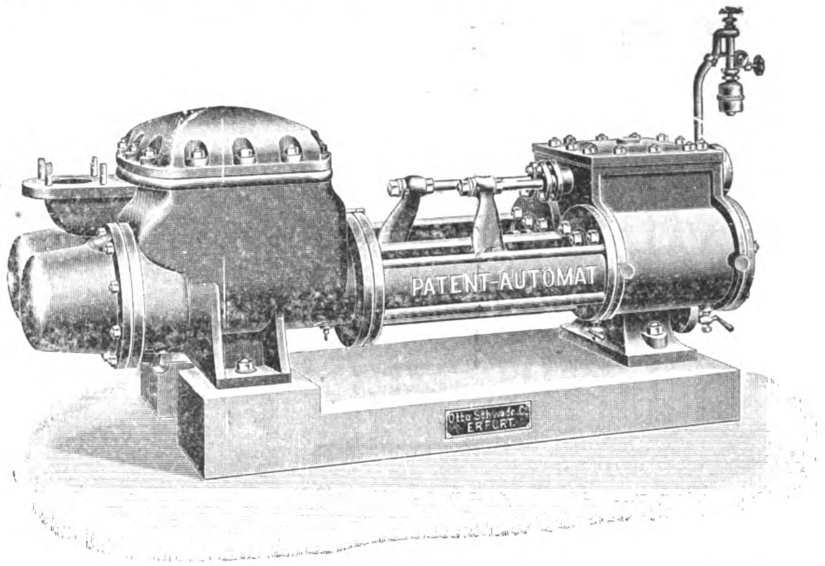

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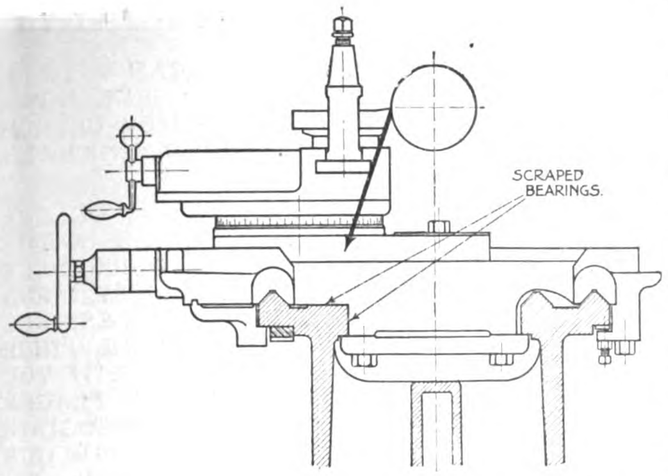

TOOL THRUST

A light bridge will answer for light cuts on large diameters with the tool point directly above the front shear. But stresses are of a very different sort when the lathe is under a heavy cut on a small diameter.

The illustration shows the position of tool and compound rest on the 24″ Patent Head lathe when taking a 15 L. P. cut on work of 5″ diameter. Heavy arrow indicates direction of pressure due to cut. Note the large bearing against the top and inside of bed directly in line with the tool thrust, in addition to the full length bearings of carriage upon front and rear V's. This extra bearing gives a solid support to the bridge just where it is needed, and positively prevents deflection or distortion even under the heaviest cut.

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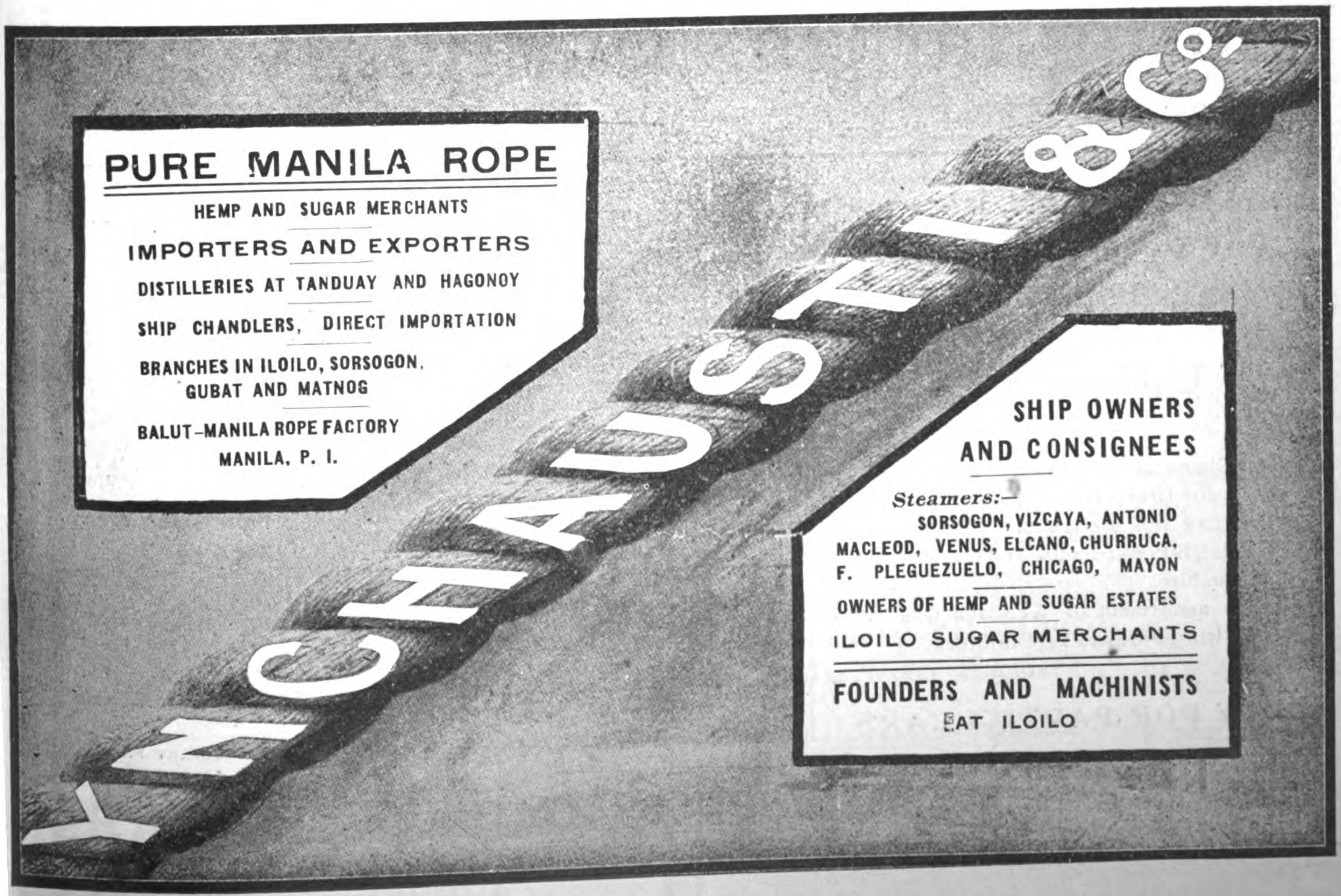

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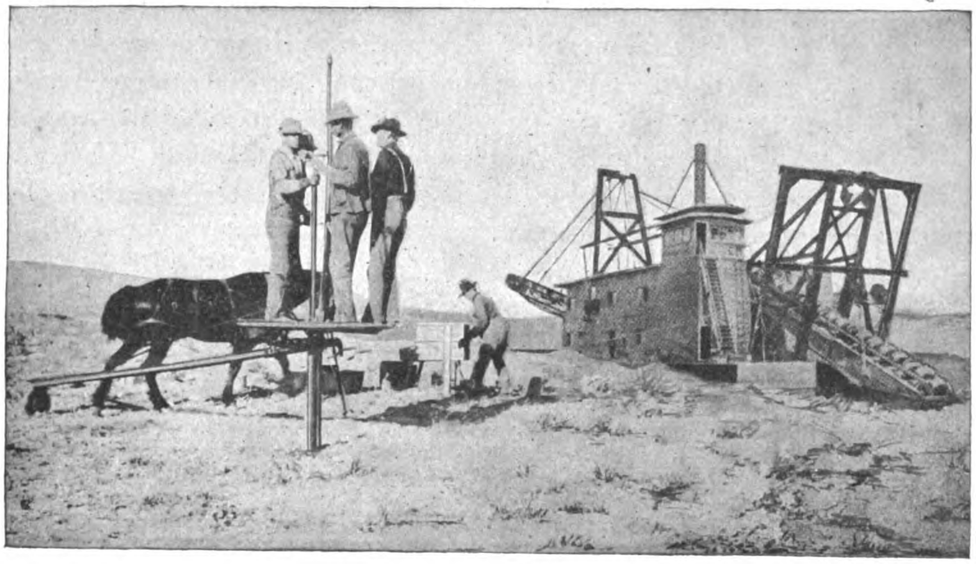

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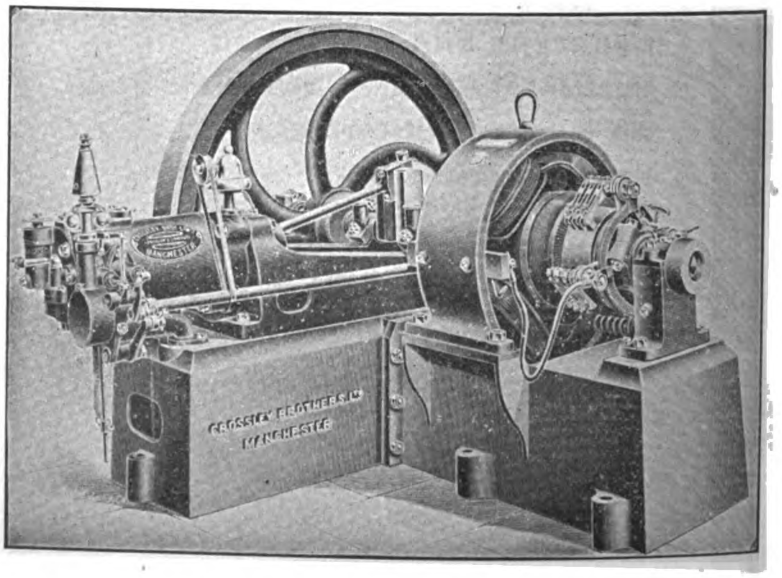

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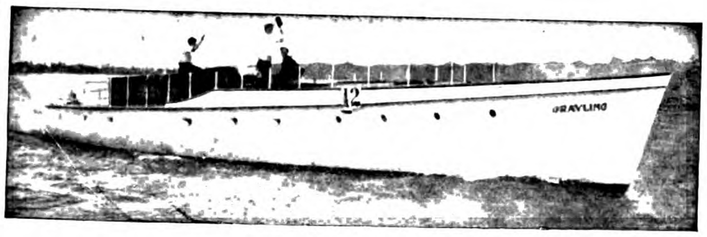

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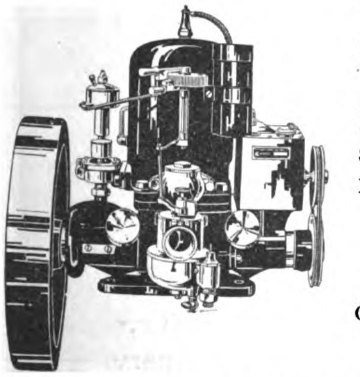

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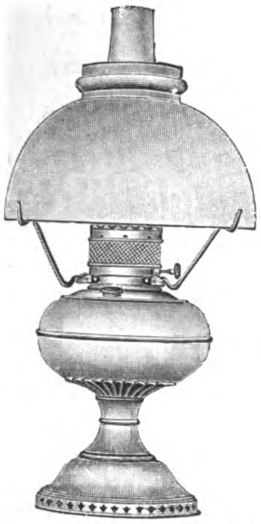

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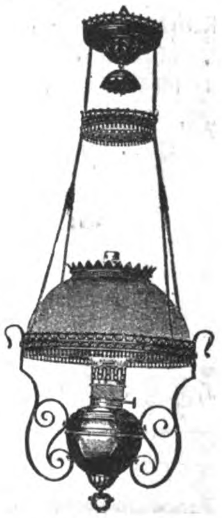

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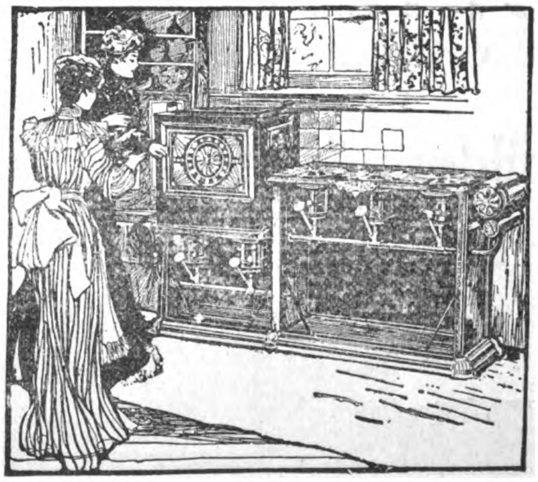

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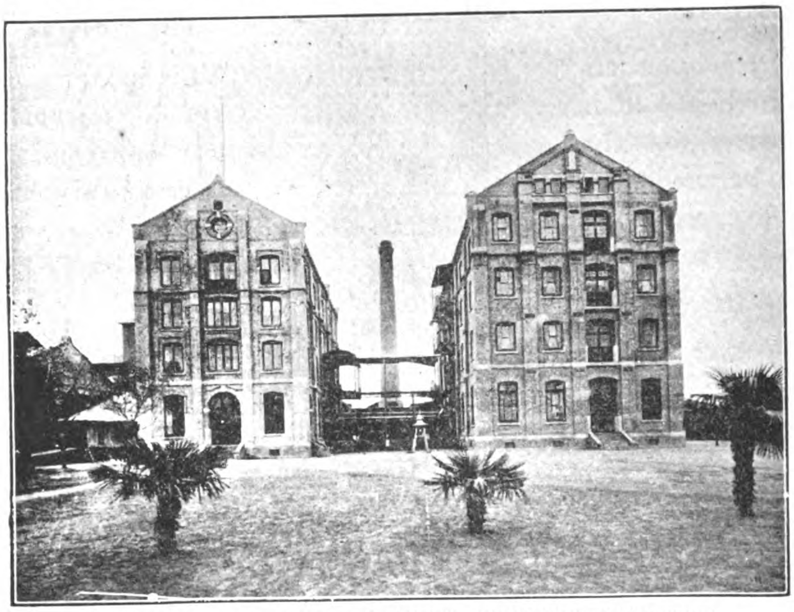

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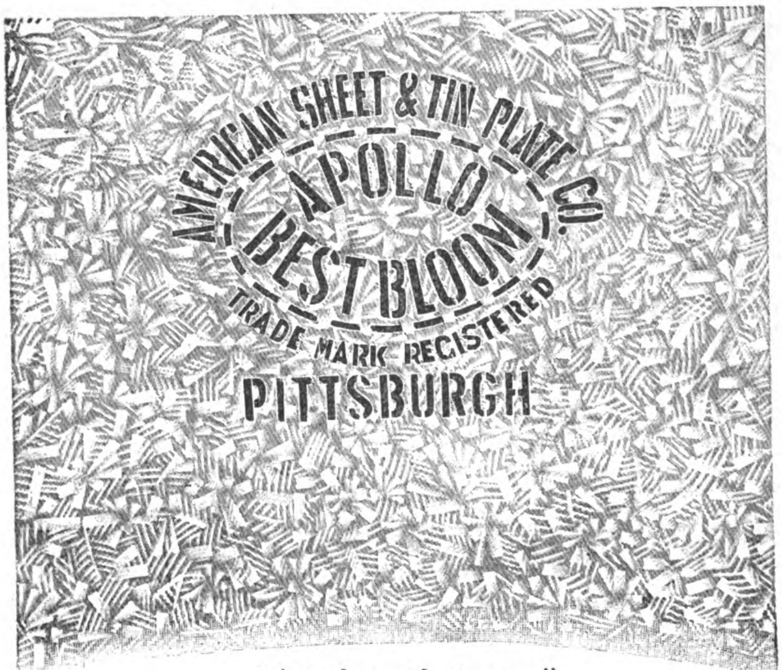

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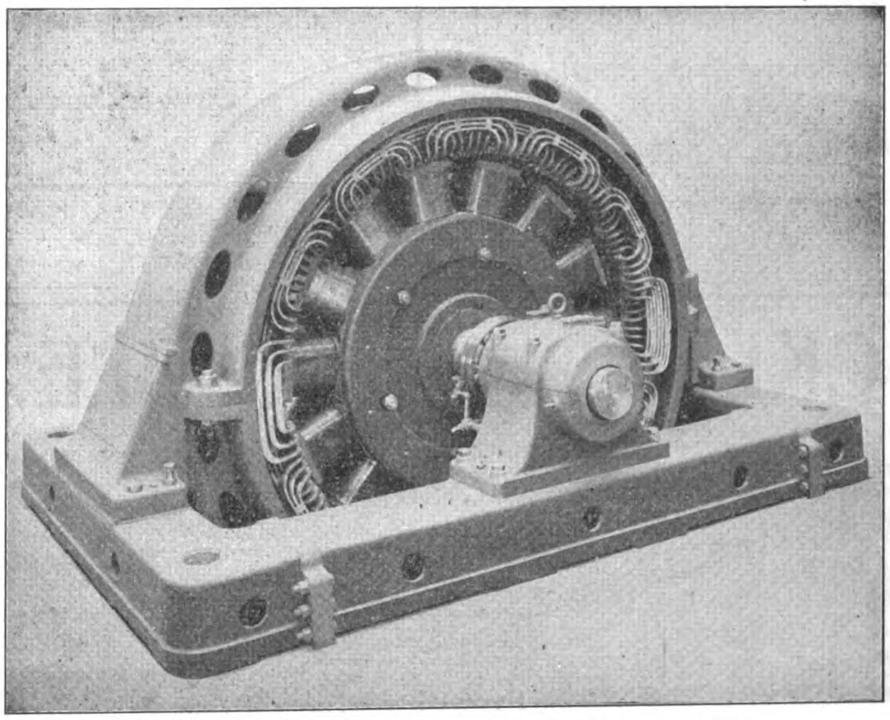

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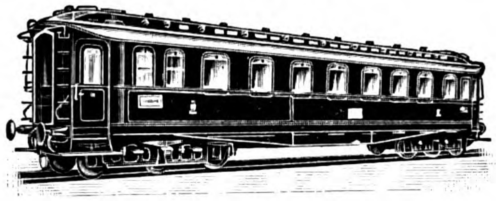

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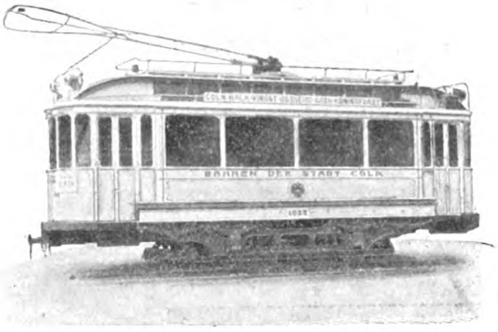

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THE ACKLEY ADJUSTABLE BRAKE

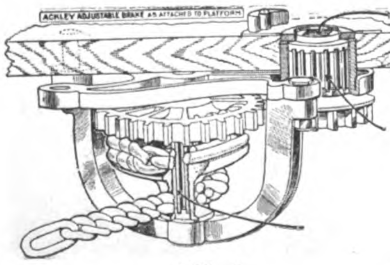

FIG. I

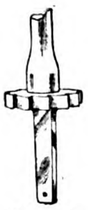

FIG. 3

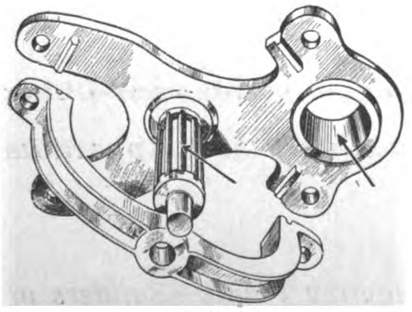

FIG. 2

FIG. 4

The ACKLEY ADJUSTABLE is the only gear brake that can be attacep to the platform at any angle, owing to the adjustable yoke.

It requires no machine fitted bearings on the staff—(Fig. 2) simply square the staff in blacksmith shop for loose fit—reducing cost of labor to less than one-fourth required to fit any other geared brake staff.

All movable parts revolve on roller bearings (B, C, Figs. 1 and 3), eliminating friction, thereby giving ease of action in applying brake shoes and releasing.

Three different gear ratios, 12×36, 14×34 and 18×30, all interchangeable in same frame, can be obtained with different sized winding drums, as desired, to take up required amount of slack chain, according to type or weight of car.

It is the only gear brake which has no staff bearing in the frame. The journaling of the pinion (Fig. 4), in the frame (Fig. 3 at D), independently of the staff (Fig. 2), places the gears at a fixed position, preventing **BINDING,** which occurs to gear brakes having staff bearings in frame. (See THE OLD—Figs. 5 and 6, G and I.)

Here is the conclusion: It is EASY AND INEXPENSIVE TO INSTALL; POWERFUL, YET EASILY APPLIED; RELEASES QUICKLY; NO BINDING OF STAFF OR GEARS; ADAPTED TO ANY AND SUITABLE FOR ALL KINDS OF CARS.

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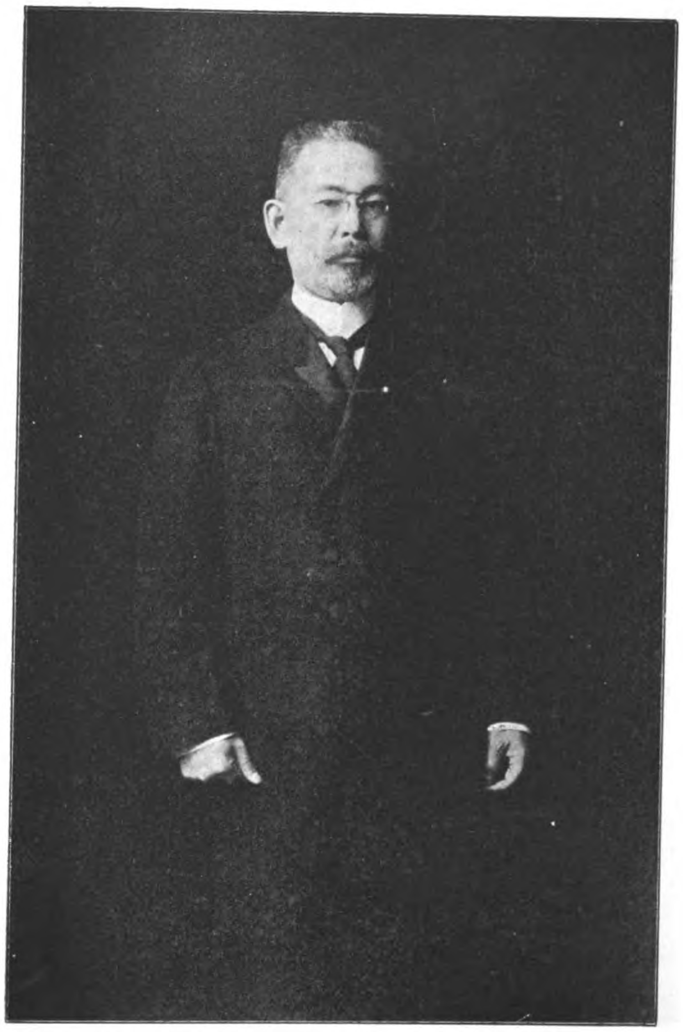
Supplement to

THE FAR EASTERN REVIEW

July, Nineteen Hundred and Eleven



His Excellency BARON S. GOTO
MINISTER OF COMMUNICATIONS

THE FAR EASTERN REVIEW
COMMERCE ENGINEERING FINANCE

VOL. VIII. MANILA, P. I., SHANGHAI, AND YOKOHAMA, JULY, 1911 No. I.

THE LANCHOW MINING COMPANY LIMITED

The Lanchow Mining Co. was founded two years ago with the administration in Tientsin. The mines are situated in the vicinity of Kaiping and join in the eastern and western direction the mines of the Chinese Engineering and Mining Co. in Tongshan and Linsi. They extend to a length of fifteen miles parallel to the Imperial Railways of North China about three miles distant to the north of the stations Kaiping, Wali and Kuyeh.

MACHIAKOU.—The principal mine and the works administration buildings are in Kaiping-Machiakou. Two shafts have been sunk here, of which one is arranged for double haulage. The surface plant of the main shaft comprises the headgear hall and steel coal dressing hall with a capacity of 225 tons per hour. connected by a steel bridge. At present there are installed seven Lancashire Boilers provided with superheaters and traveling chain grating, ash hoist, both driven by electricity and two boiler feed pumps.

In August 1909 a provisional power station, with engine of the semi-portable type installed, was erected, which provided the electric energy for the shaft draining pump, the hauling winch, one small mine ventilator, one pumping plant erected on the river about one mile distance, and for the electric lighting.

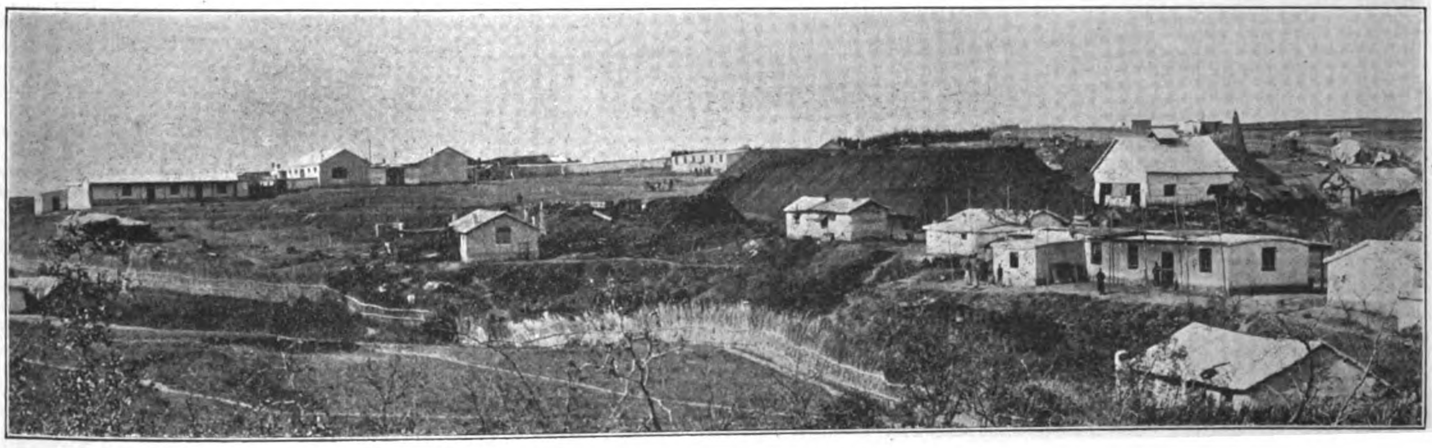
The regular power station, with compound steam engine of 1200 H. P. norm. and 1500 H. P. max. has been working since July, 1910

The plant supplies the larger motors with three phase alternating current of 3000 volts, direct exhaust to the atmosphere. A second similar plant is to be erected in 1911, and for a third unit it is intended to erect an exhaust steam turbine.

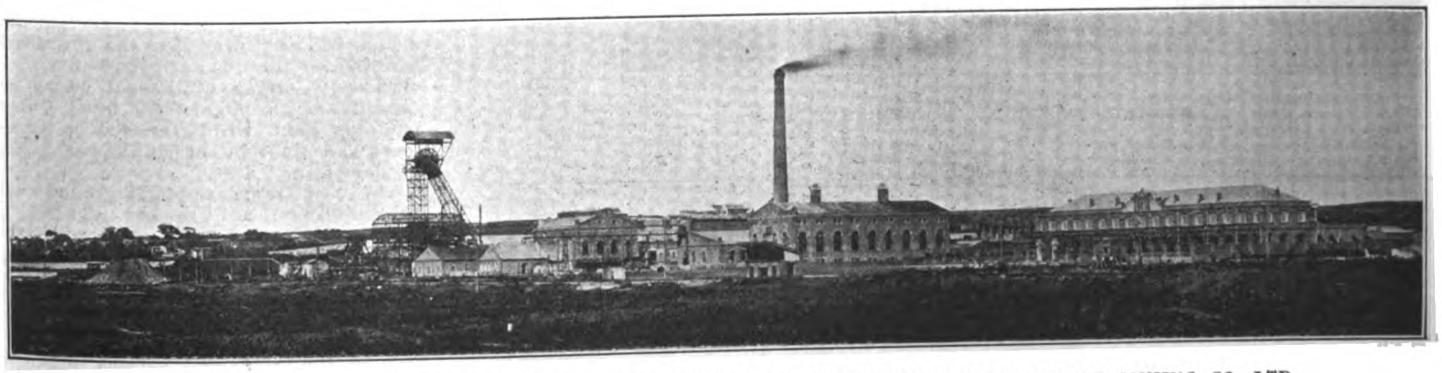
The ventilation of the mine is effected by two electrically driven fans. The capacity of the main fan is ca. 4000 cbyrds—and of the auxiliary fan ca. 3000 cbyrds. of air per min.

Hauling gear, fans, drills, coal cutters and transport appliances under ground are driven by electricity and may also be driven by compressed air.

A small air compressor in connection with a semi-portable steam engine was first used when starting the mine. Since March 1911 a large electrically driven air compressor with a suction capacity of ca. 5500 cbyrds. per min. has been erected.



THE CHENCHIALING MINE OF THE LANCHOW MINING CO. LTD.



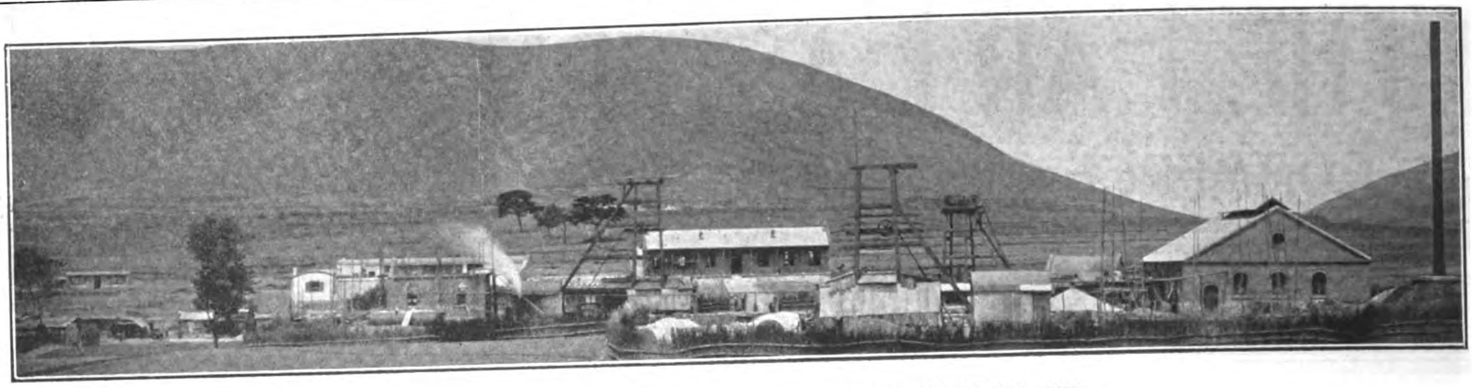
THE ERECTING OF IRON SHAFT CONSTRUCTION AT THE MACHIAKOU MINE OF THE LANCHOW MINING CO. LTD.

The coal dressing plant and the transport machinery and appliances are driven by electricity and two electric hoists serve as connections between the platforms.

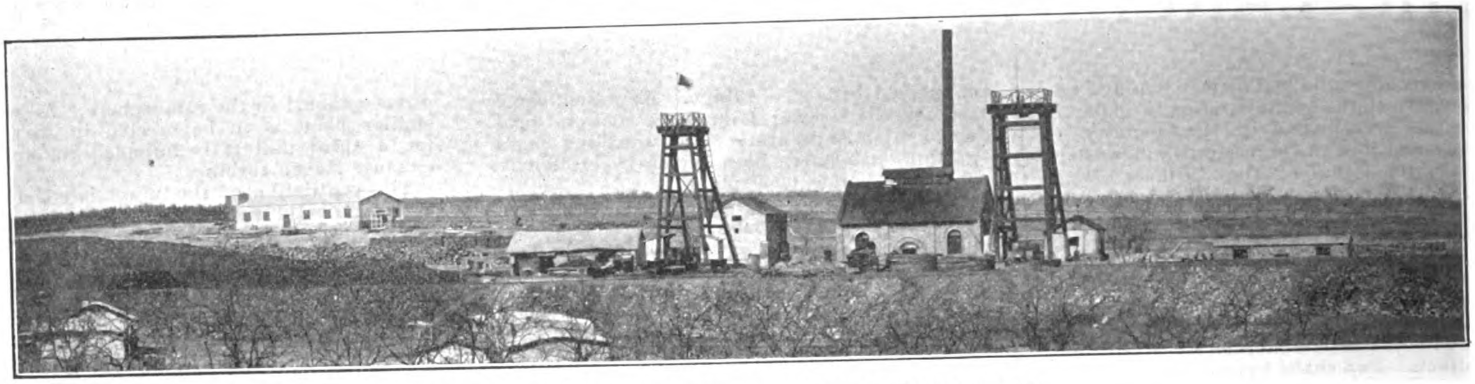
The boilerhouse and the shaftbuilding are smaller motors after passing transformers with current of 500 volts tension, and other motors with direct current of 110 volts.

The steam engine is designed for working in connection with a condenser plant or

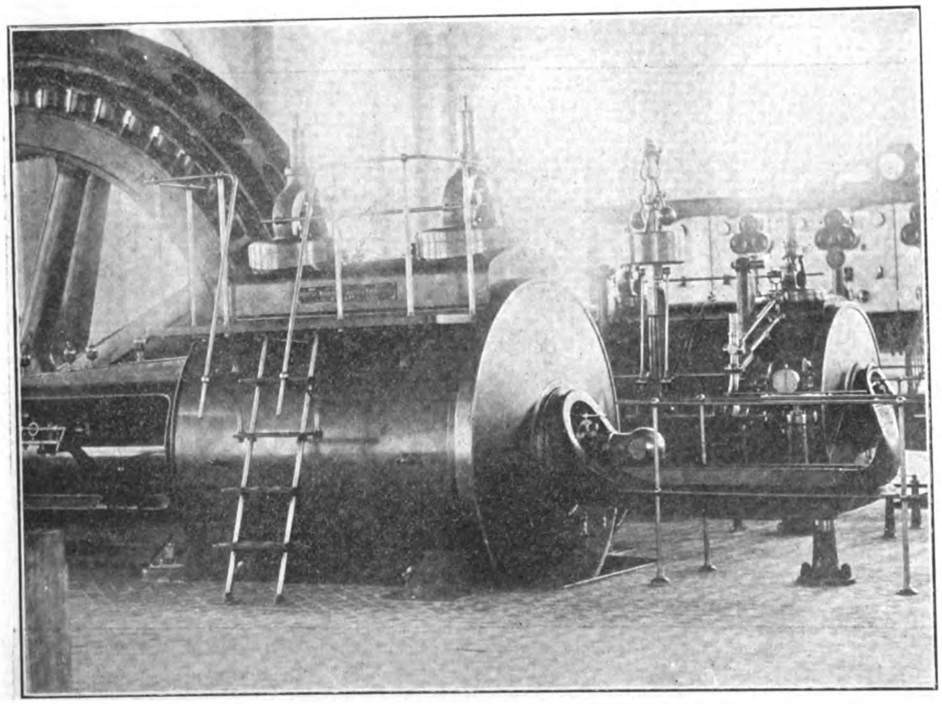
Shaft No. 1. is provided with duplex steam hauling engine and gear of 150 tons capacity per hour. It is intended to erect a second electrically driven hauling set of the same capacity.



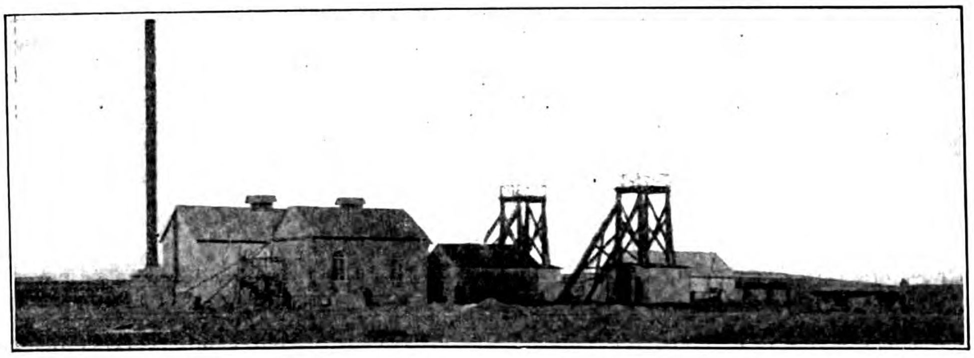
THE CHOWKOCHWANG MINE OF THE LANCHOW MINING CO. LTD.



THE TAOYUAN MINE OF THE LANCHOW MINING CO. LTD.



DYNAMO, ENGINE NO. 1, MACHIAKOU MINE



YINTSEKIOU MINE OF THE LANCHOW MINING CO. LTD.

Shaft No. 2 has a smaller steam hauling set of 50 tons capacity per hour. Since July 1910 a repair workshop with saw mill and 20 electrically driven machine tools has been installed. Two spacious store buildings, a timber yard. two coal yards, one provisional loading bridge, four oil tanks, one store for explosives, one truck scale, one locomotive shed, one water cleaning plant, one bath for mine officials, one construction office with store for building material, two sales offices for coal and one laborer registration office, complete the buildings and constructions over ground. One iron foundry plant is under construction.

One shunt locomotive has been working since January 1911, and a second one has been arranged for. A modern water supply for domestic purpose and for fire hydrants is under construction.

It is intended to erect the following plants in the next year or so:—press coal plant, coal washing plant, coke plant, by-product recovering plant and central condenser plant. About 40 small coke ovens are used at present for the production of small quantities of coke.

Four layers of bituminous coal have been disclosed, which measure from 2 ft., 4 ft , 22 ft. and 45 ft. in thickness.

The water entering the mine amounts to 2.7 cbyrd. per min. On the first level, in addition to the regular shaft pump, is an electrically driven centrifugal pump with a capacity of 2.5 cbyrds. per min. The main pumping plant will be erected on the second level and shall be of ample size to leave a good margin.

The coal transport under ground will be of the mechanically worked type and probably compressed air locomotives will be used.

A miners' compound with hard roads, post office and numerous business places is partly completed. An independent land board has been formed with its own offices in the compound. Besides looking after the administration of the compound various other works are undertaken by this board.

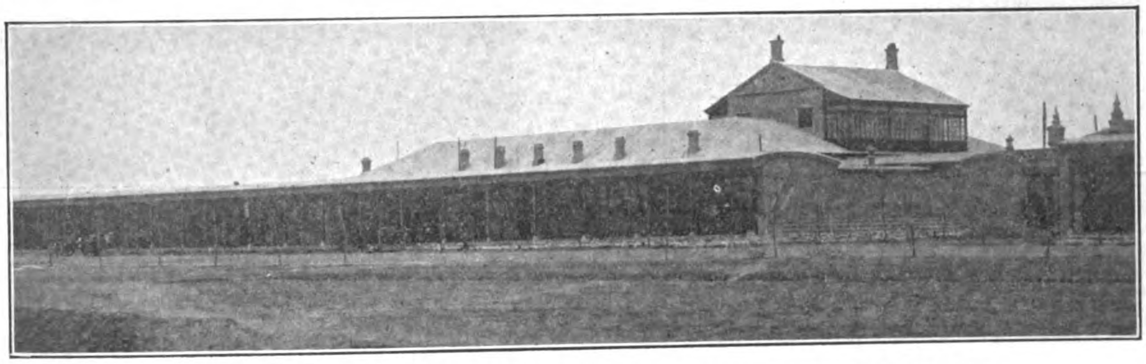
Already in the first year 1,250,000 trees were planted (mostly acacia) which were obtained from the Imp. German forestry reserve in Tsingtau. The planting of trees will be continued on account of their great value to the tree bare country and it is also hoped that useful mining timber will be produced.

In close vicinity to the mine 'a hospital has been erected by the company provided with operating hall, dispensary, laboratory, rooms for convalescents and a newly started park. A Chinese doctor is in charge. Two isolation hospitals have been erected to provide against the outbreak and spread of epidemic diseases.

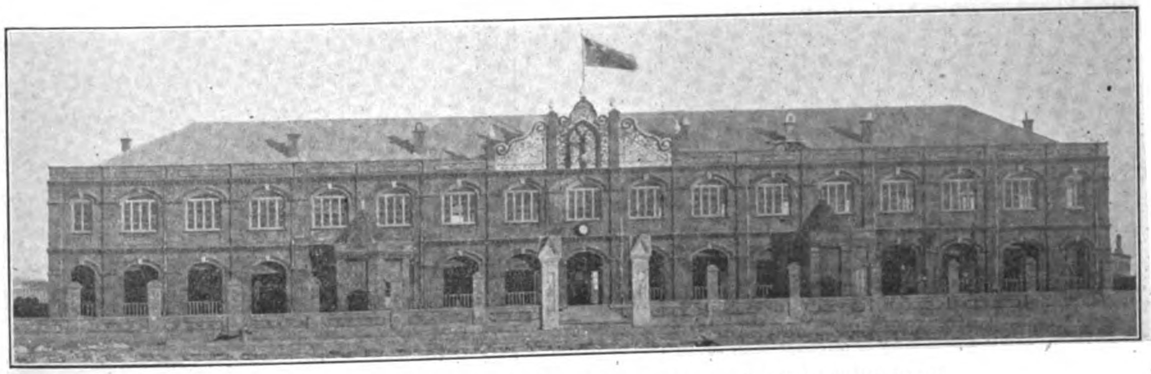
In December, 1910, a technical college was founded for the training of future mining officials. It was started with 20 pupils and in March, 1911, 33 scholars were under training.

YINTSEKOU, LANGWEIKOU, CHENCHIALING AND TAOYUAN.—In the eastern direction of

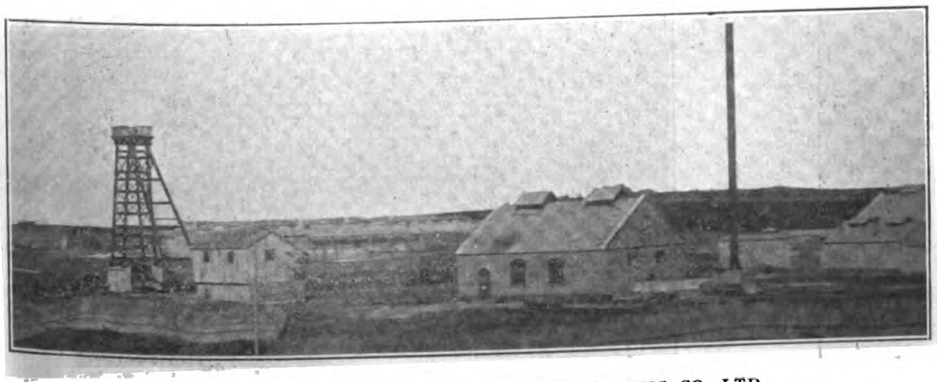
ERECTING OF IRON SHAFT MACHIAKOU MINE



LAND DEPARTMENT OFFICE AT MACHIAKOU OF THE LANCHOW MINING CO. LTD.

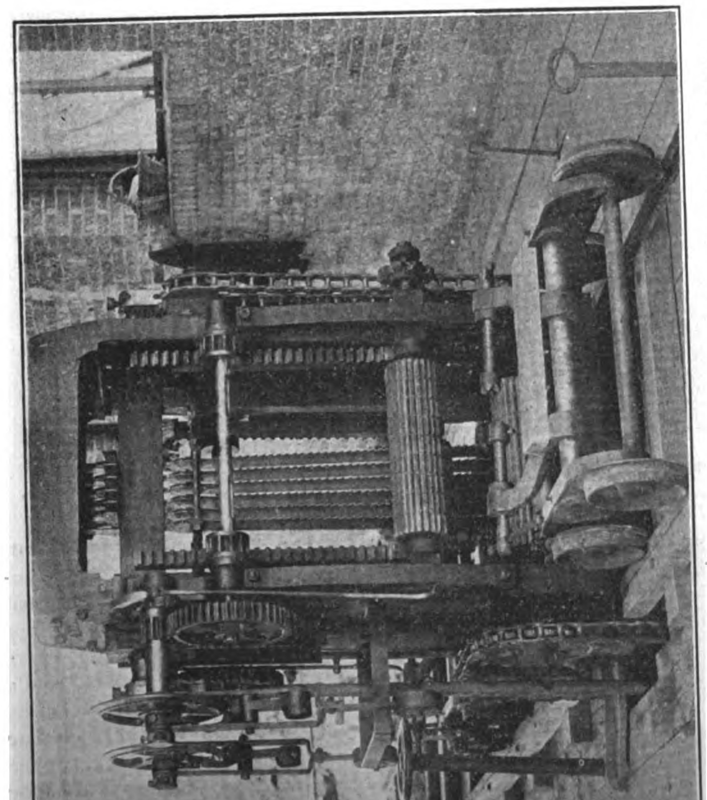


OFFICE BUILDING OF THE LANCHOW MINING CO. AT MACHIAKOU MINE

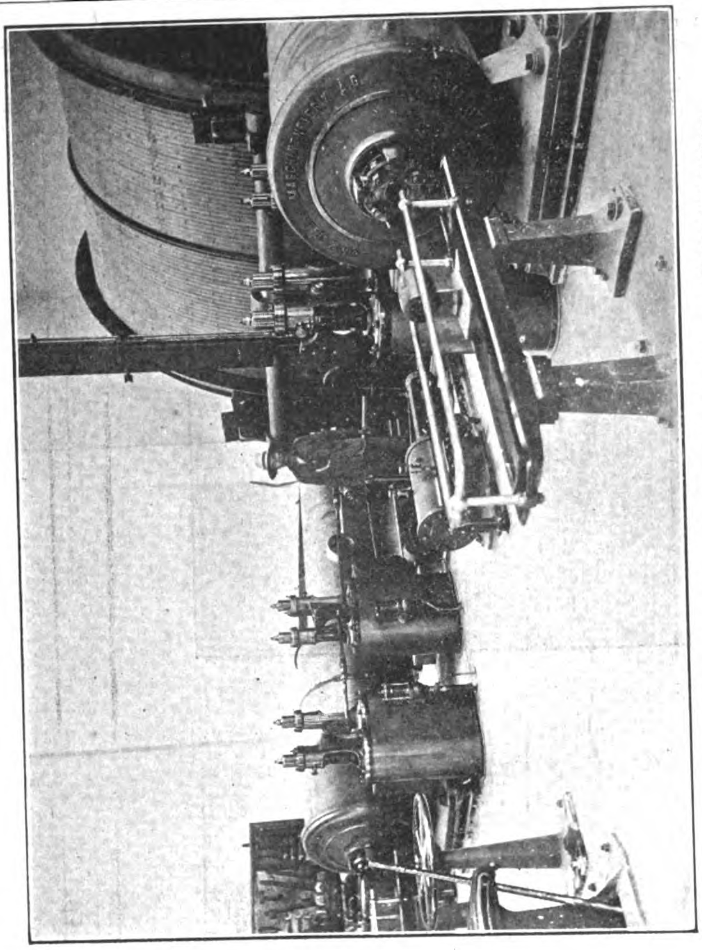


LANGWEIKOU MINE OF THE LANCHOW MINING CO. LTD.

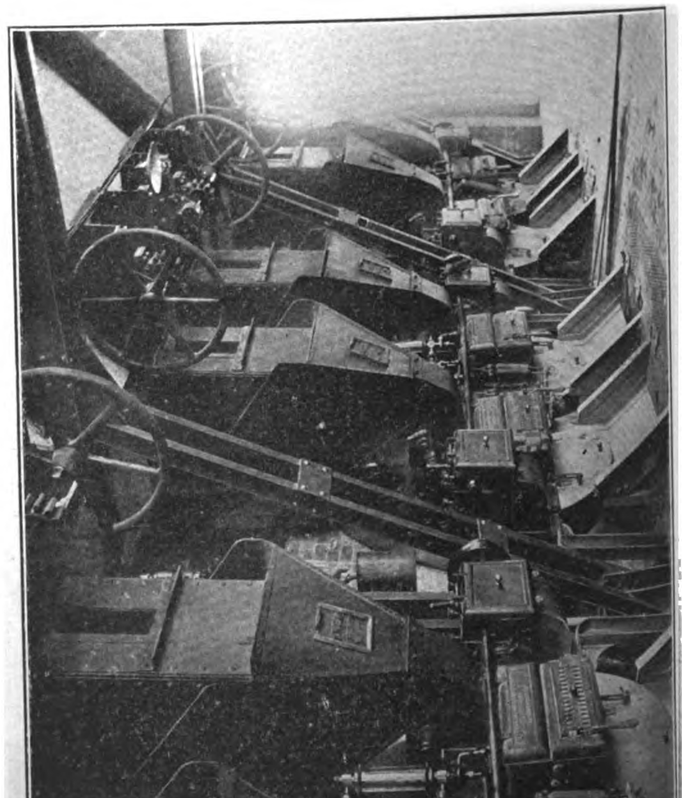
Machiakou are the four small mines: Yintsekou, Langweikou, Chenchialing and Taoyuan, all provided with steam boilers feed pumps, steam winches, steam shaft pumps and partly with steam hauling gear. There are further offices, workshops, stores, and a water cleaning plant. At the Yintsekou mine there has been installed another electric plant for lighting the mine on the surface as well as underground. There is also one electrically driven mine ventilator of 2500 cbyrds. capacity. The current is transmitted from Machiakou by means of an overhead wire line. At Chenchialing hand worked winches were used to some extent until the



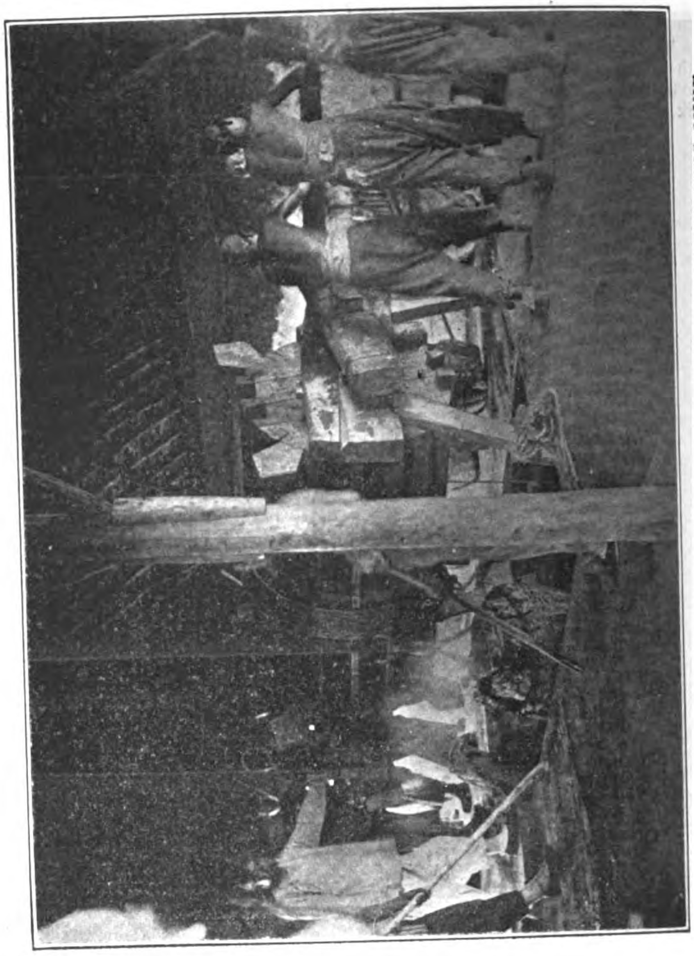
A BREAKING DOWN SAWING MACHINE INSTALLED AT THE MACHIAKOU MINE



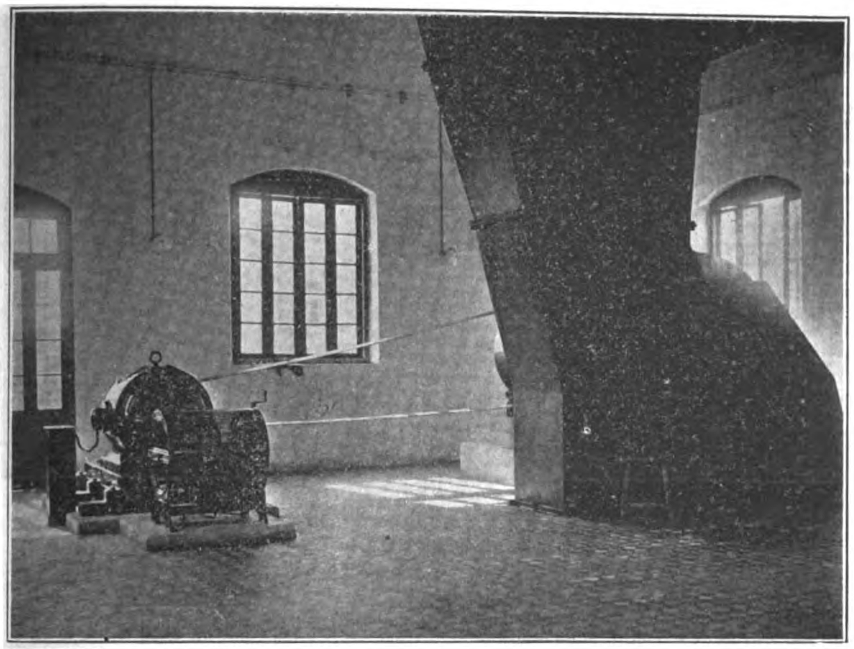
STEAM WINDING ENGINE INSTALLED AT THE MACHIAKOU MINE



MECHANICAL STOKER INSTALLED IN THE BOILER HOUSE AT THE MACHIAKOU MINE



HAND OPERATED WINDING GEAR UTILIZED AT THE CHENCHIALING MINE



AN ELECTRICALLY DRIVEN VENTILATOR INSTALLED AT THE MACHIAKOU MINE

end of 1910. A light railway connects all four small mines with Machiakou. A standard branch line connects Machiakou with Kaiping station of the Imperial North China Railways.

CHOWKOCHWANG.—The Chowkochwang mine is situated about 10 miles east of Taoyuan and is at present the least important one of all. Three shafts have been sunk and three small steam winches of 50 tons capacity per hour each, seven steam boilers, workshops, store, water cleaning plant, offices, locomotive shed, truckscale and a steam mining fan of about 2000 cbyrds. capacity per min. have been installed. A steam driven shaft pump drains the mine at present and a second larger steam pump will be erected in the the near future. Chowkochwang has standard gauge connection with Kuyeh station of the Imperial North Chinese Railway.

At the end of 1910 the output of all the six mines together amounted to 1300 tons per day. The production of the mines may be brought up to 8000 tons per day, provided there is a market for such quantities.

All the mines are connected with the Administration Building in Machiakou by telephone and the latter has connection with the Imperial Railways of North China, the land department, and some factories in the neighborhood.

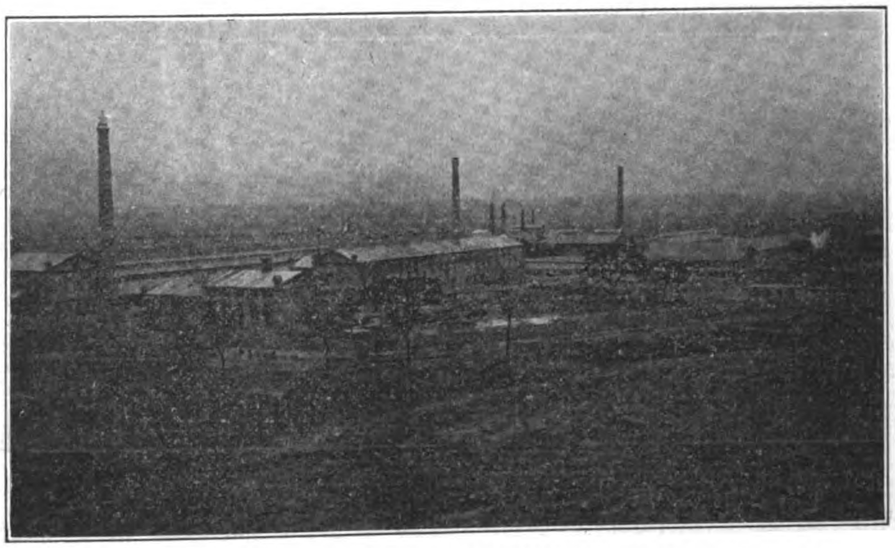
The management of the principal plant in Machiakou and the mine Yintsekou is directed by three German engineers. All other officials are Chinese. The technical management of the other four mines is wholly Chinese, the three German engineers acting as advisers only. The financial management of the whole concern lies in Chinese hands. With a view to extending the territory of sale the company intends to buy some seagoing steamers and lease a port on the coast of the gulf of Chihli. The erection of iron foundry works is also planned.

THE CHEE HSIN CEMENT CO., TONGSHAN

A review of the recent industrial development of North China would be incomplete without an account of the Chee Hsin Cement Company's plant at Tongshan. This company has been supplying cement and cement products to the railroad and public works of North China particularly to those in which Chinese capital is concerned. The plant is well situated, being close to the Imperial North China Railway.

The limestone quarries are beside the plant and the clay beds are located about 10 miles away on the railroad.

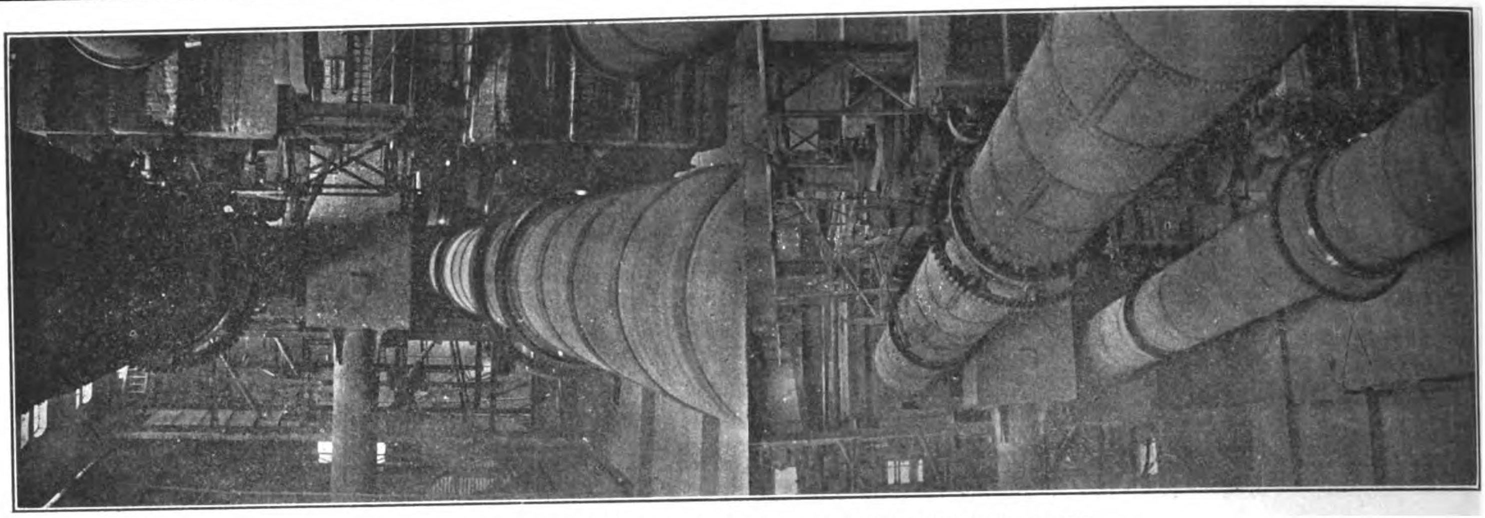
The company has now in course of erection a thoroughly modern cement plant involving an expenditure of $700,000 When completed, which will probably be in six months time, the company will be able to manufacture a half million barrels of cement per year, and the arrangement of the units in the present installation is such as to provide for an increased production when necessary. The new plant is already partly in operation while the old one is running at a reduced capacity and it is expected will be eventually discarded.



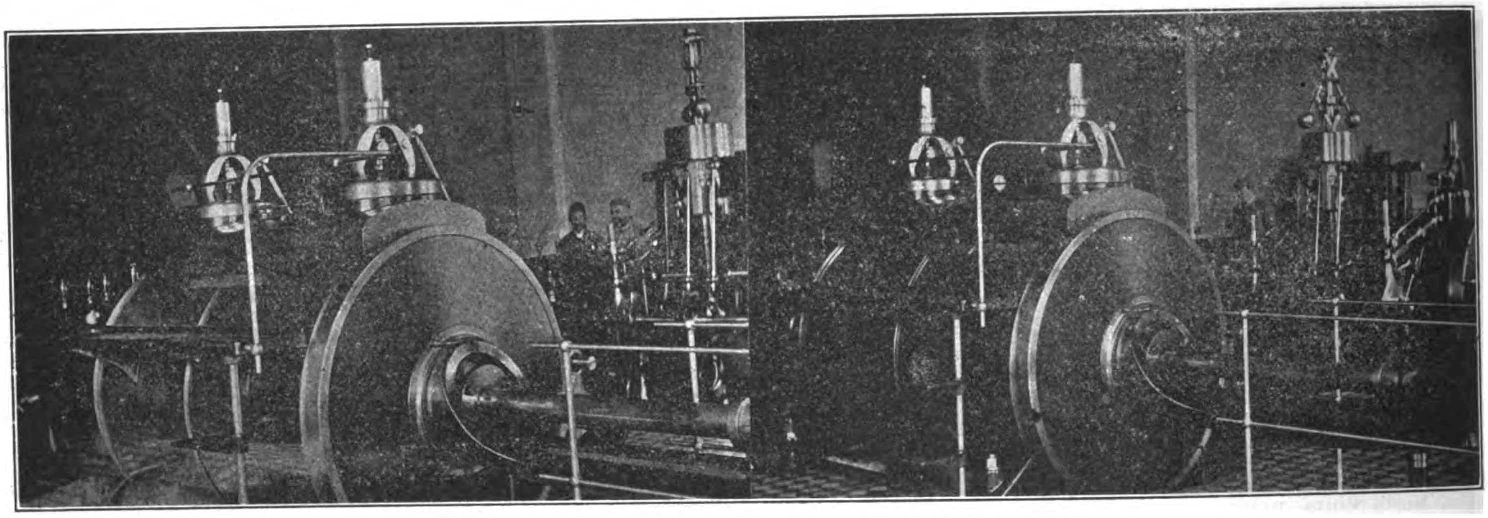
THE CHEE HSIN CEMENT PLANT AT TONGSHAN FROM PHOTOGRAPH TAKEN FEBRUARY, 1911

The old plant, while it has been turning out a cement answering in every particular the requirements of standard specifications, is not to be compared with the present up to date plants in efficiency of handling. Present practice in cement manufacture is far in advance of what it was 15 years ago, and involves a large saving in labor and time, a considerably greater economy in the use of fuel for the calciners and, what is of great-est importance, gives a final product that never varies in uniformity in the required physical and chemical properties.

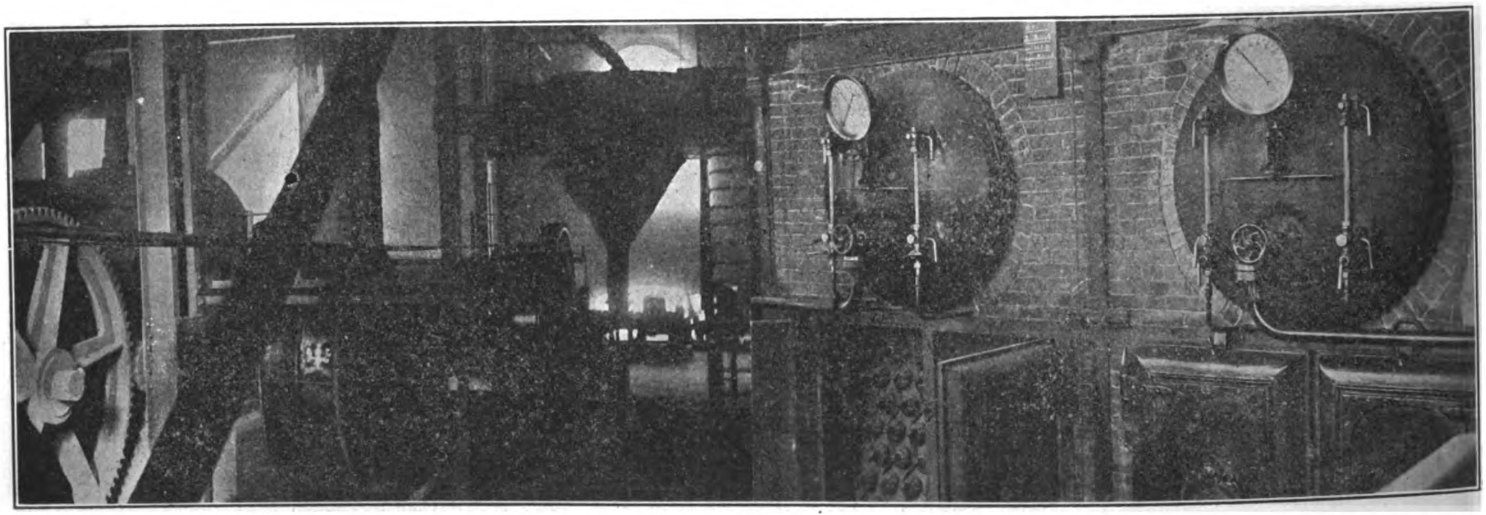
Contrast between the old and the new methods of manufacture is forcibly shown in a survey of the Chee Hsin Company's



ROTARY OVENS INSTALLED IN THE CHEE HSIN CEMENT PLANT



INTERESTING INTERIOR VIEW OF THE CHEE HSIN PLANT



ANOTHER VIEW OF THE PLANT'S INTERIOR

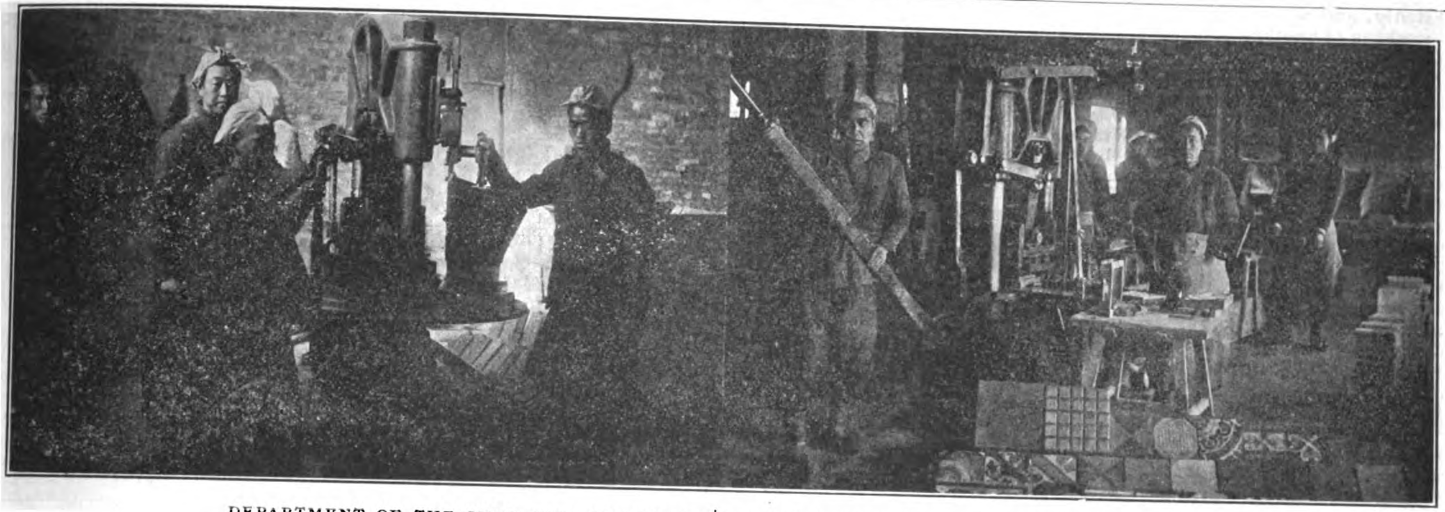
two plants, one of which is under construction and partly in operation while the other is about to be shut down.

The original plant was started in the year 1890, by Chinese capital employing an English engineer. In those days a large amount of manual labor did the work of the present improved mechanical contrivances. The limestone was dry crushed in blake crushers and revolving circular stone pulverizers. The material was then mixed with clay in the proper proportions, the whole being moistened and put together in the form of bricks. These bricks or blocks are then conveyed by coolies to a series of vertical brick drying and fasting kilns and the material heated to complete calcination. The material after cooling was finally ground up in ball mills to the required fineness of standard cement. This method of course was expensive and the company could not have successfully competed with other cement manufacturers in China were it not for the fact that being a Chinese concern, it naturally sold to the Chinese enterprises such as the Imperial railways of N. China, the Pekin-Kalgan line and various public works in Peking and other cities.

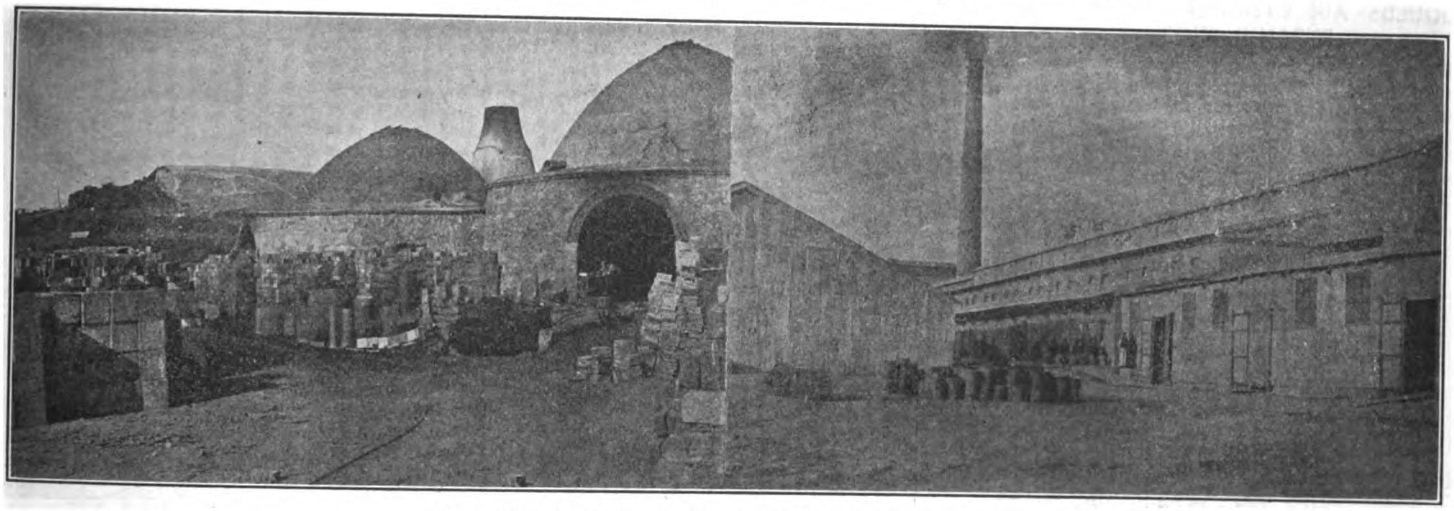
The plant has been taxed to its full capacity to meet the demands of the present building operations, the output for 1910 having reached the maximum figure of 230,000 barrels. There will be a greatly increased demand for cement from the present outlook, and the company now capitalized at \$1,000,000 will accordingly, through increase in the measure of profits, reap larger dividends than heretofore.

It is also expected that by the combination of increased plant efficiency and transportation facilities, sales will naturally be increased over a far wider territory.

In contrasting the old with the new plant we note two chief features that account for the perfection that has been attained in modern cement manufacture, i. e. (1) fine grinding by means of a tube mill, (2) the use of horizontal rotary calcining kilns. There are also many other improvements in the accessory mechanical devices for economical handling which is in line with the



DEPARTMENT OF THE CHEE HSIN CEMENT CO.'S PLANT WHERE TILES ARE MANUFACTURED



OTHER VIEWS OF THE CHEE HSIN CEMENT COMPANY

progress in similar operations in other industries.

Formerly fine grinding was done in some type of rolls or German ball mills, the latter being a cylindrical horizontal type containing a quantity of spherical "diameter balls" by which the grinding was done. A current of air was used to blow off the fine material as it is produced in order to facilitate more rapid and uniform grinding.

The new mill of the Chee Hsin works is provided with tube mills in place of ball mills. These are also cylindrical but much larger than the ball mills, being 25 ft. or more in length. Each mill contains 10 tons of flint balls that roll against each other to produce the grinding action. The lining of the cylindrical shell is also of flint so that there is no wearing away of iron parts to pass into the cement.

The success of the tube mill is shown in its comparatively recent adoption in all the cement manufacturing plants of the world. Another improvement that marks the greatest difference between modern and the former's practice is the use of the horizontal revolving roasting kilns. In the new Chee Hsin plant there are now two of these in operation and two more in process of erection. They are 35 meters in length and have a capacity of 50 tons of material roasted or "cintered" per day. These kilns will replace 20 or more of the crude vertical kilns now in operation.

The new method is automatic and continuous in operation while in the old method the process was carried on entirely by hand and was intermittent, thus being wasteful of fuel and time on account of the necessary alternate cooling and heating of the kilns.

Another feature of the plant is the absence of dust in the grinding rooms, so common to most cement plants. This is because of the new practice of wet crushing instead of dry. The material, after coming from the coarse preliminary crushers, is conveyed to large cylindrical vats where the pulp is thoroughly agitated with water before passing to the tube-mills for final grinding.

The new plant covers 30 acres of ground, and has storage room for 100,000 barrels.

Besides cement, the company is also prepared to manufacture on a large scale, bricks, common and fire-clay, and various clay and special cement products such as flooring, roofing and paving material. Electrical power will be used entirely, a thousand H. P. generator set now being in process of erection. The machinery to be used is of German and Danish manufacture.

OPENING OF THE NEW YORK ARCHITECTURE AND BUILDING SHOW

The Architecture and Building Show, which opened in New York, May 19, has the distinction of being the first to be held in the New Grand Central Palace. Incidentally the building itself is a prominent and appropriate exhibit, since the public is getting its first glimpse of the interior, and what is most remarkable is that this magnificent structure, thirteen stories high, occupying an entire block on Lexington Avenue from Forty-Sixth to Forty-Seventh Streets, directly over the underground tracks and yards of the Grand Central Terminal, was built and practically completed, except for the remaining interior finishing on the upper floors in the record time of eight months and eighteen days. The contractors, James Stewart & Co., erected all of the steel work at night and the whole construction was carried out without interfering in the slightest with the regular schedules of the trains of the New York Central and New Haven roads running beneath it.

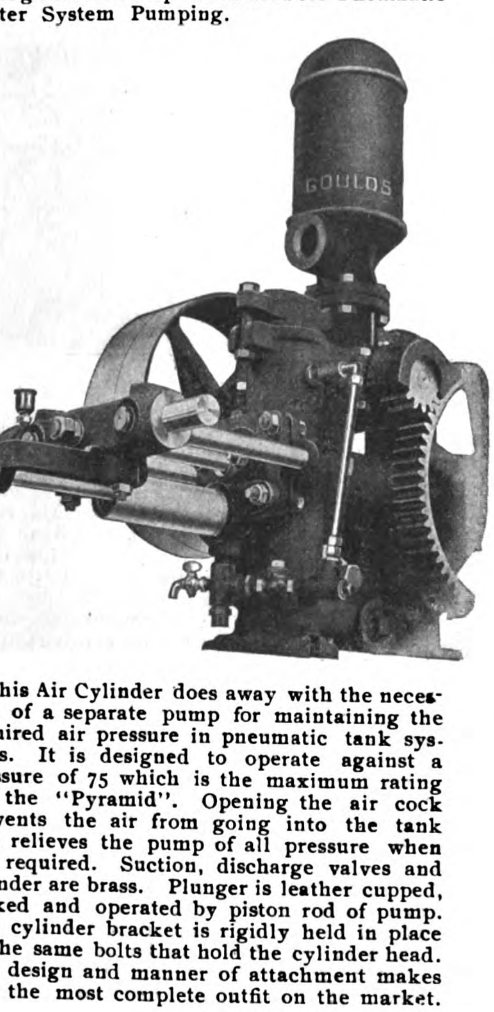
Among the exhibits that are of especial interest is the combined one of Henry R. Worthington, the Blake & Knowles Steam Pump Works, the Laidlaw-Dunn-Gordon Company and the Deane Steam Pump Company. Occupying the center of the space is one of the few operating exhibits to be seen at the show. It is a type A open pattern liquid weigher, a recent product of Henry R. Worthington, particularly developed for accurately measuring and recording by either weight or volume, the flow of hot water, chemicals, oils and other liquids that cannot be satisfactorily measured by meters. Briefly and simply described it consists of two tanks placed side by side and supported on knife edges so that they may be readily tilted a limited extent. When empty the tanks stand level but after a certain quantity of water is admitted alternately to each tank it becomes top heavy and tips over allowing the water to escape through a bent pipe establishing a siphoning action that continues after the tank settles back to its normal or horizontal position until the tank is completely drained. Meantime the other tank is filling, for the instant that one tank tips the flow of water into it is automatically switched to the other tank. With this continued alternate filling and emptying of the tanks and always involving the same definite quantities of the liquid, it but remains to count the movements of the tanks which is done by an automatic counter, made to read directly in either pounds or gallons.

In this exhibit, to use the same water over repeatedly, and at the same time demonstrate the working of another Worthington product, the water from the receiving tank into which the weigher discharges is returned by a small motor-driven centrifugal pump to an elevated reservoir from which the water flows into the weigher. In this instance the reservoir is a Blake & Knowles open feed water heater for steam boilers, and while it is not used as in practice, there being no steam available to pass through it to heat the water, it does show the automatic valve control of the feed water flow.

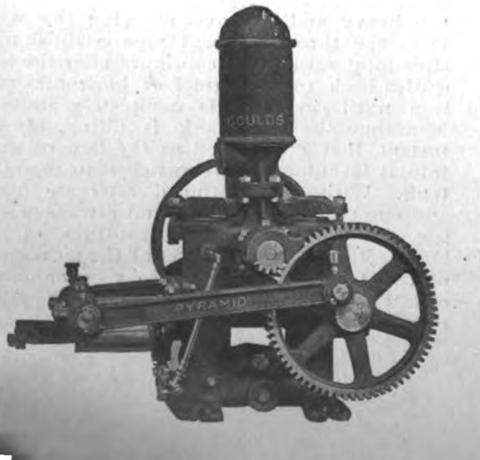
A striking thing about the little centrifugal pump, which is only 12 inches in diameter, but has a capacity of 30 gallons a minute is that it is so quiet and smooth running that it takes pretty close inspection to discover that it is really in operation. In fact, when it is running a dime may be stood on any level part of the pump without falling, showing the complete absence of vibration. Examples of the different types of Worthington meters are also exhibited and a motor driven Knowles triplex power pump.

GOULDS AIR CYLINDER FOR PUMP PYRAMID PUMP

The Goulds Manufacturing Company of Seneca Falls, N. Y., are placing on the market a special Air Cylinder for attaching to sizes 3 x 5 and 4 x 5 of their "Pyramid" Double-Acting Piston Pump when used for Pneumatic Water System Pumping.



This Air Cylinder does away with the necessity of a separate pump for maintaining the required air pressure in pneumatic tank systems. It is designed to operate against a pressure of 75 which is the maximum rating for the "Pyramid". Opening the air cock prevents the air from going into the tank and relieves the pump of all pressure when not required. Suction, discharge valves and cylinder are brass. Plunger is leather cupped, packed and operated by piston rod of pump. The cylinder bracket is rigidly held in place by the same bolts that hold the cylinder head. The design and manner of attachment makes this the most complete outfit on the market.



The pipe leading from the air attachment is connected to the drain plug opening or discharge chamber of the pump.

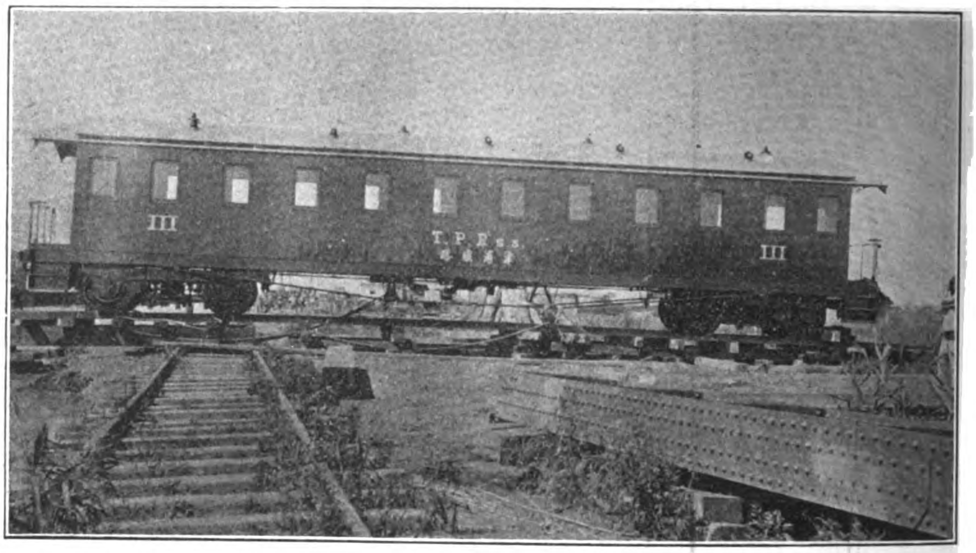
Where this attachment is used with the "Pyramid" Pump for supplying pneumatic tank systems it is possible to have running water throughout the house, stable or yard for all domestic purposes and for fire protection. The Air Cylinder attachment is known as Fig. 1567. The manufacturers will be pleased to forward complete circulars and prices to anyone upon application.

Coaches Built at the Woosung Shops for the Tientsin-Pukow Railway

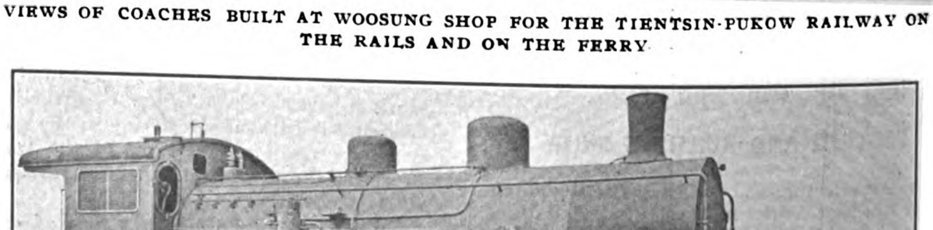
The accompanying illustration is from a photograph of the first of nineteen coaches being built at the Woosung Shops of the Shanghai-Nanking Railway. The first delivery included four coaches similar to the illustration and were transhipped across the Yangtsze on their own wheels, being the first time a coach has been taken acrosss water in China ready for the rails.

The water transportation across the river to Pukow from the Shanghai-Nanking Railway wharf was effected by lashing five Chinese junks together and leveling the tops with two 68′×14″. Oregon pine logs laid across, and on top of this construction the sleepers and rails were placed.

The temporary ferry thus constructed was then brought alongside the Shanghai Nanking Railway Wharf and connected up with the wharf track so that the coaches were pushed on board by hand. Then the wheels were "scotched," etc., and the freighted ferry towed across to Pukow, joined up to the Tientsin-Pukow Railway track and the coaches run off by hand. These coaches were landed on the Tientsin-Pukow rails from the Shanghai-Nanking rails in fifty minutes. Two coaches were transferred on June 15 and three on June 23.



VIEWS OF COACHES BUILT AT WOOSUNG SHOP FOR THE TIENTSIN-PUKOW RAILWAY ON THE RAILS AND ON THE FERRY

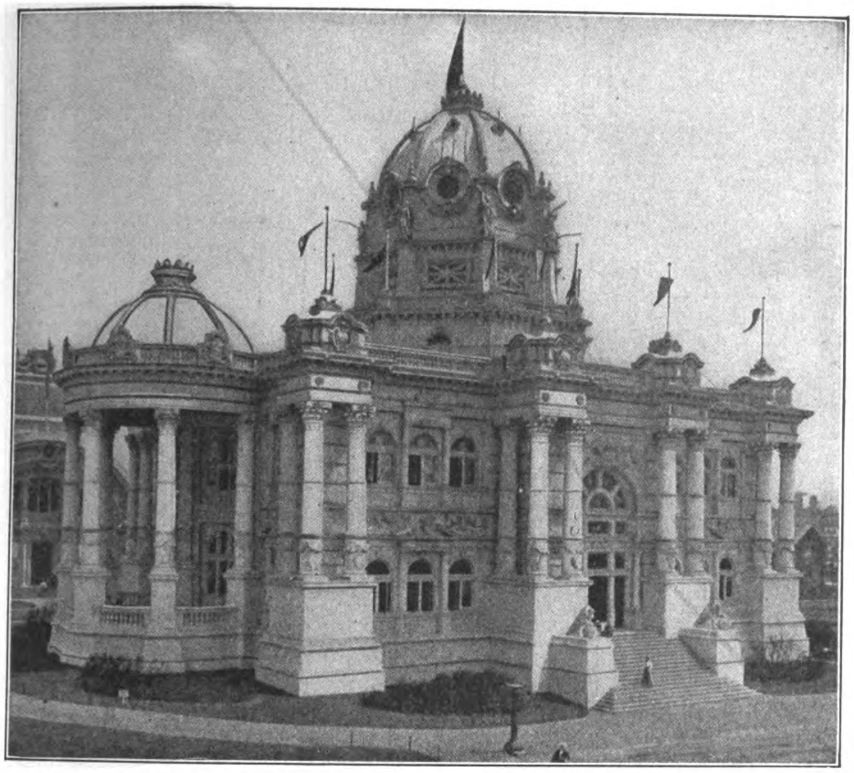


4-6-0 PASSENGER ENGINE OF STANDARD GAUGE ON THE TIENTSIN-PUKOW RAILWAY BUILT BY HANNOVERSCHE MASCHINENBAU-ACTIEN-GESELLSCHAFT, VORMALS GEORG EGESTORFF, HANNOVER-LINDEN

Cylinder Diameter. . .	21.2 ins	Grate Area	28.0 sq. ft.	Weight empty	137000 lbs.
Stroke of Piston . . .	24.8 ,,	Heating Surface . .	2090 ,, ,,	Adhesion Weight . . .	106500 ,,
Driving Wheel Diameter	68.9 ,,	Working Pressure .	85 lbs.	Weight in Working Order	153500 ,,

AMERICAN STEEL FRAME BUILDINGS ABROAD

NOTABLE ACHIEVEMENTS OF THE UNITED STATES STEEL PRODUCTS EXPORT COMPANY



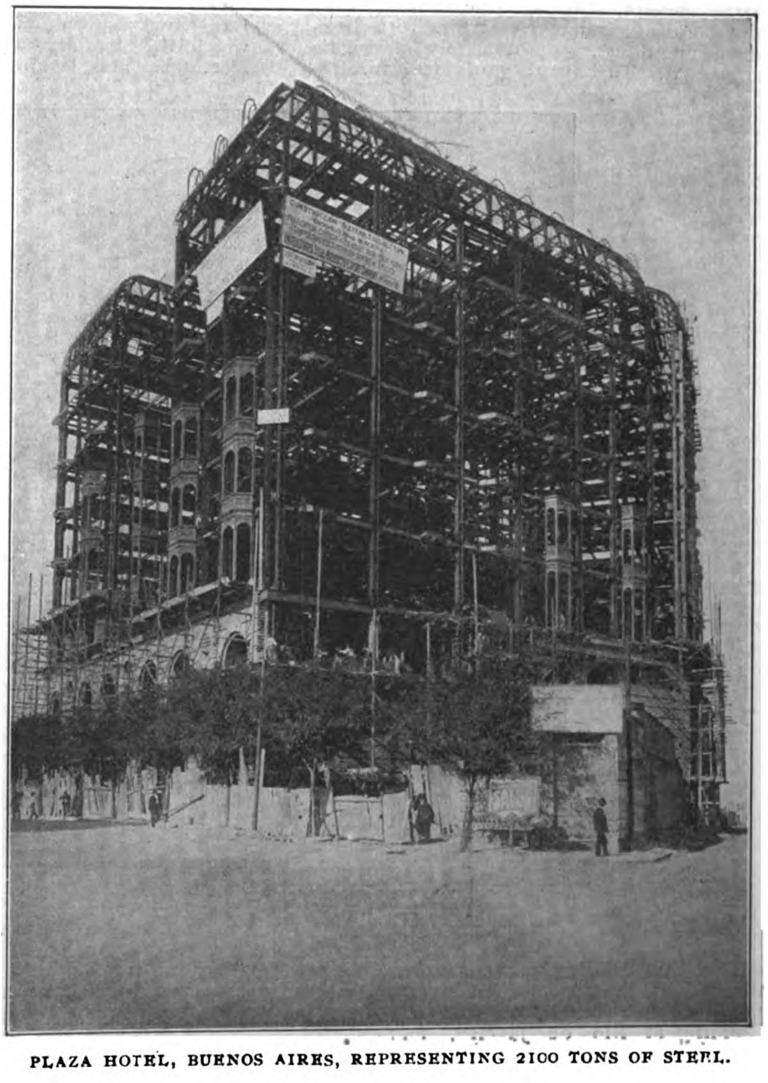
MONROE PEACE PALACE, RIO DE JANEIRO, BRAZIL, APPROXIMATELY 400 TONS.

A conspicuous example of the important work that is being done in foreign countries by American manufacturers is the construction, and in many cases the erection, of steel frame buildings, says the *Iron Age*. It is generally known that American manufacturers have undertaken contracts for some of the largest bridges in the world, and that the United States Steel Products Export Company recently supplied the whole of the bridges for the South Manchurian Railway and for a number of other important railroad projects in the Far East, Mexico, South America and elsewhere.

It is probably, however, not generally known that there is a steady development of a demand for steel buildings of American design throughout the world. While these buildings have not as yet assumed the proportions of the American skyscraper, the tendency of development is in that direction, and it is probable that within a few years an increasing number of large buildings of American design will be erected in the principal cities of the world. A recent example is the Phoenix Hotel at Buenos Aires, which an accompanying illustration, Fig. 1, shows in process of erection. This is the first modern fireproof building in Buenos Aires, and is, furthermore, the largest and highest building in that city. It consists of nine stories, the maximum hight from the level of the sidewalk, being 63 m. (about 207 ft.), with a frontage on San Martin square of 60 m. (about 197 ft.) and a depth of 57 m. (about 187 ft.). The contract for the steel work was taken by the Buenos Aires branch office of the United States Steel Products Export Company, and the material was fabricated and furnished ready for erection by the American Bridge Company, the total quantity of steel amounting to 1800 tons. The erection of this hotel resulted in a further important development in the shape of steel construction apartment houses, of which a number are now under way in Buenos Aires.

In the early stages of the development of the American skyscraper, American methods of steel building construction were not regarded with favor by foreigners. Many of the most notable examples of the new style of construction, while possessing the advantages of size with resulting economy and adaptability to the uses for which they were designed, were nevertheless of a type of architecture so unsightly that it would not have been tolerated in the old cities of the world. Foreign architects whose ideas were in favor of buildings of moderate hight, and who were also obliged to conform to laws restricting the hight of buildings (such as, for instance, the English laws relating to "ancient lights"), viewed with distrust the comparatively light skeleton designs of American steel work. Time has, however, demonstrated the strength and safety of this form of construction, and the constant increase in the value of land in the large cities of the world has compelled an increase in the hight of buildings, thus removing one of the principal obstacles to the development of American steel construction, and the pioneer work of American architects and engineers in foreign countries is beginning to yield substantial returns.

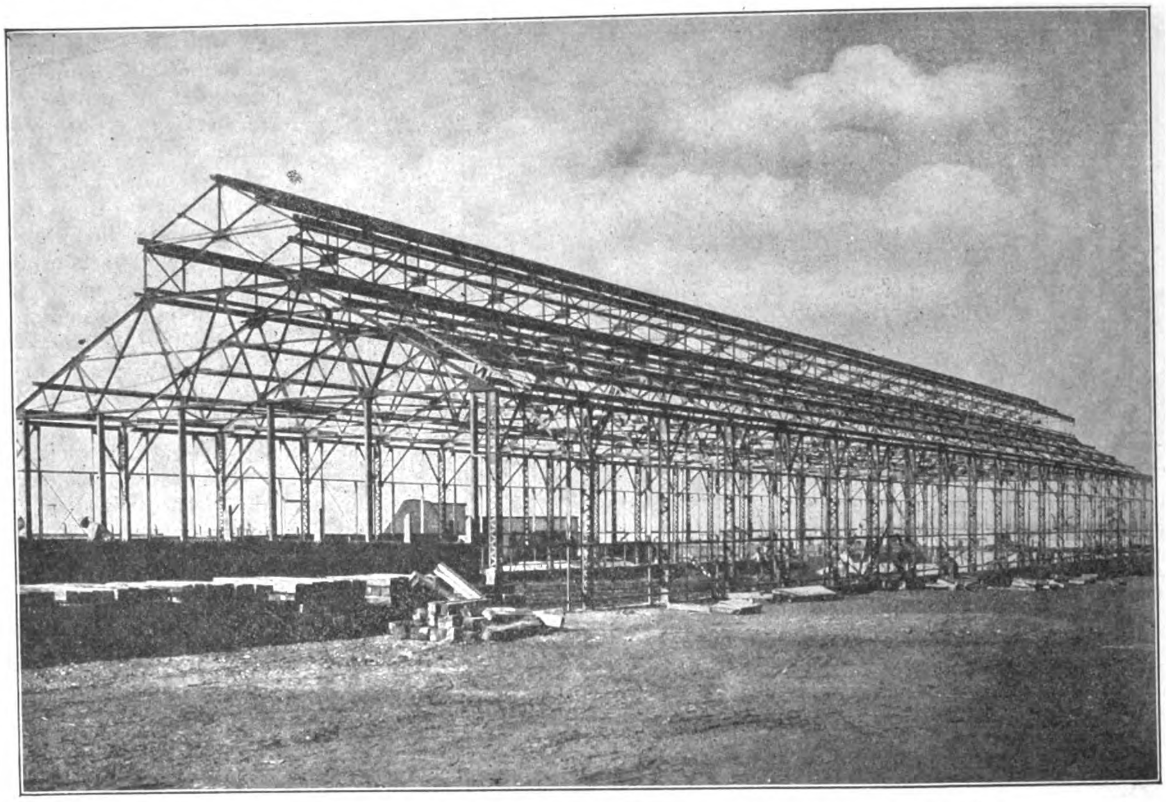
Other important examples of American building construction, although not of the skyscraper type, are the two buildings at Rio de Janeiro, also shown in accompanying illustrations, for both of which the steel work



PLAZA HOTEL, BUENOS AIRES, REPRESENTING 2100 TONS OF STEEL.

was sold by the United States Steel Products Export Company and manufactured by the American Bridge Company. One of these buildings, the artistic National Library of with a central dome eight stories hich, which was also furnished by the American Bridge Company through the United States Steel Products Export Company. The other building of with a dome, the main section occupying an area of 90×120 ft.

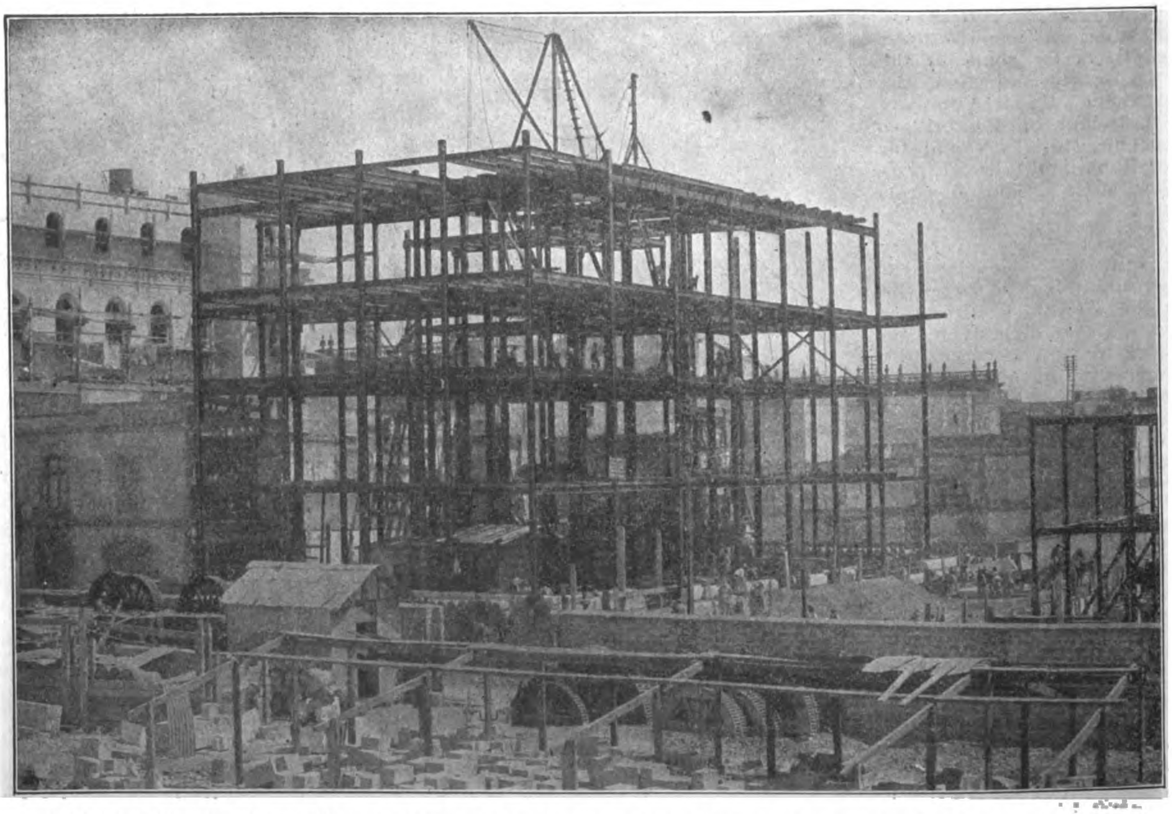
As a result of the efforts and organization of the United States Steel Products Export



CAR BARN AT KALGOORIE, AUSTRALIA, 300'×60' WEIGHT OF STEEL 110 TONS

Company American steel building construction is being rapidly developed throughout the whole of South America. Other important contracts secured by this company include

Rio de Janeiro, Fig. 2, is a modern steel frame building, four stories high, with basement and dome, approximately measuring 100×208 ft. The quantity of steel furnish-



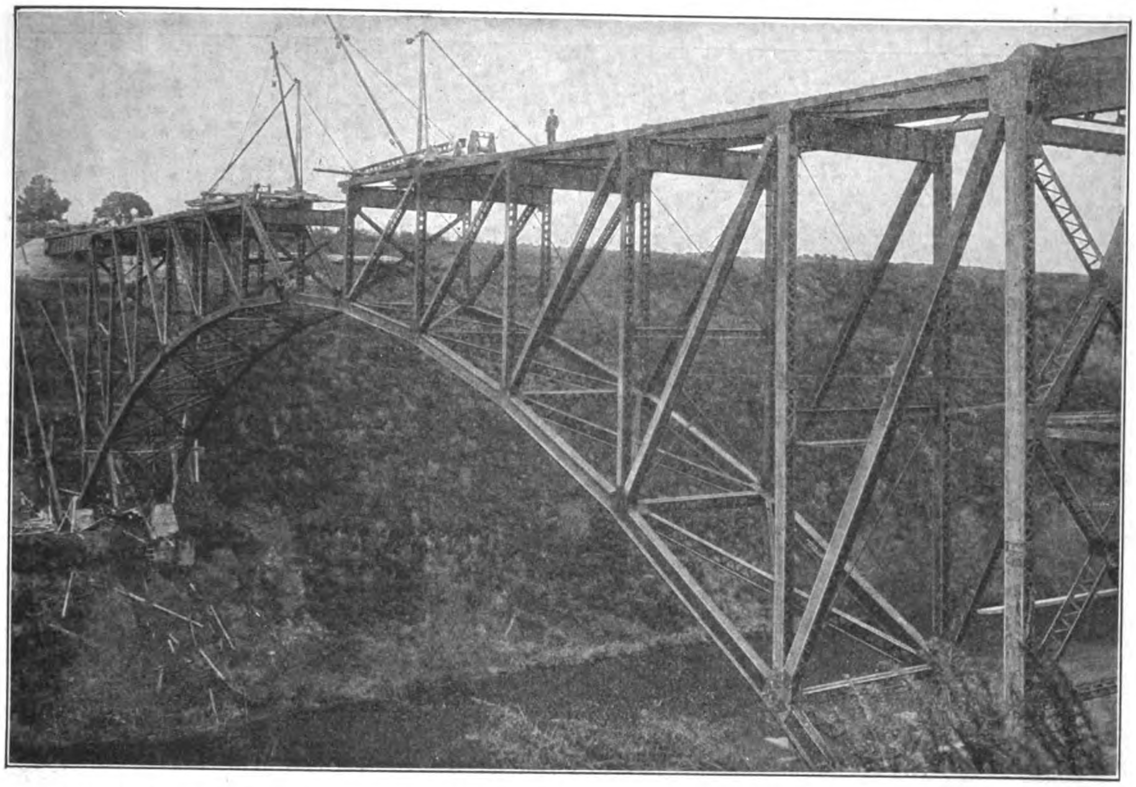
FIVE-STOREY BUILDING 94'×143' BUILT FOR THE MUTUAL LIFE INSURANCE COMPANY, MEXICO CITY. WEIGHT OF STEEL 750 NET TONS

ed for this building was 1500 tons. This was the second structure of its kind in Brazil, the first one being the Fire Department Building at Rio de Janeiro, four stories, which an illustration is given, Fig. 3, is the Exposition Building at Rio de Janeiro, in which the Pan-American Congress held its meetings. This is an exact duplicate of the Government Building at the St. Louis Exposition, with the exception that, instead of wood and staff, the Rio de Janeiro building is of masonry and steel, two stories high,

the smelting plant of the Cerro de Pasco Mining Company in Peru, for which 4000 tons of steel was required; buildings of various kinds in Chile, car and factory buildings

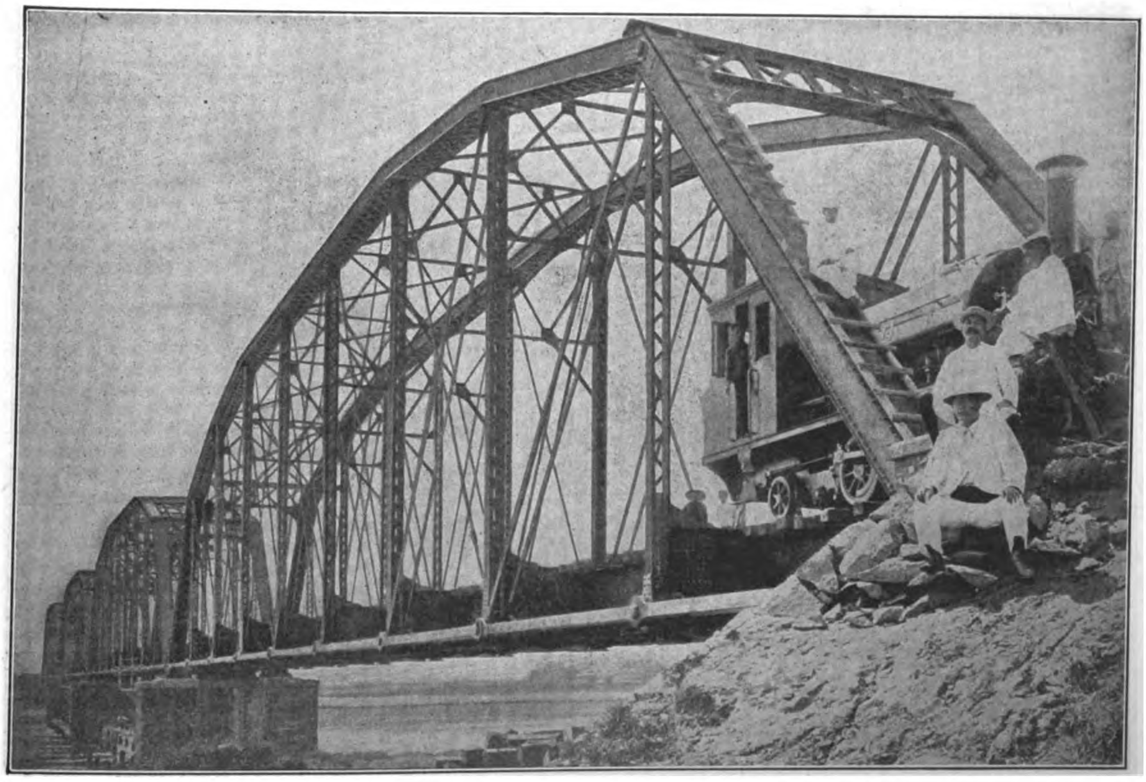
in the Argentine Republic, warehouses in Paraguay, power houses in Peru, power plants in Brazil, railroad and highway bridges in Peru, Colombia, Argentina, Ecuador, Brazil, Bolivia and Uruguay.

Considering the engineering difficulties to be overcome in building bridges over gorges, canyons, rivers and valleys in far distant countries, where the facilities for transportation and erection are frequently of the most primitive character, the fact that American exports of steel bridges and structural work have already become one of the most important branches of our foreign trade, even from the point of view of tonnage, is highly creditable to the enterprise of American manufacturers and of the distributers of their products in foreign markets.



ARCH SPAN, CAMBRIDGE, NEW ZEALAND 1 290-FT. ARCH SPAN, 2 65-FT. GIRDER APPROACH, 1 42-FT. GIRDER APPROACH.—APPROX. 345 TONS.

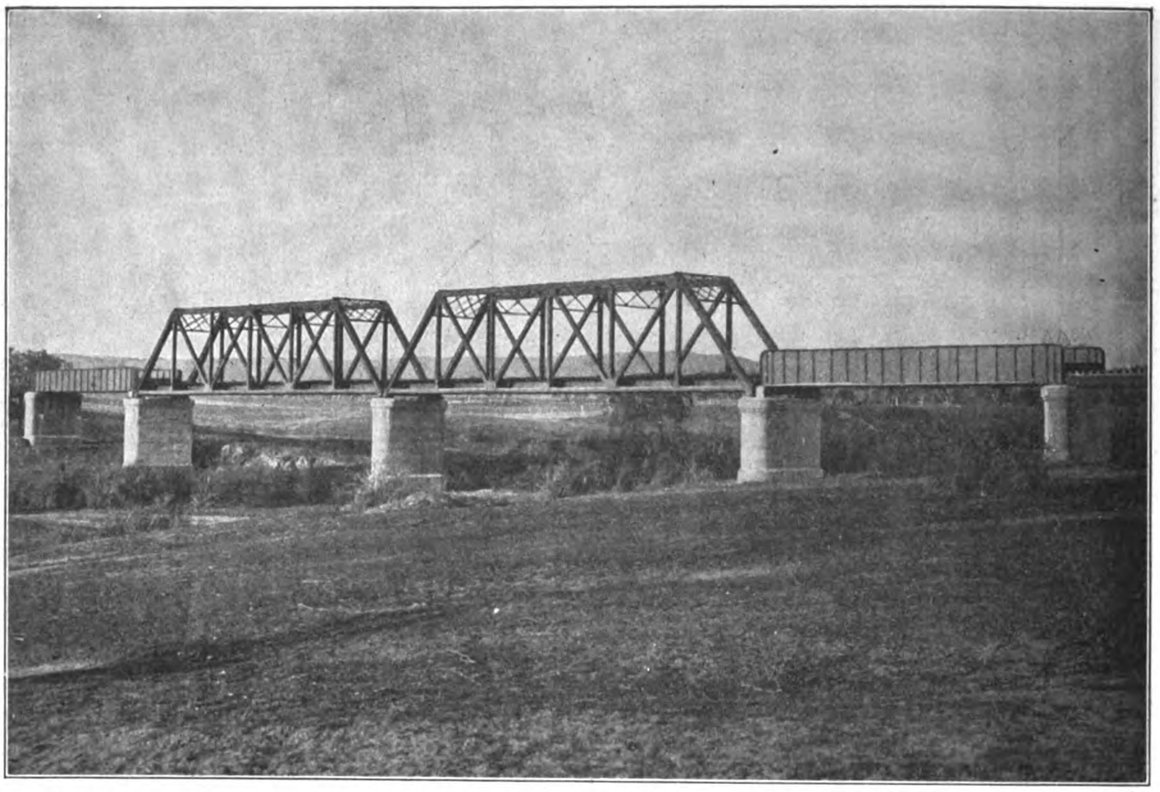
Not least among the difficulties to be overcome was the fact that a large majority of the engineers and architects in the countries in which this development is taking place were trained in Europe, and are therefore accustomed to regard European practice as standard and to distrust any departure from it. In such cases it has been necessary to convince them not only of the economy of American methods and standards, but also of their safety and practicability.



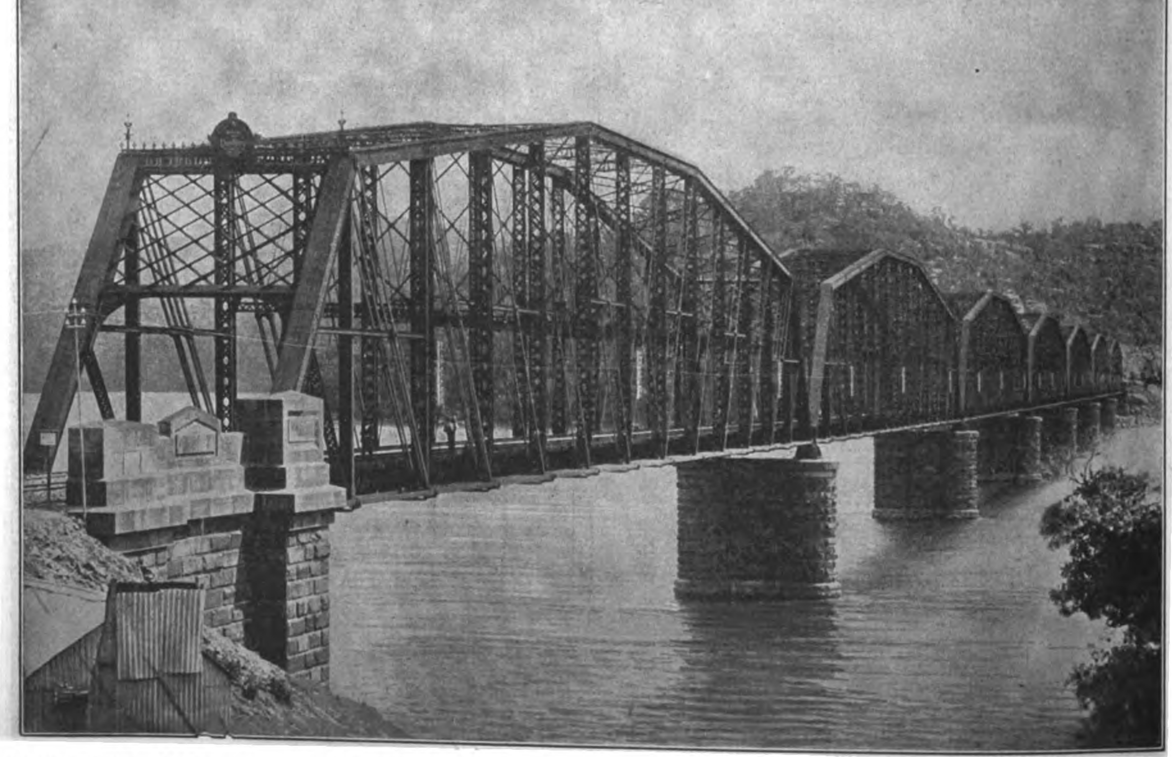
4 200-FT. SPANS, TAIWAN RAILWAY, OVER RIVER NEAR TAIPER CITY, JAPAN.—WEIGHT 660 TONS.

One feature of the organization of the United States Steel Products Export Company, the necessity of which soon developed was the establishment at important points of a complete engineering and technical staff, capable of designing steel structures to meet the local requirements, of submitting esti-

mates of cost of erection and of carrying out the actual work of erection under local conditions. In other words, the representative of the United States Steel Products Export Company at these leading foreign points is in a position to make a bid on the erected work, and for that bid needs nothing more from the home office than a cabled c. i. f. price on the material. The foreign engineering office receives at frequent intervals detailed costs of fabrication from the American Bridge Company as a guide in figuring, subject to local conditions. The foreign customer therefore need not wait for the passing to and fro of estimates for material, and is not called upon to figure freights or any details whatever. He receives a straight bid, with the design, of the actual cost to him of the erected structure, terms of payment being arranged locally in the funds of the country, all the correspondence being conducted, as is the rule of the United States Steel Products Export Company, in the language of the customer, whose views, it will be observed, are met to the last detail. It was found that this was the wisest course to adopt in developing this business, particularly since the disposition of European competitors was to make a low price per pound of material, but to submit designs cumbersome in character, so that the tonnage was considerably greater and the final cost to the user larger. It has been the aim to convince the customer that the final structure, meeting all his requirements, is put in place, by American design and methods of erection, at a lower ultimate cost to him than the proposals of rivals which may appear more advantageous on the basis of a fallacious low per pound price for the material alone.



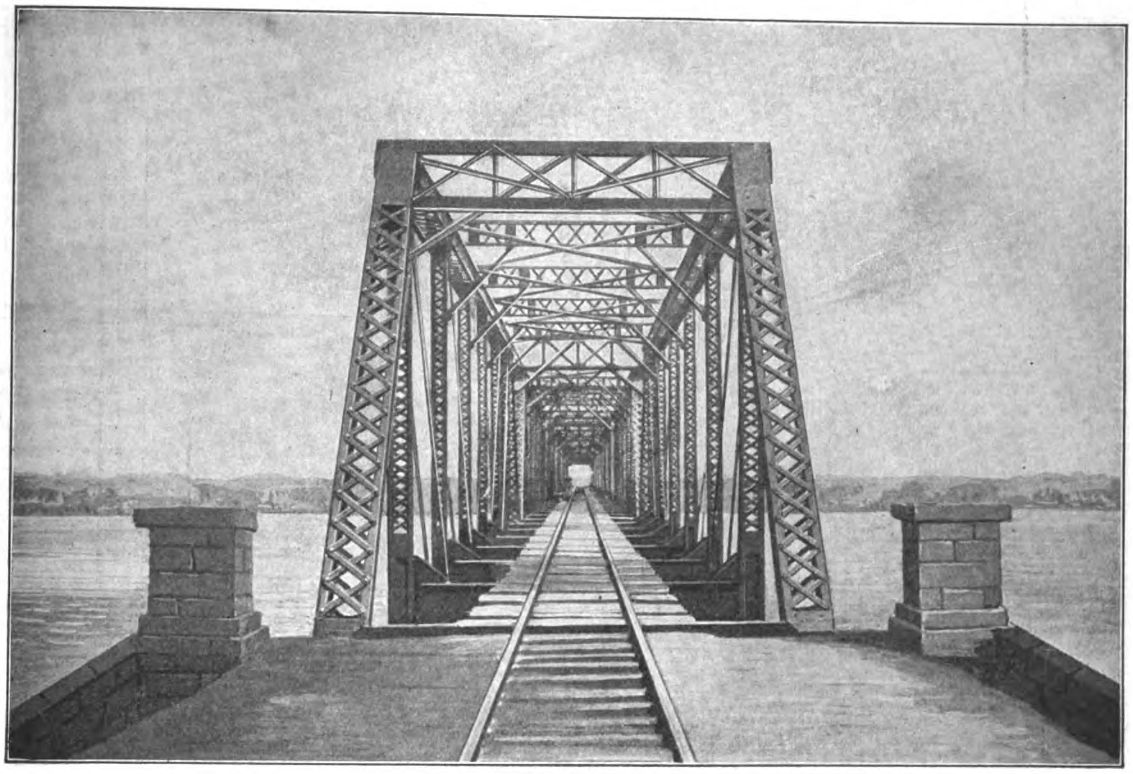
GOVERNMENT RAILROAD BRIDGE OVER WOLLONDILLY RIVER, AUSTRALIA.—TWO LATTICE TRUSS SPANS, EACH 120 FT. LONG WITH PLATE GIRDER. APPROXIMATE WEIGHT 220 TONS



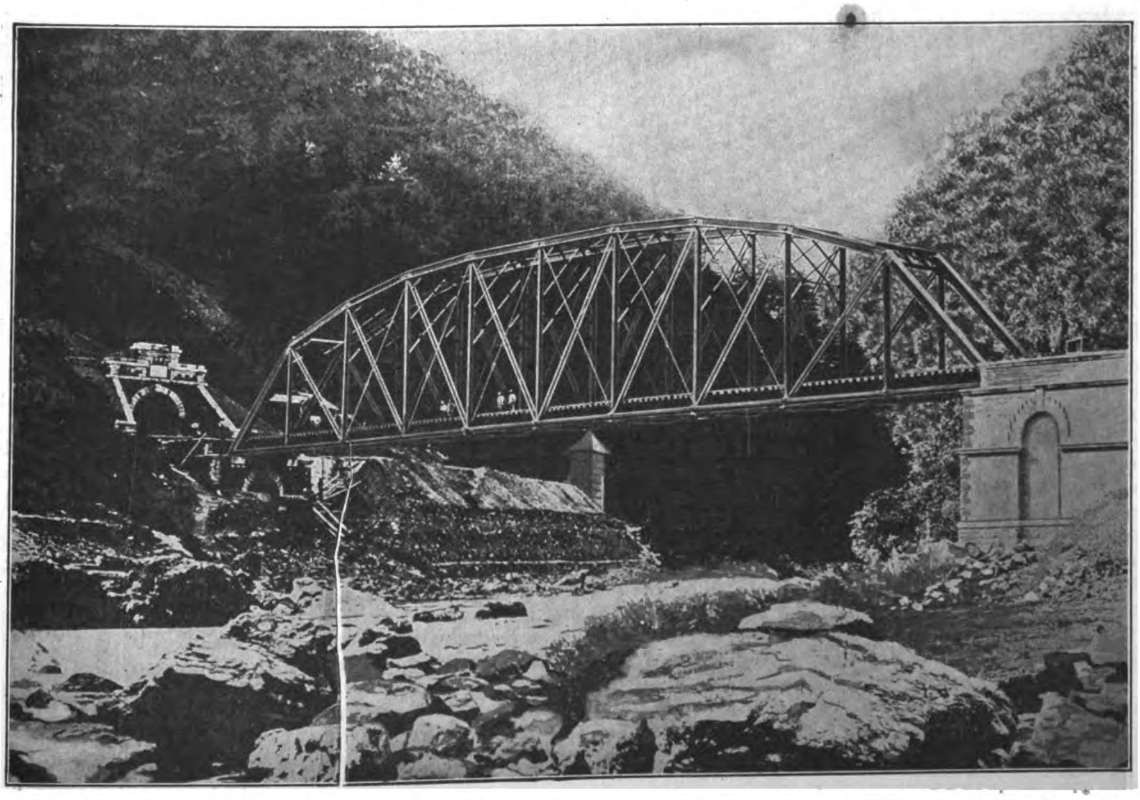
BRIDGE OVER HAWKESBURY INLET IN AUSTRALIA.—7 D. T. THROUGH PIN CONNECTED SPANS, EACH 416 FT. LONG

The United States Steel Products Export Company now has an engineering organization at Buenos Aires, Argentine Republic; Valparaiso, Chile; Sydney, Australia, and Shanghai, China. How completely the selling organization, which handles over $50,000,000 worth of business a year, covers the world may be judged from the following list of the branch offices, some of which are effective aids in the important purchases of raw materials, notably tin, which this subsidiary of the United States Steel Corporation handles: London, E. C., England; Antwerp, Belgium; Montreal, Canada; Buffalo, N. Y. (for Province of Ontario); Mexico City, Mexico; Sydney, N. S. W. Australia; Johannesburg, South Africa; Cape Town, South Africa; Buenos Aires, Argentine Republic; Rio de Janeiro, Brazil; Lima, Peru; Shanghai, China; Yokohama, Japan; Batavia, Java; Aleppo, Syria; Alexandria, Egypt; Barcelona, Spain; Beyrouth, Syria; Bombay, India; Cairo, Egypt; Calcutta India; Christiania, Norway; Constantinople, Turkey; Copenhagen, Denmark; Genoa, Italy; Limassol, Cyprus; Mersina, Turkey; New Orleans, La.; Piraeus, Greece, Portland, Ore.; Rotterdam, Holland; St. Johns, Newfoundland; St. Paul, Minn. (for Manitoba); San Francisco, Cal ; Smyrna, Turkey; Trieste, Austria; Tripoli, Syria; Turin, Italy; Vancouver, British Columbia; Varna, Bulgaria.

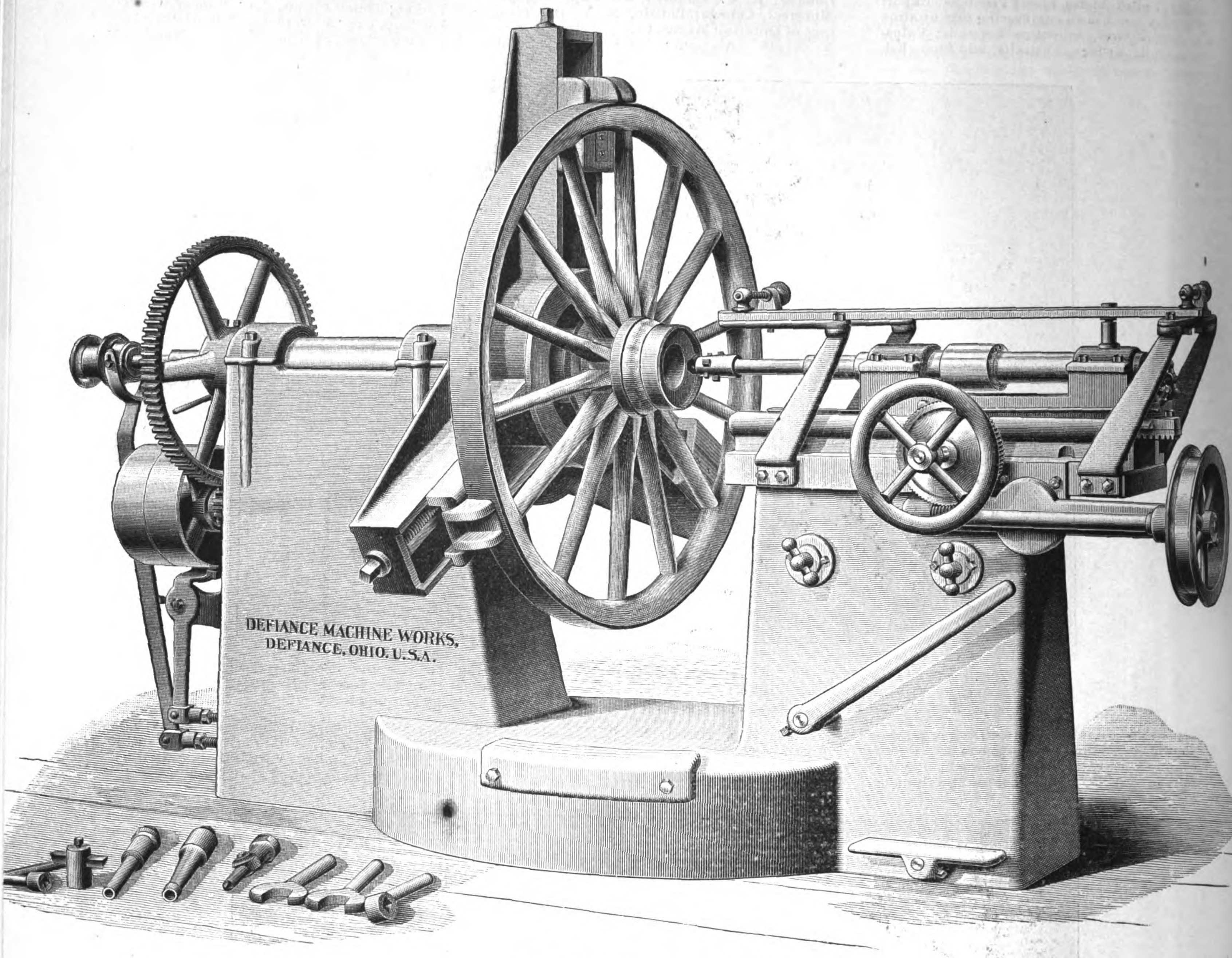
It will be observed that while a great lead has been accomplished in the past few years the broad foundations have been laid for a much more extensive and important development in the near future.



BRIDGE OVER ATBARA RIVER IN EGYPTIAN SOUDAN—SINGLE TRACK RAILROAD BRIDGE, COMPOSED OF 7 PIN CONNECTED THROUGH TRUSS SPANS. EACH 147 FT. LONG.—WIDTH C TO C OF TRUSSES 16 FT. 2 INS. DEPTH C TO C OF CHORDS, 21 FT. 6 INS. WEIGHT OF STEEL WOORK, 760 TONS.



HODSU RIVER BRIDGE, KYOTO RAILWAY, JAPAN.—ONE THROUGH PIN CONNECTED TRUSS SPAN, 280 FEET LONG—WEIGHT 230 TONS.



AUTOMATIC WHEEL BOXING MACHINE

AUTOMATIC WHEEL BOXING MACHINE

The No. 1 Automatic Wheel Boxing Machine manufactured by the Defiance Machine Work, Defiance, Ohio, as shown by the accompanying engraving is used by the principal wagon and carriage builders for boring the wheel's hub for the reception of the box.

It is calculated to bore and finish the hole at one cut to any shape regular or irregular in form to suit the shape of the box to be used therein, relieving the center of the hub around the spokes, and cupping both ends of the hub to any desired shape.

All this is performed at one starting and stopping, and 600 wheels can be fitted complete in ten hours. It is calculated to perform either light carriage and spring wagon work or heavy work for farm wagon, truck and artillery wheels.

It possesses every convenience of operation, is thoroughly durable, and unusually well adapted to rapid and accurate work.

The cored frame is cast in one piece and is heavy and substantial throughout, care having been taken in every way to secure a machine that will not spring, jar or chatter when performing the heaviest class of work.

The chuck is universal and fitted to a 6″ spindle. All the dogs are actuated simultaneously, by turning with a wrench any one of the three screw heads, opening and closing them to receive wheels from 20″ to 60″ diameter.

The boring bar of hammered steel 2 1-2″ diameter makes 4,000 rotations per minute, has lateral and longitudinal adjustments to enable it to bore holes of any taper, size or contour desired, and is provided with auxiliary cutter-heads to perform the depthing at back of hubs to accommodate the shoulder of axle. The several operations of the boring bar or spindle are automatic. After completing the cut the feed is disengaged automatically, thus leaving the operator a few seconds' time in which to dispose of his finished and unfinished wheels.

The contour of the axle box to which the wheel is bored is faithfully followed by an automatic device which relieves the operator of all care and attention.

The boring cutter is of the most improved kind, consisting of three independent cutters of square tool steel, which are easily replaced when worn out at small expense.

The wheel is rotated at 50 turns per minute and the cutters at 4,000 turns.

The operator has complete control over the machine from the working side, the chuck and all other rotating parts of the head stock can be set in motion or arrested by a combination of shipper and brake by a single movement of the foot of the operator.

The machine is made with unusual broad wearing surfaces, and as well fitted as those of machinists' tools; the weight of the machine is 5,000 lbs.

The counter is furnished as follows: Shaft 2 3-16″ x 9 ft 5″, three No. 3 ball and socket hangers; T and L pulleys 12″ x 6″; pulley to drive chuck 6″ x 8″ overhung; pulley to drive spindle 30″ x 22″; pulley to drive feed 2 3-16″ or the naked shaft overhung 4″; pulley to drive front cupping spindle 20″ x 7″; speed of shaft 550 rotations per minute; speed of boring spindle 4,000; counter should be placed immediately above the main axis of the machine.

THE DANSALAN-KEITHLEY BRIDGE, DANSALAN, MORO, P. I.

This bridge spans the swiftly flowing Agus River, which has a fall of more than 2200 feet, from Lake Lanao, its source, to the coast, a distance of eighteen miles. It was constructed by the municipality of Dansalan, Moro Province, P. I., the design being drawn by the engineer of the province. The length of the bridge is 104 feet, width, 11 feet, center to center of beams, and the weight is 53½ tons.

The illustration shows the manner in which the bridge was swung across the river by Mr. S. A. Vickroy, foreman, Moro Province, Engineer's Office, the constructing work having been done on the north bank of the river, the bridge resting on rollers. When it was complete a casco was loaned by the quartermaster at Camp Keithley and was securely lashed fore and aft, to both sides of the stream. The bridge was then shoved on to the casco and slowly towed across the stream.

Mr. Vickroy was highly complimented by his superiors for his success in swinging the bridge across the river.

THE DANSALAN-KEITHLEY BRIDGE NEAR CAMP KEITHLEY, MINDANAO

NEW SPECIAL DRILLING ATTACHMENT

The Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, have recently completed an interesting special drilling attachment, applied to one of their 30" motor driven Patent Head lathes, to drill 4" holes longitudinally through the centers of steel axles 10" in diameter.

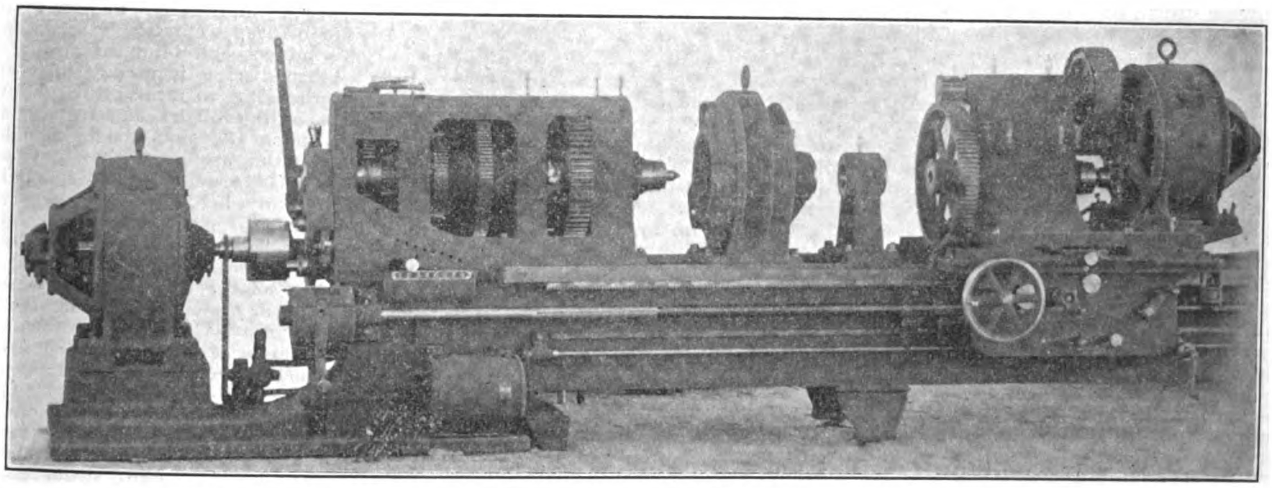


FIG. 811—FRONT VIEW OF LATHE WITH SPECIAL DRILLING ATTACHMENT ON THE CARRIAGE

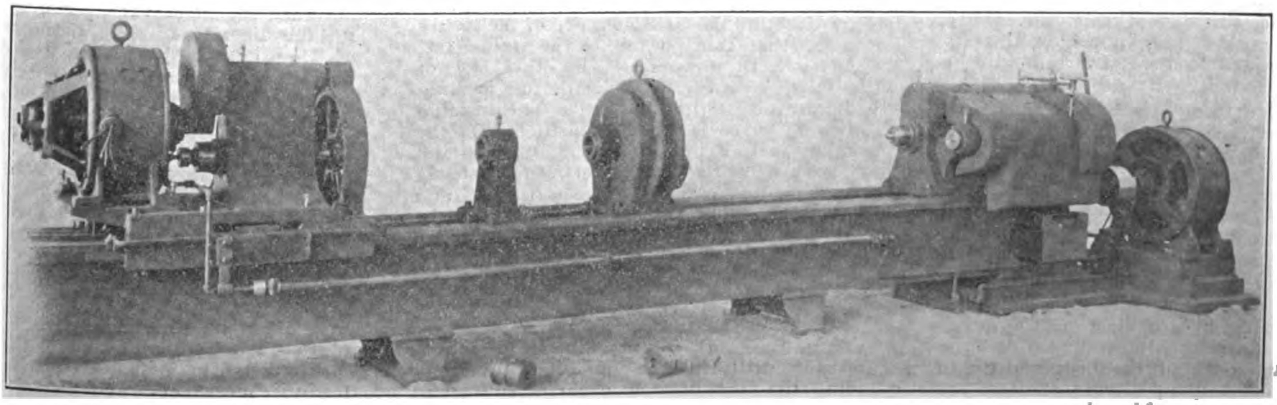


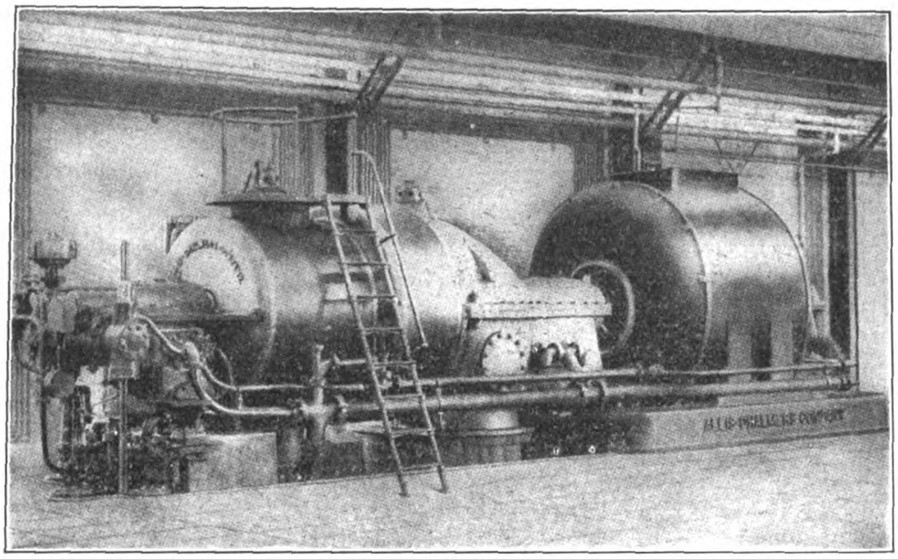
FIG. 812—BACK VIEW OF LATHE WITH GEAR COVERS IN PLACE

INSTALLATION OF ALLIS-CHALMERS STEAM TURBINE AND GENERATOR FOR THE MANILA ELECTRIC RAILROAD AND LIGHT COMPANY

The Manila Electric Railroad and Light Co. is installing a 2500 K. W. steam turbine and generator in its powerhouse in Manila thus increasing the capacity of its generating plant 50%. The new turbo-generator is being installed by Messrs. Allis-Chalmers Co. of Milwaukee, Wisconsin, under the direction of J. W. Grigg superintendent of erection and operation for the Milwaukee Company.

At present the plant comprises two-750 K. W., one 1500 K. W. and one 2,000 K. W., all Westinghouse turbo-generators, making a total of 5,000 K. W. With the Allis-Chalmers 2,500 K. W. the total will be increased to 7,500 K. W.

The 2.500 K. W. turbo-generator now being installed, is of the 60 cycle, 2 phase type 3,600 volt., 1,800 r. p. m. At full load the steam consumption guaranteed is 15.7 lb. per K. W. hour. At the usual steam pressure the current per terminal is 434 amperes normal voltage 3,600, steam pressure at throttle 175 lbs. per sq. in. by gauge; superheat of steam at turbine throttle 100° Fhr., temperature of steam 477; vacuum at turbine exhaust throttle, 28 inches of mercury referred to a 30 inch barometer; maximum above room temperature at full load 50° Cent. excitation at 120 volts, 280 amperes, at full load; the regulation is perfect. The diameter of the steam pipe at throttle valve is 7″ and at exhaust outlet 36″. The length overall is 29′ 8″, the approximate width 9′ 6″ and height 8′ 5″. The total weight is 159,000 lbs.



2500 K. W. ALLIS-CHALMERS STEAM TURBINE AND GENERATOR NOW BEING INSTALLED IN POWER HOUSE OF THE MANILA ELECTRIC RAILROAD AND LIGHT COMPANY

The present boiler capacity of the plant which comprises five batteries of Babcock & Wilcox boilers, of two boilers each, and 4.000 sq. ft. of heating surface, for each boiler is sufficient to provide all the steam necessary to supply the increased plant.

The Allis-Chalmers steam turbine is of the horizontal, multiple expansion, parallel full annular flow reaction type generally known as the Parsons' type. It embodies the designs patented by the Hon. Charles A. Parsons, C. B., together with additions made by the engineers of the Allis-Chalmers Co., as found necessary in practice. These turbines are built of three standard styles, viz, high pressure condensing, high pressure non-condensing, and low pressure condensing.

In the arrangement of the balance pistons of the Allis-Chalmers turbine a smaller piston is substituted for the largest piston upon which the steam acts in the Parsons, with the exception of those for the smaller turbines.

In the construction of the blading a foundation ring is provided that has slots cut in it of dovetail shape to receive the roots of the blades, accurately spaced, and inclined. To protect and bind the tips of the blades a shroud ring is used. Holes are punched in the ring to receive the projections on the tips of the blades and are accurately spaced to match the slots in the foundation rings. The latter are inserted in dovetail groves in the turbine cylinder and spindle where they are firmly held by key pieces which when driven into place are upset into undercut groves, locking the whole structure together and making it impossible for a blade to get out of place. The advantages of the Allis-Chalmers system of blading are summed up as follows: (1) Firm attachment of blades. (2) Ample stiffening of blades at all lengths against the effects of vibration. (3) Accurate spacing and angle of blades (4) Protection of tips so that accidental contact does not rip out blades. (5) Smaller clearances, resulting in diminished steam leakage. (6) Improved baffling against steam leakage by reason of the shape of the shroud ring. (7) Protection against a possible defective blade coming out and destroying other bales. (8) Accurate machine work as against uncertain hand work. (9) The facilities for through inspection of workmanship.

T e generators use l with the Allis-Chalmers turbin are of the revolving field type and are designed to meet the special conditions of turbine operation. The stationary armature of these turbo-alternators are designed to prevent undue heating of the armature core and winding. The laminated core is provided with numerous air ducts and the frame is adapted to assist in the circulation of air.

The slots formed in the core to receive the field coils are radial, and it is advanced by the manufacturers as a distinct advantage over construction with slots paralell to chords of the cross-section of the core.

The installation of the 2500 K. W. turbo-generator by the Allis-Chalmers Co. is the first made by that company n the Philippines. The representative of this prominent Milwaukee firm is Mr. Frank L. Strong, the leading machinery and electrical hause in the islands.

Photograph No. 811 is a front view of the lathe, with some of the gear covers removed to better show the gearing of the headstock and of the special drilling attachment on the carriage. In the back view of the lathe (photograph No. 812) the gear covers are shown in place; all gears are completely covered so as to fully safeguard the workman.

To take care of the unusual end thrust required to drive a 4″ drill, the headstock is provided with a special tie-piece across the top, fastened to the caps of each one of the four bearings: this supports the bearings from above, as well as from below. The front and rear gear covers of the headstock are bolted to either side of th s tie-piece. The headstock gearing gives six mechanical changes of speed, which are supplemented by a 2 to 1 speed variation in the motor.

The special drilling attachment is mounted upon the carriage. It consists of a heavy bracket with a train of gears driving from a direct connected variable speed motor. The main driving shaft in this bracket carries the drill, and is in exact alignment with the lathe spindle

The arrangement of pump and piping is shown in photograph No. 812. The pump is placed near the and of the headstock, and positively driven by a chain from the motor shaft. This forces the lubricant through the piping at the back of the bed, and up to the center of the main driving shaft of the drilling attachment. The lubricant then passes through the drill itself and is discharged at its tip. The pipe joint just below the carriage is fitted with a stuffing box, so that the rear section of pipe telescopes the adjoining section. This makes a good joint and insures proper lubrication of the drill, regardless of the location of the carriage. The whole machine sets in a pan (not shown in the photograph) to retain the lubricant and chips.

One end of the axle to be drilled is gripped in a chuck (not shown) on the lathe spindle, and the other end is carried in the special steady rest shown in each photograph between the headstock and the carriage. That portion of the steady rest which carries the end of the axle has a large annular bearing within the circumference of the steady rest, so that this portion of the steady rest revolves with the axle. The other side of the steady rest carries the drill, in a bushing which revolves with the drill. The bushing shown in place is for a 4″ drill, while the bushings shown on the floor in photograph No. 812 are for a 2″ drill. Between the steady rest and the carriage is a drill rest and guide, with a revolving bushing to support the drill at about its center. These bushings, while free to revolve, are kept from movement endwise by a set screw the tip of which enters an annular groove around the center of the bushing.

Thus, the work revolves in one direction, and the drill in the opposite direction, giving the best possible accuracy and speed of production.

THE FAR EASTERN REVIEW

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CHINA'S FOREIGN TRADE

We have to hand a copy of a review of China's foreign trade for 1910 by J. S. Chalmers, Statistical Secretary of the Imperial Customs, published in the Official Returns of Trade. Foreign imports are represented by Hk. Tls. 462,964,894 and exports by Hk. Tls. 380,833,328, making a total of direct foreign trade of 843,798,222, surpassing in value by Tls. 86,650,000 the year 1901 which is the highest recorded. According to Mr. Chalmers the increase is due largely to increased values. One item is opium where the increase represented Tls. 30,000,000 and another, cotton, Tls. 15,000,000. Increases are noted in trade through Hongkong by Tls. 33,000,000, with Japan by 27,000,000, with Germany by 12,000,000 and with Russia 6,000,000, while the only conspicuous exception is the falling off in trade with the United States by Tls. 8,000,000.

The high price of raw cotton, due to the shortage of the American supply, was responsible for the decline in importations of cotton frabrics from Europe and America. Japanese yarns and piece goods, manufactured from raw cotton imported from China and India, a d sold to China showed a remarkable increase respectively, 937,908 piculs of yarn compared with 674,654 piculs in 1909 and 2,389,693 pieces of varied piece goods compared with 1,396,297 in 1909, giving some idea of the activity of the Japanese.

The increase in tea export aggregated 62,000 piculs of which Great Britain took 35,000 piculs, or 46% more black tea than in 1909, while the United States took 35,500 piculs or 42% less black tea and 27,000 piculs or 23% less green tea, making a decreased American purchase of 31%. To Russia there was an increase of 57,000 piculs or over 6%.

There was also a falling off in the export of beans to the extent of 3,500,000 piculs. The exports of raw cotton amounted to 1,247,000 piculs, about double that of the previous year. Reference is made to the development of cotton manufacture in North China which now involves 33 mills with an aggregate of 900,000 spindles and 4,000 looms the output of which represented 272,000,000 yards of sheetings and drills.

The foreign imports of Tientsin and the open port of Chingwangtao increased Tls. 10,000,000 compared with 1909. This was largely due to the increased importation of Japanese cotton, railway materials, and military equipment. The total trade of Chihli ports reached Tls. 109,587,893 and of Shangtung, Tls. 72,776,000. The Yangtsze trade reached Tls. 293,756,591 notwithstanding the poor crops and the embargo on food stuffs in the early part of the year. The striking feature of the year's trade was an increase of Tls. 11,000,000 in the value of export trade from Hankow. Shanghai's participation showed an expansion due to the advance in opium prices and the remarkable increase in the shipments of raw cotton.

The Kwangtung and Kwangsi ports yielded a total in trade of Tls. 280,660,178.

THE NATIONALIZATION OF CHINESE RAILWAYS

When the edict issued directing the early nationalization of China's trunk lines, doubt was expressed in many quarters of its feasibility, and predictions made that the scheme would meet with such serious opposition that the central government would be unable to enforce its authority. From present indications Peking continues firm in her resolve and notwithstanding the activity of provincial agitators against the measure, the preliminary work is under way and it is expected by October that effective plans for the transfer of private railway interests to the Federal government will be submitted to the conference of railway directors of the Empire to be held in Peking that month. As indicative of the prevailing foreign sentiment with respect to the nationalization we quote the following from the *Shanghai Times*.

"The decision of the Central Government to take over the control of the trunk lines of railway was not reached a day too soon. It must have been decided upon after careful enquiries had been made as to the progress of the work undertaken by the provincial companies, for since these companies have been entering their protests against the proposed action the Government has been ready with arguments to refute every statement made. It appears that the Canton provincial company succeeded in selling shares to the amount of about forty million dollars, of which about twenty million have been paid into the treasury of the company. All of this sum has been spent, and the construction of less than a hundred miles of railway is the only result. This provincial company had also a large amount of material at its disposal which was left over by the American-China Development Company. In the case of the Hunan provincial company, about five million dollars was raised, and every cent of it has been expended in the construction of thirty-five miles of railway, and the company has still several large debts outstanding. It is not known how much money was raised by the Szechuan Railway Company, but the amount is supposed to be about ten million dollars; of this large sum, three or four millions were lost in Shanghai, through the failure of Chinese banks and the speculation in rubber of the man who had the funds in charge. The situation in other Provinces has not been so bad, and it must be said to the credit of the Kiangsu Railway Company and of the Chekiang Railway Company that, as far as is known, their affairs were handled with honesty and discretion. The difficulty in the case of the three Provinces mentioned above is that there seems to be no source of financial authority to which the officers of the companies felt themselves responsible. They were only indirectly recognized by the provincial governments, and the shareholders were so widely scattered that the election of directors was little more than a farce. It was found easy for designing persons to secure election or appointment to lucrative posts, and instead of these provincial enterprises being conducted more honestly or efficiently than similar official undertakings, the contrary has been the case. Even in the most flagrant instances, officials have had their official standing to act as a check upon rapacity; but in the case of the gentry (who are only retired officials), there has been no restraint, and such peculation as has been unknown in the modern era of China has been the result. We do not believe that these serious charges against the provincial companies can be considered a reproach to the Chinese Government or the people, for, on the one hand, the Government had no control, and on the other hand, the people were not organized to exercise supervision. These provincial railway companies which we have mentioned have been conducted with gross carelessness, and it was quite time that Government stepped in to take control of them. There need be no occasion for alarm at the attitude of opposition to the Government which has been so loud-spoken in these three Provinces, for it is to be expected that the men who have been responsible for the failure of the provincial companies should fight strenuously in their own interests. The Central Government seems to have no misgivings as to the reasonableness of its position, and the only thing that remains is for proper compensation to be paid by the Government to the stockholders of the provincial companies. It cannot be expected that the Government will pay in full all the money which has been squandered. It will be sufficient if careful estimate is made of the value of the property which these companies are able to turn over to the Government and this amount should be paid in full to the shareholders. It is inevitable that there should be a serious loss to the shareholders; but for the condition which

have allowed this loss they must hold themselves responsible. The Government can only purchase from the companies, at an equitable appraisement, the property of which they are in possession. This experience in railway construction is a severe blow to the growth of the influence of the people in governmental affairs, but we believe that the sturdy honesty of the people will support the Government in its determination to oust the demagogues who have been feathering their own nests at the expense of the public."

This opinion is shared more and more by progressive Chinese leaders as the result of investigations made by Peking are disclosed. The successful flotation of the Hu-Kwang loan at a premium also demonstrated that the nationalization scheme as proposed greatly strengthened China's credit abroad, and with the better understanding of Peking's purpose to protect every interest involved, the influence of the selfish agitators grows less and less.

EL BANCO ESPANOL FILIPINO

The semi-annual report submitted to the directors by President John S. Hord of the Banco Español Filipino of Manila is indicative of the continued prosperity of that institution and reflects t.e generally improved conditions of trade and industry throughout the Philippines. The net earnings for the term amounted to ₱212,184.89, equal to a dividend of 7% on the bank's shares issued which is ₱3,000,000. Out of this amount, howev.r, a 5% dividend was paid, ₱35,728.29 transferred to legal reserve fund, ₱10,575 51 to voluntary reserve fund and ₱15,881.09 to the executive officers of the bank and representing 9% of the net earnings. The legal reserve is now ₱531,070 99 with circulating notes to an equal value. This represents practically double the amount of paid in capital of the bank a year ago. Deposits and other accounts have also increased materially. Commenting on the sugar situation President Hord refers to the stagnation due to the large sugar crops in Cuba and Germany but which was relieved by several sales at fair prices and better indication for July. (This has already been realized.) The bank's branch in Iloilo were enabled to see their clients through the critical period.

Of the hemp and cigar situation he says:

"The hemp situation is still most confusing, and only concerted action amongst those interested, or government intervention, or perhaps both together, will serve to avert a still more serious situation. Late advices from the United States indicate a revival in the Philippine cigar sales in that country. But the improvement will be gradual."

Mr. Hord pointed to the steady healthy growth of the exterior trade of the islands with few boom features which, he writes, "some might wish for, but which sounder judgment would condemn because of the constant danger of collapse."

Mr. Hord recommends to the wholesale merchants a credit system based on clearing house methods to overcome misrepresentation of resources and liabilities on the part of some retailers. He says:

"Some of the larger import houses have been much harassed by their inability to understand the bookkeeping of a certain influential section of the retailers, as well as by actual misrepresentation of resources and liabilities on the part of some of their customers. This has resulted in curtailment of credits by the importing houses as a measure of precaution. There is but little doubt that sooner or later a system based on the clearing house methods will be established whereby both the large importer and the small retailer doing a legitimate business will be protected against the unnecessary loss due to the present anomalous condition of affairs.

"Amendments to the law codes of the islands with respect to false representations as to resources and liabilities, and regarding attachment for debt, etc., would help to clarify the situation. Much good is expected to result from the endeavors, now taking form, of the various mercantile associations to work together to common ends in such matters where their interests are not necessarily opposed. The co-operation of the government, through necessary legislation and administrative action, with the commercial interests of the islands is assured.

"The lumber industry shows a healthy activity, the local demand being, in fact, greater than the supply."

CHINESE-AMERICAN COMPANIES

The advancement of Chinese-American trade relations has proven a popular movement among leading Chinese financiers and merchants since the memorable visit of the Pacific Coast commercial delegation in 1910. The outcome up to the present writing is one proposal to establish a Chinese-American bank with a capital of $10,000,000 with branches throughout the Empire and the United States, the capital to be furnished by Americans and Chinese in equal portions with equal representation on the board of directors. Owing to the serious financial situation in China, due to the rubber boom, the organization was deferred, but new interest is now being taken in the project and there is every prospect of its going through.

In addition to the bank the prospectus of Chinese-American Steam Navigation Company has been issued which provides for the taking over of the new 8,600 ton steamer now being built for Captain Robert Dollar and in addition the raising of $600,000 of capital. The company has been registered in the Board of Posts and the Board of Commerce at Peking as a limited company. The agencies of the Robert Dollar Steamship Co. are to be utilized by the new company.

These two companies will no doubt be the forerunner of many more as there is a growing interest among Chinese in the expansion of trade with the Pacific Coast. The proposed visit of representatives of 46 Chambers of Commerce of China to the United States in October will probably give added impetus to this intertrade movement. The Chinese Government is reported to have arranged to pay the cost of the expedition to and from San Francisco.

*PHILIPPINE OPPORTUNITIES

The Philippine Islands present to energetic, capable and enterprising people an opportunity which it would be hard to find anywhere else in the world. Here is a soil and climate capable of producing abundant harvests; here are a vast number of people under paid, underfed and never yet given an opportunity to acquire those things which are usually obtained under the American flag and unable to acquire a standard of living such as the Americans are accustomed to provide for people whom they employ. All that is necessary to greatly benefit the condition of the Filipino and at the same time reap a profit more than commensurate with the risk and effort is the application of capital and brains to the work.

Here is about ten per cent of the population of the United States in a country that can produce things which cannot be produced in the United States. People in America can afford to pay more for their luxuries than can any other people because the rate of wages is higher in the United States and many of the things deemed to be luxuries in other countries are of general consumption there because the average rate of living is high. The poorer people in the United States are accustomed to live better than are the poorer people of other countries, and as a result there is a wider market for such things as sugar, coffee, chocolate, tea and rubber.

The Philippine Islands have the advantage given by the tariff that they can admit their products to the United States free of duty whereas other countries have to pay. This gives the Philippine Islands a preference over any other country and enables us to get a better price for our products here.

With these advantages there is no reason in the world why the Philippines should not produce a very large proportion of the tropical products consumed in the United States.

The attitude of the Government is that of favoring the establishment of new enterprises; we welcome the coming of capital; we fear it not. The laws are such that undue combinations can be controlled and the Philippine Islands under their present form of government are not liable to abuses by corporate control. On the contrary, the Government is more inclined to fear the result of capital not coming to the Islands. Even with the advantages given us by the tariff, it is necessary that Philippine labor should be made effective and economical to compete with other countries. The tariff advantage will not compensate for the loss of one-half of the sugar crop by reason of faulty methods of treatment of the cane; it will not make up for the lack of irrigation, lack of ports, lack of roads, lack of machinery, lack of labor-saving devices and lack of modern methods of finance and conduct of business.

In order to avail ourselves of the lower tariff we must still adopt all those measures which modern concerns in modern countries have found necessary in order to compete in the markets of the world. We cannot afford, for instance, to let a large proportion of our tobacco crop spoil by reason of allowing the leaves to be wet by the rain while drying, we cannot afford to neglect those precautions which are necessary to keep the worms out of the leaves of our crops; we cannot afford to lose our credit by permitting adulteration of the products of the Islands, for instance, in hemp bales by placing the best quality on the outside of the bale and the poorer on the inside which has the effect of creating distrust in the minds of all purchasers of hemp and depreciates the price which producers can expect to realize.

We must take those measures which will put an end to these conditions and let people know that business in the Philippine Islands is conducted on the square; that our goods are as represented; that adulteration is not only frowned upon but not permitted, and that we make ourselves the agents of our clients and look after their interests as if they were our own.

The Government is ready to do its part in the establishment and carrying on of such a policy and the active and vigorous Merchants' Association will also do its share in bringing it about.

*By His Excellency, Governor General W. Cameron Forbes, in the Merchants' Association Review.

The Manila Electric Railroad & Light Company and Filipino Labor

The efficiency of Filipino labor, as demonstrated under favorable conditions of employment and direction, is the subject of an interview courteously accorded the FAR EASTERN REVIEW by General Manager C. B. Graves of the Manila Electric Railroad and Light Co. in which he offers his conclusions after six years experience in charge of the operation of the extensive railway system and light and power distribution in Manila. He said:

"I would say from our experience here that the general class of Filipino operatives are satisfactory, but they require considerably more supervision than a similar force at home. This supervision must be of a high order and the Americans and Europeans employed for this purpose must be competent in their respective lines, familiar with the native dialect, and have a working knowledge of

Spanish. It is absolutely necessary to insist on painstaking instruction and correction in both Spanish and the native dialect in order that no doubt may remain that the operative understands just what is expected of him. Under no circumstance should he be allowed to begin any work without his duties being made clear. Success in the development of a substantial working force depends perhaps more on painstaking superintendence than any other feature, as an impatient overseer lapsing into English will demoralize any operative to such an extent that the latter would be unable to understand either the sense or purpose of his instructions. More depends on perfect understanding of requirements than probably any feature of training and direction. The operative generally endeavors to carry out instructions exactly as he interprets them, but it is usually found necessary to continually repeat them. For instance, with our car crews we find it necessary to maintain two weekly instruction classes for all these men and regular rules and orders are continually gone over and repeated over and over again throughout the year.

"The railway system comprises 47.5 miles of track and a maximum of 110 cars in operation. The light and power department furnishes current for approximately 85,000 lights of an average of 16 candlepower. In the work of construction, labor cost for building a mile of track on wood ties and macadam pavement runs in the vicinity of $1700 U. S. C. The monthly payroll disbursement for the entire system for labor and supervision, not including the staff, is $21,000 U. S. C.

"The total number on the payroll of the company, including the supervising foremen, averages 1097 employes which may be divided as follows:

Foreign and American foremen	33
Clerical	136
Operatives	622
Skilled Operative Mechanics	63
Laborers	218
Miscellaneous	25
Total	1,097

"The most important division, as I said before, is that of foreign and American foremen who are directly in charge of the instruction, training and supervision of the operatives and laborers in the different departments. Their work of supervision is made effective by the assistance of a large number of sub-foremen, checkers and supervisors, chosen from the most reliable and trained Filipinos. The successful foreman must have the virtue of patience to a remarkable degree and a knowledge of native language, characteristics and customs. Thus equipped a large measure of efficiency may be realized, as has been demonstrated by our experience in thus handling native labor. Indeed, economic and effective supervision of labor should be accorded first place in the administrative program of any company looking to successful creative enterprise in undertakings in the Philippines.

"The clerical force, which numbers 136, is under the supervision of officials of the company and their assistants, and in respect to efficiency has proven satisfactory. Under this heading are the clerks in the railway department, numbering about one quarter of the whole force, and clerks, collectors and solicitors of the light and power department. These men are carefully trained in their respective duties and a check kept on their work at all times. The result after several years of training is an almost perfect clerical organization. The clerks now on the payroll have been in continuous service and very rarely is there a vacancy.

"Under the head of operatives are included linemen, motor men, conductors, sub-inspectors, checkers, starters, switchboard attendants, wiremen's helpers, painters, blacksmith and shop helpers, car barn maintenance employes, freight and truck repairers, etc. These number 622 and it is their training and supervision that taxes the capacity of the foreign and American foremen. The initial training of these men cover a period of four to six weeks after which unremitting overseeing is necessary. Each man must be made to understand his duties thoroughly and trained in intelligent performance. This work may be said to be never ending for nowhere is vigilance so necessary as in the direction of Filipino labor at all times. Once trained and with the knowledge that his work is subject to the most careful scrutiny, the native operative, in any of the above capacities, gives fairly efficient service.

"The skilled operative mechanics include water tenders, machinists and blacksmiths, carpenters, winders, printers, etc., and number in all 63. They are also carefully supervised.

"The force of common laborers number 168 and include trackmen, greasers, cleaners, coal passers, ground men, power house, car barn and dock laborers.

"In connection with the success obtained in developing local labor, the remarkable change in the attitude of the native under favorable conditions and better wage, is worthy of special reference. When Messrs. J. G. White & Co. undertook the construction and installation of the present system, they found that the native laborer, familiar with the old native contract system, looked with some suspicion on the proposal made to pay him directly. It took several pay days to convince the backward that the money paid was real, but finally all the labor necessary was available although the number of names carried on the payroll sometimes doubled and trebled the actual steady working force. The laborer had no idea of thrift nor increased confort and it was usually the custom for him to lay off for a few days after pay day to put his accumulation of wealth into active circulation. Before the tracklaying was completed, however, a steady force was developed and by a careful system of encouragement and supervision most satisfactory results were obtained. Finally laborers that had formed the habit of taking a few days lay-off after pay day upon reporting for duty found their places filled and by Filipinos inclined to report every day and a place on the working force rose to a premium. The opportunity that better wages afforded to buy comforts for his family soon appealed to the average Filipino and he became a steady, reliable employe. Indeed, among the 1097 now on the company's pay roll, and well towards the top, are many of those early construction laborers who helped J. G. White & Co. install the system.

"In organizing the system of operation higher rates of pay were inaugurated than prevailed in Manila and the Company was subjected to considerable adverse criticism on that score, but the wisdom of this policy has been demonstrated in the better class of men attracted and in better service to the public. The application-for-employment list is always overflowing and during a strike in 1909, which involved 400 employes, the most difficult problem confronting the Company was the selection of the best material from the deluge of applicants. Indeed, there were scores of men then appointed who walked or ran all the way from provincial towns to take advantage of the opportunity to work for the company.

"The men are constant in their employment although among conductors there are many more changes than are usual a thome and also more than in any other department of the company here. One most desirable virtue of the Filipino employes that will be appreciated is their abstinence. There is almost an entire absence of intoxication among them.

"In general, from the adaptability standpoint, the Filipino, in our opinion, makes a satisfactory operator when properly trained and supervised. With increasing investment and a greater supply of low class labor he will find associated employment in varied creative investments now being inaugurated.

"The men are naturally of a happy disposition and generally uninclined to thrift. Most of them spend as they go, but I recognize a growing tendency among the older employes to save a little, and as conditions have been created here making it possible for anyone to secure an education and acquire property, I believe that there will be continued improvement in the status of the individual Filipino operator and laborer.

"Political questions create no interest among the employes of the company and those who own a little property are not looking with delight at the prospective withdrawal of the present American association in the government, nor of the elimination of the liberal American consumer and rent payer."

The above interview should be read with great interest by prospective investors in creative enterprises in the Philippines. It demonstrates that the Philippines have their share of labor and its successful development for any special line of endeavor rests entirely with the employer. Every success of pioneer enterprises such as that of the Manila Electric makes for the general improvement of labor condition throughout the islands.

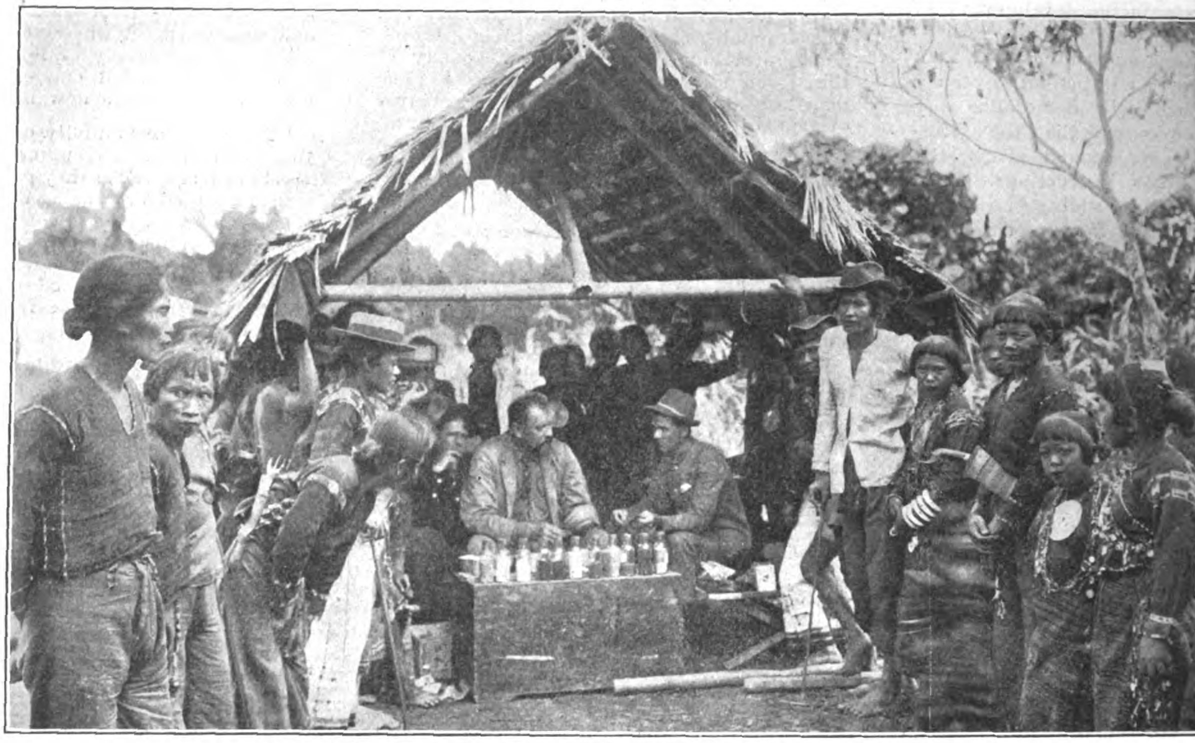
The company has given especial attention to the welfare of its employes. Medical and hospital service is provided free of charge and the men are encouraged to thrift. Care is taken to recognize efficiency by prompt advancement. Every facility to encourage the employe to equip himself with a thorough knowledge of all the phases of railroad and light and power work is provided. A school course is within the reach of every native on the pay roll. Here they are given practical instruction in rules and the details of the many features of railroading with which they come in contact every day. The instructors are familiar with the language and local conditions and their work dovetails into every day performance.

Healthy outdoor amusements are encouraged. The M. E. R. R. & L. Co. baseball team is the pride of every employe and official of the company from the trackman to the general manager. The batting average is discussed in Tagalog wherever two or three are found together and the enthusiasm over the team's prospects is typical of the esprit de corps prevailing whether at work or at play.

It may be accepted as a definite axiom that in any successful enterprise involving the employment of a large force of labor in any country, intelligent study of local conditions is necessary, and of no section of the world does this apply more strikingly than to the Philippines where labor until recently suffered from indifference, neglect and abuse to such an extent that its spirit was broken and with difficulty induced to respond to more liberal treatment. The pioneers in the development of the present efficient Filipino labor from its status under centuries of peonage deserve great credit for patience and perseverance and the successful outcome of their intelligent efforts, as in the experience of the Manila Electric Railroad & Light Company, removes effectually the reflections cast upon the Filipino as a laborer. And it also demonstrates that the basis of reports of alleged inefficiency of Flipino labor may be found largely in the incapacity of employers in failing to provide the necessary measure of intelligent training, supervision, and control of the material to their hand

THE DEVELOPMENT OF THE HILL PEOPLE OF THE PHILIPPINES

In the government of the Philippines, the administration provided for special supervision of what are termed the non-christian tribes, as separate and apart from that of the Christian or civilized Filipinos. The control of these hill people takes a more paternal form, designed to reclaim them from savagery and encourage them in arts of peace.



SECRETARY WORCESTER MAKING FRIENDS WITH THE MANDAYAS BY DISTRIBUTING BEADS

GOOD-NATURED MANDAYAN SAVAGES ON THE UPPER AGUSAN RIVER IN MINDANAO

They are ready for peace or war. The people of this tribe have not yet been brought under effective Government control.

The non-christian population comprise about one-eighth of the population of the Philippine archipelago and inhabit the more or less inaccessible mountain regions of the different islands. The different communities, in the state in which they were found, were continually at war with each other. Indeed in whatever section of the islands found, the total male population were always in arms either for defensive or offensive operations while the women and children were the only producers. The taking of heads for trophies was the popular pastime. These conditions applied generally to all these scattered tribes when the islands became American territory, and presented a serious problem to the administration. Very fortunately, among the members of the Philippine Commission was Mr. Dean C. Worcester, who previous to American domination had travelled extensively throughout the islands and was more or less familiar with the characteristics of these wild, yet simple people. When he accepted the portfolio of Secretary of the Interior the non-christian tribes were placed under his supervision. He at once inaugurated a program designed to eliminate the continual internecine warfare, encourage intercourse between neighboring tribes, and interest them in agriculture and other peaceful pursuits. This was no easy task, for the hill native had reason to be suspicious of the people of the flat country, but Secretary Worcester by his personal courage invaded their inaccessible territory, won their confidence, and by fair dealing has managed to popularise the baseball bat and the plowshare where the headaxe was once the only implement emblematic of prowess. He has demonstrated that the savage of the Philippine is amenable to fair treatment and kindness and that his word

is as good as his bond. Some idea of the progress of this magnificent work may be gathered from excerpts from Secretary Worcester's report for 1910. For instance in the Mountain Province he says:

A MANDAYA HOUSE

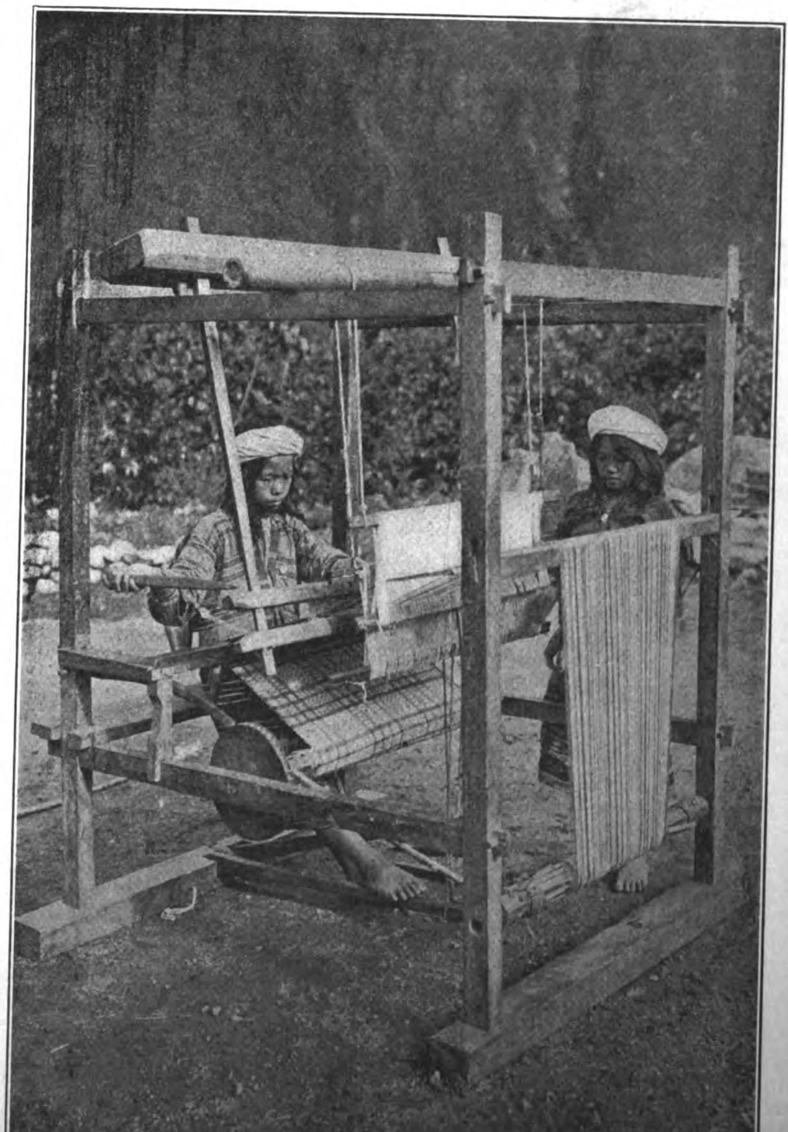
"No heads have been taken during the year among the 117,000 Ifugaos, and very few among the Igorots or the Kalingas. Governmental control has been rapidly extended over the Kalinga settlements, although Lieutenant-Governor Hale has been repeatedly warned that if he attempted to go to certain settlements his head would be taken. In such cases he has visited the obstreperous settlements at the earliest possible opportunity, often taking no other escort than a few of his own Kalinga policemen. In several instances spears have actually been thrown at him, but he has displayed admirable courage in dealing with the troublesome situations thus created and has succeeded in establishing friendly relations with such settlements and in gaining a reasonable degree of control over their inhabitants."

An evidence of the success of Secretary Worcester's pacific policy in dealing with his wards under trying conditions, in fifteen years of experience with the wild tribes he has never fired a shot, nor had any member of one of his parties, or its escort, done so, until last year when a treacherous Moro leader and murderer of Palawan attempted to ambush him and his companions at Culasian Bay where four of the dato's followers were killed as they attacked the guard. No one regretted the incident more than Mr. Worcester, but it was unavoidable. In all sections of the islands where his duties call him in connection with these people, he usually goes unattended and unarmed.

In the two sub-provinces of Butuan and Bukidnon of Agusan, Mindanao, great progress has been made in stimulating commercial development through government exchanges. As the secretary puts it in referring to Butuan, the effect on public order has been most fortunate. "People who are busy growing and stripping hemp have little time for murder and head taking".

Bukidnon comprises almost level table lands sloping gradually from 900 to 3,000 feet above sea level with streams so boisterous as to be unnavigable. The progress made among them has been more rapid than among any other non-Christians under American rule. The settlements are models of cleanliness and the state of public order most satisfactory. The only influence tending to interfere with the steady progress of development has been traced to the Christian population of Misamis province who resented the interest taken by the Insular authorities in encouraging and protecting these people. This is better explained by Mr. Worcester in an excerpt from his report in which he says:

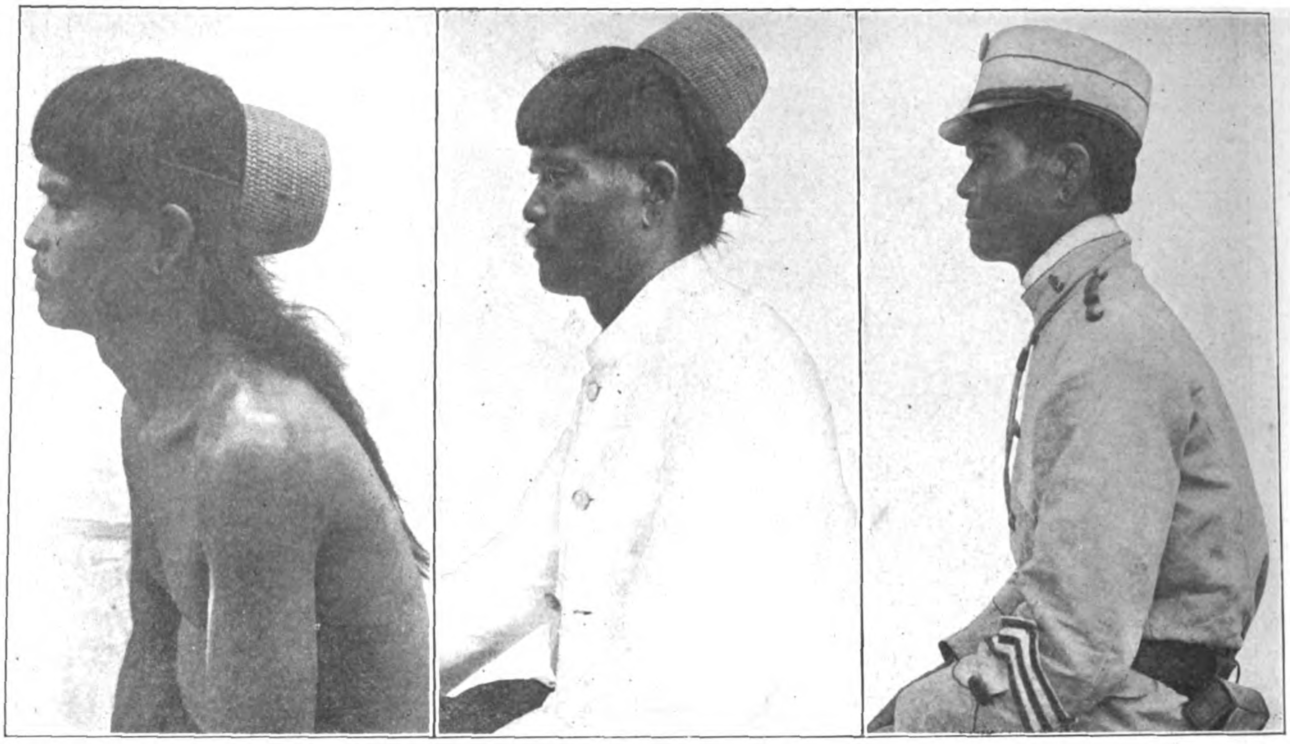
"It is probably true that in no part of the Philippine Islands were members of the non-Christian tribes so robbed and oppressed as were the Bukidnon people prior to the establishment of a special government for their protection. They are comparatively industrious, and bring down to the coast hemp,



BENGUET IGOROT GIRLS WEAVING

cacao, and coffee in considerable quantities. Formerly they also brought out a good deal of gutta-percha. These products they were compelled to sell to the Christian Filipinos at prices fixed by the latter, to whom this arrangement was most advantageous. It was to be anticipated that measures which resulted in freeing the people whom they had so long oppressed would meet with their most bitter and determined opposition. This expectation has been fully realized. During a period of more than two years I dealt very gently with those who sought to destroy the government of the subprovince, or to render it ineffective, but their persistent efforts in this direction ultimately had the effect of bringing Lieutenant-Governor Frederick Lewis, who was the special object of their malevolence, to the verge of breakdown, and in several instances caused the sudden and otherwise unexplainable migration to the neighboring mountains of hitherto quiet and peaceful residents of settlements. Although these people were ultimately practically all persuaded to return to their homes, their extraordinary action in temporarily leaving them caused uneasiness and even excitement among those who remained behind. Believing that this condition should not longer be allowed to continue, I proceeded to the capital of the Province of Misamis, and held a conference with some of the persons believed to be immediately responsible for it and with officials whose duty it was to end it. In the course of this conference I frankly informed those present that if there were not a prompt cessation of hostilities I should personally interest myself in active measures looking to the arrest and trial of those who were continuing seditious secret agitation. The result has been a falling off in efforts to destroy the usefulness of this sub-provincial government."

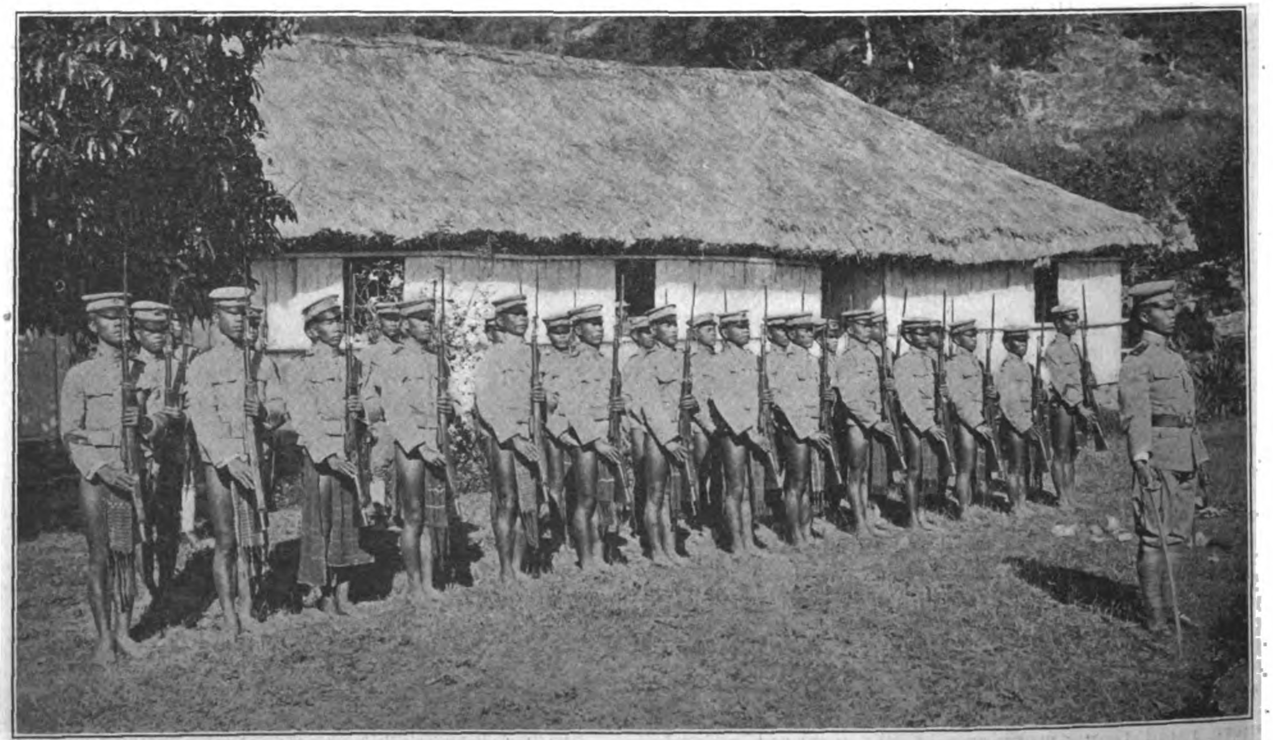
"Development of means of communication.—Road, trail, and bridge construction have been very actively pushed during the year, both in Nueva Vizcaya and in the Mountain Province. In Nueva Vizcaya a good



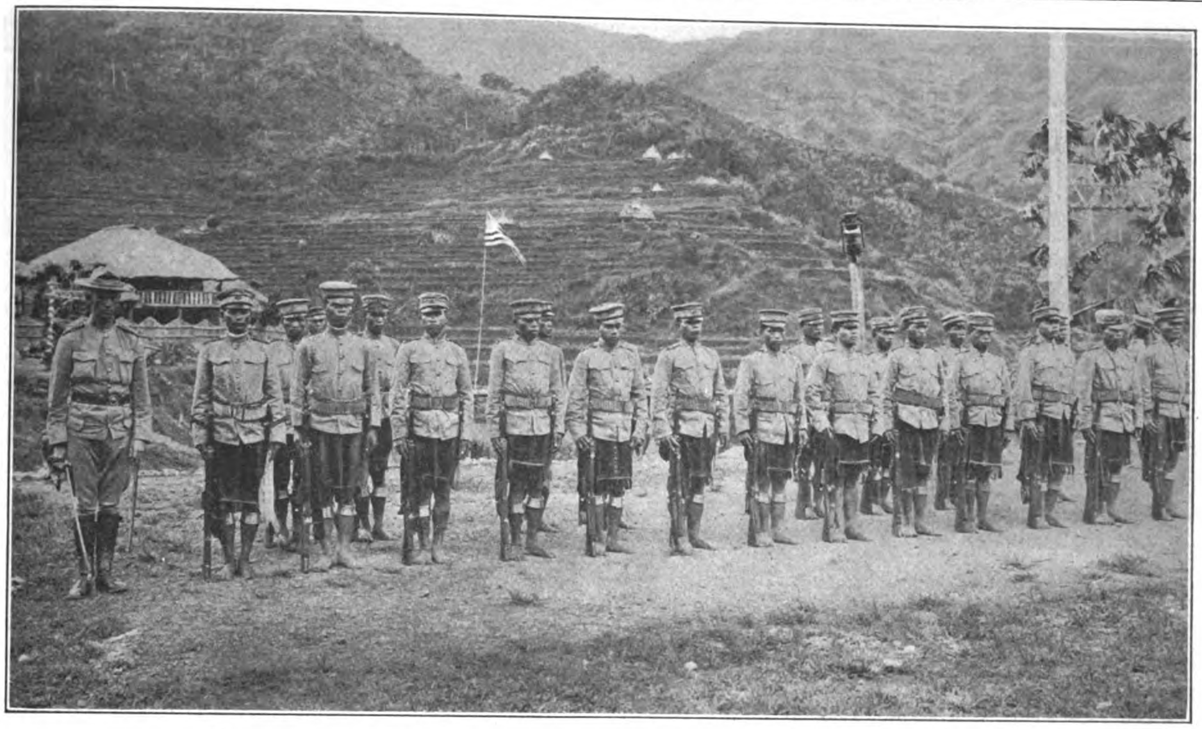
1901 1902 1903

THE EVOLUTION OF A BONTOC IGOROT CONSTABULARY SOLDIER.

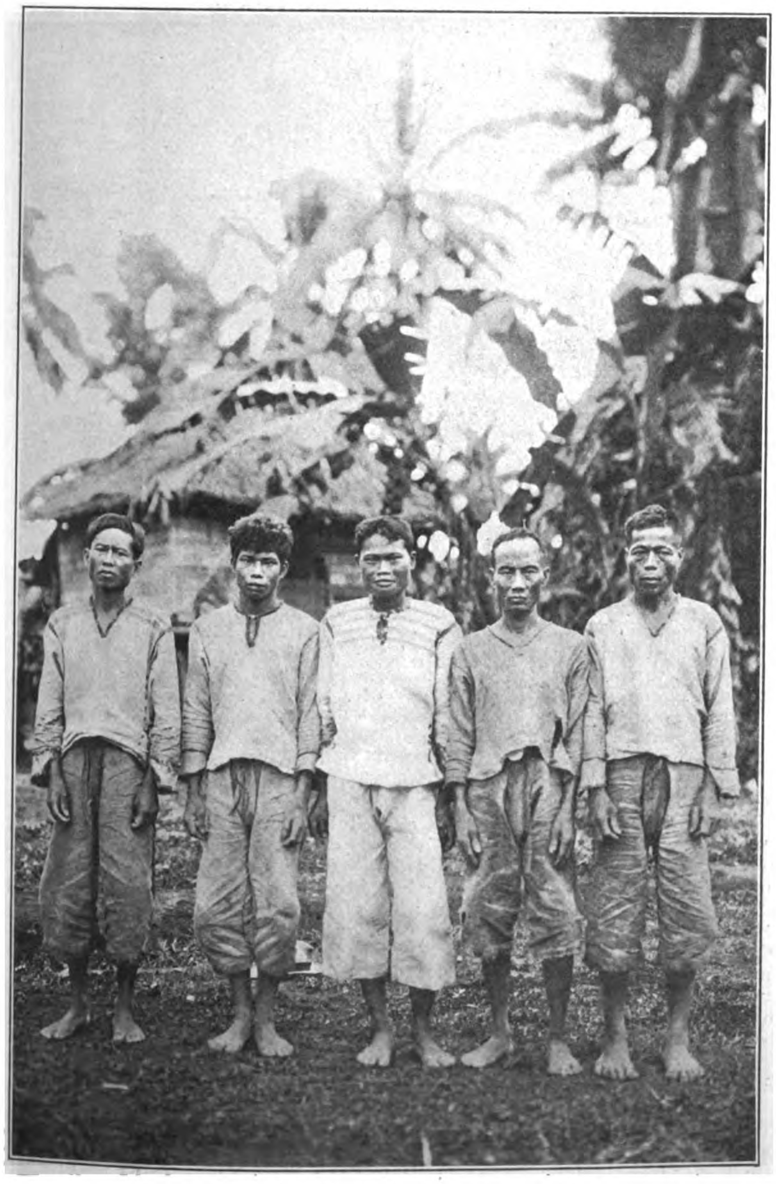
Showing a Bontoc Igorot in 1901, when he was a head-hunting savage; in 1902 after he had been for a year in contact with Americans, and in 1903 when he was a well-disciplined and competent sergeant of a company of Philippines Constabulary made up of his fellow-tribesmen.



BONTOC IGOROT CONSTABULARY SOLDIERS.

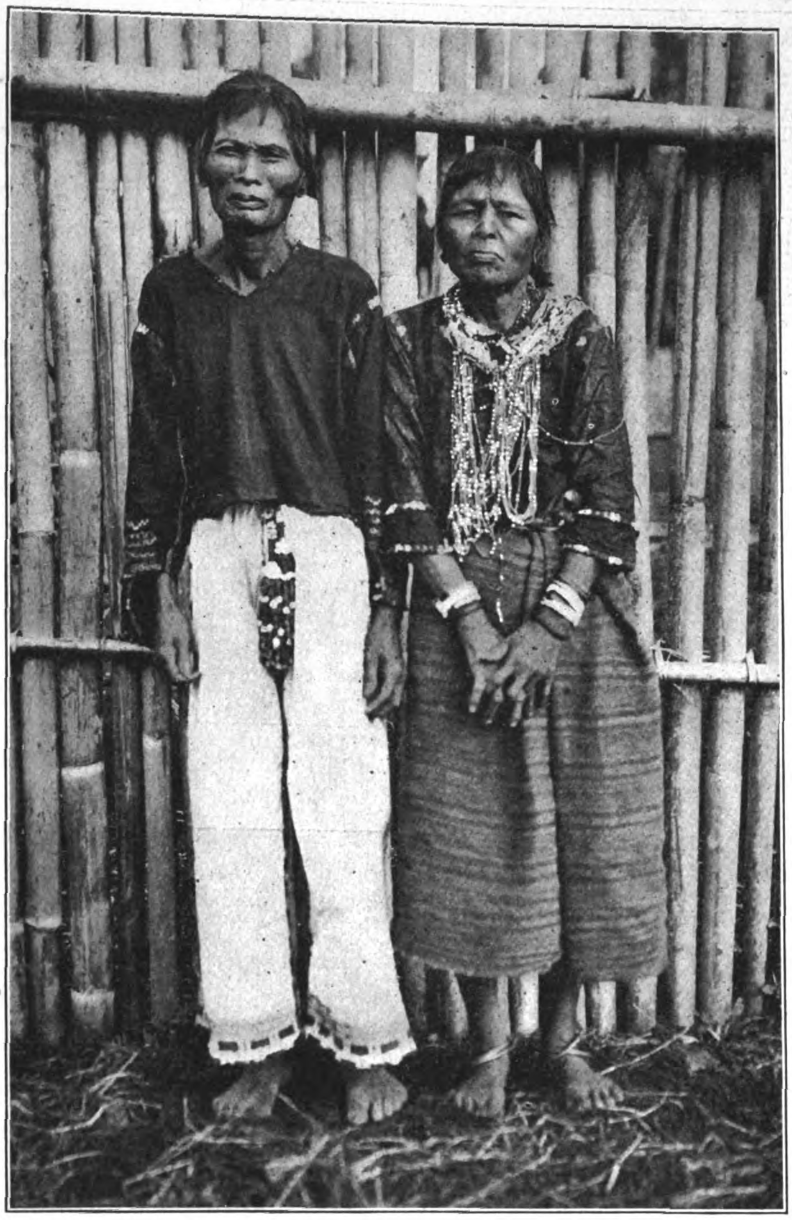


IFUGAO CONSTABULARY SOLDIERS IN COMMAND OF LIEUTENANT DOSSER



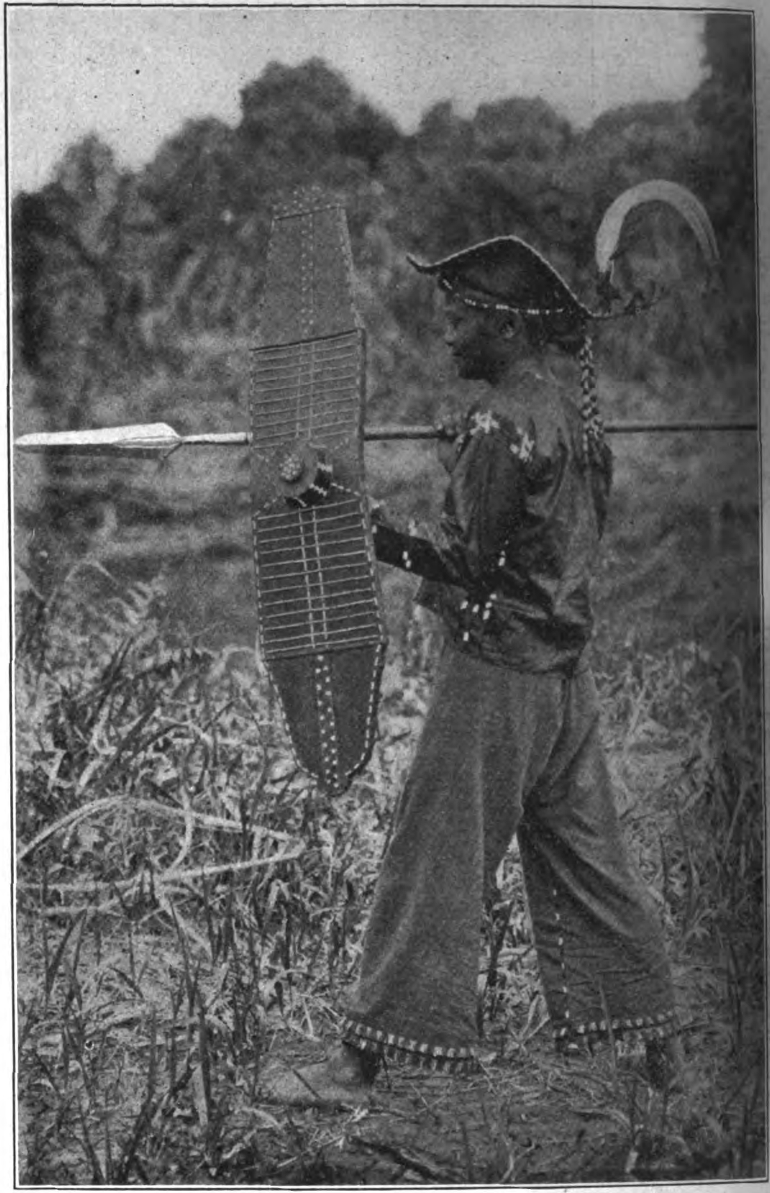
A GROUP OF TYPICAL MANOBO MEN

GROUP OF TYPICAL MANOBO WOMEN



DATA BADAO AND HIS WIFE

This woman has, in the past, practically held power of life and death over Manobos in the upper Agusan Valley, as her orders relative to killings were implicitly obeyed. Badao and his wife are now living quietly at Waloe, where there is a Constabulary garrison.



MANDAYA WARRIOR

start has been made toward opening up the Ilongot country, into the heart of which trails will be pushed as actively as possible. In the Mountain Province there now exist some 730 miles of excellent low grade horse trail. Narrow-tread carts are being run from Tagudin, on the coast, to Cervantes, the capital of the subprovince of Lepanto, and in a short time will be running into Bontoc, the capital of the Mountain Province. A new low-grade trail from Cervantes to Bontoc has been completed with the exception of two bridges. A line has been staked and cleared for a similar trail from Bontoc to connect with the Ifugao trail on the top of the Mount Polis Range, and a considerable amount of construction work has already been done.

"In the subprovince of Ifugao there were 20,000 road laborers available for ten days' work each during the year. Old trails have been widened and improved, and there has been a large amount of new construction, including the opening up of a trail into the heart of the hitherto almost inaccessible Silipan district, and the completion of half of the work on a new trail through the equally inaccessible Asin region to Bugias in the subprovince of Benguet. The main line north through the Mountain Province has been pushed to a point more than 3 miles beyond Tabuc, into the subprovince of Kalinga, and during the present year should be extended well into the subprovince of Apayao. It is within the range of possibility that two years more may see a through route for horseback travel completed from Twin Peaks, in southern Benguet, to Claveria, at the extreme northern end of Luzon. Very great damage was done to trails throughout the Mountain Province by the destructive typhoon of October, 1909, and as repair of existing trails necessarily takes precedence over construction work, it was not possible to build as much new trail as had been planned. It is hoped, however, that some 300 miles can be completed in the Mountain Province during the fiscal year 1911.

"Nothing has as yet been done in the way of trail construction in Apayao, and soon practicable efforts must be centered upon the opening up of a line of travel through this subprovince. Until this has been accomplished, very rapid progress in civilizing its unruly inhabitants can hardly be expected.

"In Mindoro road work has been pushed as rapidly as the very limited funds of the province would permit. No trail work has as yet been undertaken and efforts have been confined to the constrution of good permanent roads and bridges extending along the coast from the capital of the province.

"In the subprovince of Bukidnon the people have cooperated actively with the lieutenant-governor in his efforts to improve their means of communication, with the result that a very large amount of road, trail, and bridge work has been done at extraordinarily low cost. In the subprovince of Agusan work on the Cabadbaran-Butuan Road, which is opening up a very rich agricultural region, has progressed slowly, and a new trail has been constructed from La Paz to Segunto and thence to Waloe, the first two settlements named being on the Adgauan River, and the last on the Umayan River. The effectiveness of the Constabulary garrison at Waloe has been thus greatly increased.

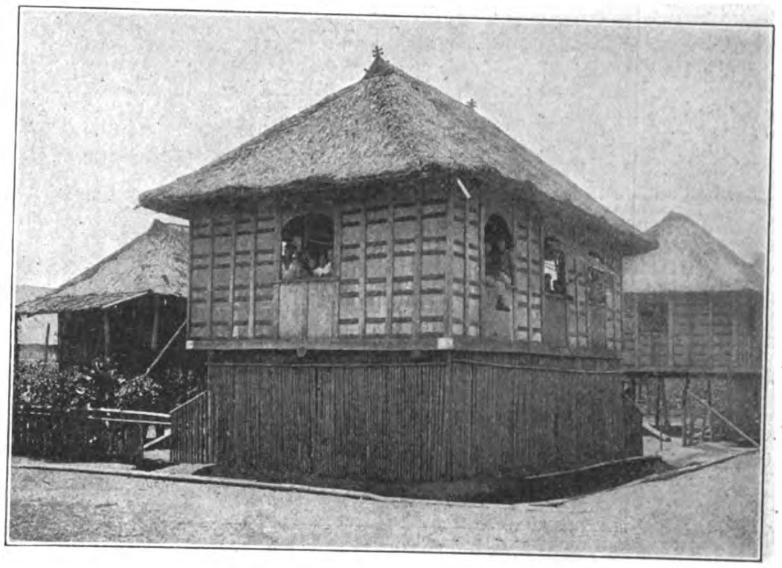
"In my opinion the next important step which we should take in stimulating the development of the hill tribes of northern Luzon is to develop trade among them as actively as possible.

"In the past it has been necessary for the wild men to make long and tedious journeys to the coast towns in order to purchase the salt, cloth, steel, and other necessary articles which they themselves did not produce. The sudden change in climate involved in a rapid descent to the lowlands often made them ill. They were apt to drink too much strong liquor and to suffer in consequence, and they were often badly imposed upon

"STREET" IN AN OLD-STYLE MANOBO TOWN

MANOBO HOUSE, OLD STYLE

STREET IN ONE OF THE NEW MANOBO TOWNS WHICH HAS BEEN DRAINED SO AS TO ELIMINATE MOSQUITOES



MANOBO HOUSE, NEW STYLE

SCHOOLHOUSE BUILT BY BENGUET IGOROTS AT KABAYAN
The girls shown in this photograph are being taught to weave cloth.

LIEUT. E. Y. MILLER, U. S. ARMY, LATE GOVERNOR OF PALAWAN, AND SON OF DATO BATA-RASA

GOVERNOR MILLER WAS ONE OF SECRETARY WORCESTER'S MOST ABLE ASSISTANTS

and made to pay many times what the articles which they had purchased were really worth.

"With a view to remedying these conditions Government 'exchanges' have been started at Bontoc, Banaue, and Lubuagan in the Mountain Province, and a Campote in Nueva Vizcaya. An effort is made to keep these stores supplied with the things which the people in their vicinity most need. Sales are made at Manila prices plus 20 per cent and the cost of transportation. The 20 per cent is intended to cover dead stock and loss or injury to goods on the trail and slowly to increase the capital of the exchanges."

An insistent demand on the part of the Christian Filipinos to secure the control of the Hill Peoples has been in vogue for some time to which Secretary Worcester is strongly oppos:d on the ground that Christian Filipinos who now enjoy local self government have not demonstrated adaptability or inclination to "dominate, justly control, and wisely guide along the pathway of civilization alien peoples, some of whom are warlike." And further Mr. Worcester says:

"In asking that this territory and its people should be turned over to him by the Americans, he is presumably actuated by high motives and a desire to promote the social development and the material prosperity of the people concerned; but in making this claim, and at the same time denying the right of the Ame icans to control him and his territory with a view to promoting the same desirable ends, he places himself in a somewhat anomalous logical position." Proceeding to the obstacles in the way of carrying out the serious policy of the government under Filipino direction the Secretary says:

"The average hill man hates the Filipinos on account of the abuses which his people have suffered at their hands and despises them because of their inferior physical development and their comparatively peaceful disposition, while the average Filipino who has ever come in close contact with wild men despises them on account of their low social development, and in the case of the more warlike tribes, fears them because of their past record for taking sudden and bloody vengeance for real or fancied wrongs.

"It is impossible to avoid plain speaking if this question is to be intelligently discussed, and the hard fact is that wherever the Filipinos have come in close c ntact with the non-Christian inhabitants, the latter have almost invariably suffered at their hands grave wrongs which the more warlike tribes, at least, have been quick to avenge. Thus a wall of prejudice and hatred has been built up between the Filipinos and the non-Christian tribes. It is a noteworthy fact that hostile feeling toward the Filipinos is strong even among people like the Tingians, who, barring their religious beliefs, are in many ways as highly civilized as are their Ilocano neighbors.

"The success of American rule over the non-Christian tribes of the Philippines is chiefly due to the friendly feeling which has been brought about.

"The wild man has now learned for the first time that he has rights entitled to a respect other than that which he can enforce with his lance and his head ax. He has found justice in the courts. His property and his life have been made safe, and the American governor who punishes him sternly when he kills is his friend and p otector so long as he behaves himself. He learns to like that American. Because of his manliness and courage when his friendship is once won, the American learns to like him, and finds compensation for the loneliness, the hardships, and the dangers of his isolated life, in the friendliness and appreciation shown by those for whose advancement he is striving."

The Filipinos at the outset exercised the same control over the hill tribes as their own people and had an opportunity to demonstrate their interest in the hill people under their charge the result of which as Mr. Worcester puts it:

"*To the best of my knowledge and belief not one single measure looking to the betterment of the condition of these non-Christian inhabitants was ever inaugurated by a Filipino during this period.*"

After reviewing the undesirable attitude of the different provincial authorities towards the hill people during the period when they were under control, he says:

"Contrast with this record of inaction and lack of interest the record of the special government province and the Moro Province, where dwell really formidable tribes which have until recently engaged in piracy, head-hunting, and murder. Here very extensive lines of communication have been opened up by the building of roads and trails and the clearing of rivers. A good state of public order has been established. Head-hunting, slavery, and piracy are now very rare. The liquor traffic has been almost completely suppressed. Life and property have been rendered comparatively safe, and in much of the territory entirely so. In many instances the wild men are being successfully used to police their own country. Agriculture is being developed. Unspeakably filthy towns have been made clean and sanitary. The people are learning to abandon human sacrifices and animal sacrifices and to come to the *doctor* when injured or ill. Numerous schools have been established and are in successful operation. The old sharply drawn tribal lines are disappearing. Bontoc Igorots, Ifugaos, and Kalingas now visit each other's territory. At the same time that all of this has been accomplished, the good will of the people themselves has been secured. They are outspoken in their appreciation of what has been done for them, and in their expression of the wish that American rule should continue. They would be horrorstricken at the thought of being turned over to Filipino control."

And further: "I say it in all kindness, but with deep conviction, that there is no reason for believing that Filipino control of the more pacific non-christian would not promptly result in the re-establishment of the old system of oppression which Americans have found it necessary tò combat from the day when military rule was first established in these islands until now. I speak whereof I know when I say that the people of these tribes have been warned, over and over again, by those interested in the re-establishment of the old regime, that American control in the Philippines will be only temporary, and when the government is turned over to the Filipinos the tribesmen will be punished for their present "insubordination," and failure tamely to submit to injustice and oppression as many of them formerly did." In conclusion Secretary Worcester writes:

"In view of the facts stated, I am of the opinion that to turn the control of the non-Christian tribes over to the Filipinos would speedily result in disaster. As the Filipinos have no just claim to the territory which the non-Christians occupy, I see no reason for pursuing such a course.

"It has been my highest ambition as Secretary of the Interior for the Philippine Islands to bring the work for the non-

CONTRACTING NEWS

BIDS OPENED AND CONTRACTS AWARDED

U. S. CHIEF Q. M., MANILA.—Conduct and electrical fittings, including 32,485 lbs. iron bushings, outlet boxes, locknuts, covers and 27,000 feet of conduct.—Contract awarded Frank L. Strong, price $3,116.75. The other bidder was Messrs. Germann & Co., price $3,197.90.

U. S. NAVY, MANILA.—50 h p., D. C. 650 r. p. m. Motor.—Contract awarded Castle Bros.,-Wolf & Sons (Fairbanks, Morse & Co.'s motor), price ₱1,380. The other tenders were: F.H. Thompson, ₱1,593 (Westinghouse Manufacturing Co.); Messrs. E. C. McCullough & Co. ₱1,600 (unknown); Germann & Co., ₱1,750 (Siemens & Schukert); Frank L. Strong ₱1580 (Central Electric); the Electrical Supply Co., ₱1,200.

U. S. Q. M. D., MANILA.—10-ton locomotive crane.—Contract awarded Frank L. Strong, $6,275 (Brown's Hoisting Machinery Co.). The other tender was that of Messrs. Castle Bros.,-Wolf & Sons, $9,700.

U. S. Q. M. D. WATER TRANSPORTATION.—Air Compressor, etc.—Contract awarded F. L. Strong $350 for 4½x 4½ (duplex vertical Gardiner). The other tender was that of Messrs. Castle Bros.,-Wolf & Sons, $387 (Duplex Ingersoll-Rand).

CHIEF Q. M. D , MANILA.—One Hydraulic Ram Press for masking saw dust blocks, 10 p. m. electrically driven with pump attachment.—Awarded Frank L. Strong, $2200 (Watson Stillman & Co.). There was only one tender.

CITY OF MANILA.—Furnishing and installing sewer pumping plant in the port district comprising 2 3 h. p. vertical motors directly connected to 4" vertical-centrifugal pumps complete with starting panels.—The only tender was that of Frank L. Strong and the price ₱10,600 to supply General Electric motors and International Steam Pump Co.'s pump, the same as installed in the other city pumping stations.

CHIEF Q. M. D., MANILA.—(1) 3 15 h. p. vertical, tubular boilers. (2) 4 25 h. p. portable tubular boilers. (3) 2 40 h. p. portable tubular boilers. (4) Laundry Machinery. The tenders were as follows:

Frank L. Strong, (1) $2:8; (2) $616; (3) $815. Castle Bros.,-Wolf & Sons, (1) $262.50; (2) $550; (3) $750. Fred Wilson & Co., (1) $360; (2) $662, (3) $850. Lambert & Springer, (1) $505. Frank L. Strong, (4) total $1480 (American Laundry Machine Co.). Other tenders were submitted for part of No. 4.

U. S. MEDICAL SUPPLY, MANILA.—One Buffalo Steel Plate planing mill exhauster.—Germann & Co. $55, F. H. Thompson $104 50, Frank L. Strong $100.—Both contracts awarded Frank L. Strong.

MUNICIPALITY OF SHANGHAI.—Overhead Traveling Crane.—Messrs. Babcock & Wilcox received the contract at £920. The other tenders were:

	£.	Weeks.
Chatteris Engineering Co.	923	12
Sir Wm. Arrol & Co.	979	23
Carrick & Ritchie	990	15
Higginbottom & Mannock	1,058	14
Stothert & Pitt	1,080	21
Booth & Brothers	1,085	13
Royce & Co.	1,120	12
Cowans, Sheldon & Co.	1,175	22
Vaughan & Sons	1,206	15
Craven Brothers	1,300	16

Q. M., MANILA.—25,000 Gallons Lubricating Oil.—Vacuum Oil Company at from 50 to 95 centavos per gal.

CHIEF Q. M., MANILA.—1780 Coilsof Rope.—Contract awarded the Johnson-Pickett Co., Manila. Price ₱0.154 per pound.

MUNICIPAL BOARD, MANILA.—475 tons cast iron pipe, 73 tons cast iron specials, 15 tapping valves, 64 gate valves and 100 fire hydrants.—Successful bidders were Messrs. H. W. Peabody & Co. and Finlay Richardson & Co.

PHILIPPINE GOVERNMENT.—Supply of Oregon pine and redwood for six months ended December 31, 1911.—The successful bidders were Messrs. Norton, Harrison & Co. The contract is valued at ₱60,000.

CITY OF BANGKOK.—Installation of Filter Plant, Water Works.—Awarded The Jewell Export Filter Co. of New York, London and Calcutta.

PHILIPPINE GOVERNMENT.—15000 metric tons of Coal.—The following tenders were submitted·

Messrs. Macondray & Co., Inc., Wallsend coal, Manila ₱10.83, Iloilo ₱12.05, Cebu ₱12 05, Tacloban ₱12.57, Romblon ₱12.57, Jolo ₱13.82, Zamboanga ₱12.32, Balabac ₱13.95, P. Princesa ₱13 95. This company also bid on Japanese Ochi lump coal as follows: Manila ₱10.05, Iloilo ₱10 62, Cebu ₱10.62, Tacloban and Romblon ₱10.52, Jolo ₱13.56, Zamboanga ₱11.84, Balabac and P. Princesa, ₱14.55.

Messrs. W. F. Stevenson & Co., Ltd., bid on West Wallsend as follows: One cargo of 5,000 tons Manila, September delivery, ₱10 44, one cargo 5,000 tons, 10 weeks notice, ₱10.68. One cargo for provinces (5,000 tons) ten weeks notice, Iloilo and Cebu ₱11.71, Tacloban and Romblon ₱12.45, other ports ₱16.45.

C. B. Williams offered three bids as follows: Pacific coal, Manila ₱9 75, Iloilo ₱11.00, all other ports ₱11 49. His bid on Southern Australian coal, Mount Pleasant, etc., was: Manila, ₱10.84, Iloilo ₱12 09, all other ports ₱12.58. Hetton coal was offered by this bidder as follows: Manila ₱11.09, Iloilo and Cebu ₱12.34, all other ports ₱12.83.

The Mitsui Bussan Kaisha, Ltd., bid on Miike washed nut as follows: Manila ₱9.50 Iloilo and Cebu, ₱11.50, Tacloban and Romblon ₱12.45, Zamboanga and Jolo ₱13 60. Balabac and P. Princesa ₱18 30.

U. S. GOVERNMENT.—Carrying of Supplies from Pacific Coast to the Philippines—Contract awarded Messrs. Dodwell & Co. of Beattle Blue Funnel Line. Tenders follow:

General merchandise: Waterhouse & Co., $2.43; Dodwell & Co. $2.25; winter rate, $2.75. Coal: Waterhouse & Co., $5.00; Dodwell & Co., winter and summer $3 00. Lumber: Waterhouse & Co., $6 45; Dodwell & Co., summer rate $6.00; winter rate $6 75. Heavy weights, 7000 to 12000 pounds: Waterhouse & Co., $10.00; Dodwell & Co., $8 00.

U. S. Q. M. DEPARTMENT—Distribution Box Boat.—The contract was awarded W. S. Bailey & Co., the price being $11,365 U. S. C. delivered at Hongkong. This vessel will be fitted with a 100 h. p. engine supplied by The Gas Engine & Power Co. and Chas. L. Seabury & Co. (Consol dated) of New York City through their agent, Frank L. Strong, Manila.

PROPOSALS INVITED

DIRECTOR GENERAL OF POSTS AND TELEGRAPHS, BANGKOK.—Tenders will be received up to August 1, 1911, for the furnishing of 50,000 Kilograms of galvanised iron telegraph wire of 4 millimeters diameter, in coils of about 50 kilograms.

10,000 Insulators with protective enamelled iron caps.

10,000 galvanised swan neck bolts with screw ends and felt washers.

BUREAU OF PHILIPPINE CONSTABULARY.—Tenders will be received up to November 1, 1911, for the furnishing of 200 capes, hoods, Khaki.

Christian inhabitants to such a point that the practicability of civilizing them might be conclusively demonstrated, and that the importance of doing it might be so fully established that the work *could not be dropped.* The progress already made by the Bukidnons and the Igorots of Benguet indicates that the day may come when these and similar non-Christian tribes can safely be allowed to manage their own affairs, if protected from interference from without. Whether or not it will be possible, in the reasonably near future, to relinquish full control over such people as the Moros, Ifugaos, Kalingas, Bontoc Igorots, and the wild Tingians of Apayao remains to be seen, but to turn these or any non-Christian tribes over to Filipino control at this time would inevitably mean the speedy loss of many of the important results already achieved.

"In quieting the f ars of members of the more pacific tribes who have been assured by Filipinos that American control would be only temporary, and threatened with future punishment when it should terminate, I have repeatedly assured these simple people of my conviction that the American Government, having once undertaken their protection, would not desert them, and I earnestly hope that such a deplorable course may never be seriously contemplated."

The illustrations accompanying this article are published by courtesy of the Department of the Interior, Philippine Islands.

FAR EASTERN RAILWAYS

ROYAL SIAMESE RAILWAYS.—According to the *Bangkok Times* tenders were recently opened for the supply of permanent way accessories for the Southern line comprising 1,675 tons of fishplates, 280.1 tons of fish bolts and nuts, 1,029.5 tons of rail spikes, 9.5 tons of spring washers, and 596.2 tons of bearing plates; and quotations were asked for c. i. f. to Penang, Singora or Bandon, and Bangkok, and f. o. b. price nearest shipping port.

Thirty-one tenders were opened, of which sixteen came from British firms, seven from German firms, six from Belgium, one from France and one from Japan. Eight tenders were received from Bangkok firms as tenderers or agents. Mr. H. Gittins, the Controlling Engineer, opened the tenders.

LOCOMOTIVES FOR JAPAN.—The contract for the supply of 12 tender-locomotives with superheaters for the Railway Board of Japan placed with the Borsig Works, Germany, is to be delivered on record time. The entire order was completed in 66 working days, the first of the engines being turned out by the works in 47 days.

MUKDEN - VLADIVOSTOK LINE.—Advices from Peking are to the effect that the Board of Communications has approved the project proposed by the Russian Government for a Russian-Chinese line connecting those two p ints directly. The company proposed will have a capital of 5,000,000 roubl s.

BRITISH ENGINEER-IN-CHIEF FOR HUPEH-HUNAN RY.—A report from Peking under date of June 22 announces the appointment of A. H. Collinson, M. Inst. C. E., Engineer-in-Chief of the Hupeh-Hunan section of the Canton-Hankow Railway which, according to the terms of the Hu-Kwang loan, is to be constructed under British direction. Mr. Collinson

is one of the leading British engineers in China and a well-known railway authority. He was chief engineer during the construction of the Shanghai-Nanking line and has since been associated with the road as consulting engineer and engineer-in-chief. His selection as chief of the engineering staff of the Hunan-Hupeh section will assure construction consistent with the best British standards and practice.

CHINESE EASTERN RAILWAY.—The report of the line for the year shows a gross income of yen 17,000,000 and expenditures amounting to yen 15,700,000.

SOUTH MANCHURIA RAILWAY.—The net operating revenue for the last half year amounted to yen 3,075,324.00 which with yen 1,803,855.72 carried forward made yen 4,879,179.72 available for distribution as follows:

Legal reserve fund....................	153,766.20
Dividend for shares owned by the Government....................	1,000,000.00
Dividend to shareholders other than the Government (6 per cent.)....................	60,000.00
Special reserve fund....................	1,000,000.00
Bonuses and social expenses..	200,000.00
Sum carried forward..............	2,465,413.52

Out of the revenues 410,000 yen were spent fighting plague and the interest on £10,000,000 debentures was also an extraordinary expense that tended to reduce the net returns.

INDO-CHINA-SIAM RAILWAY.—The proposal of the two governments to connect their respective systems has met with favor and it is understood that the King of Siam has entered into a loan agreement with French bankers for this purpose. The line is to be an extension of the Saigon-My Toh section to Pnompenh and from Pnompenh to Battambang. The completion of these sections will bring the line within 75 miles from Patriew. Besides connecting Saigon with Bangkok, with the completion of the Peninsular line, Singapore will also be linked up in this comprehensive system.

AUSTRALIAN TRANSCONTINENTAL LINE.—The federal government of Australia has decided to construct the line connecting Port Augusta and Kalgoorie as a standard gauge railway (4′ 8½″) and later adapt the same gauge to all Australian lines.

JAPAN'S RAILWAY TUNNELS.—The difficult character of the country traversed by railways is emphasized by the extensive tunneling found necessary. One tunnel of the Central Eastern line is 15,275 feet in length or approximately three miles. Of tunnels over 2,000 feet in length there are 26 aggregating 115,387 feet or a total of over twenty miles.

PENANG HILLS RAILWAY.—The *Straits Echo* announces that the work of construction on this line will begin within three months. The estimates submitted by Engineer Bach placed the cost at $60,000 including the purchase of old plant, etc., and that the net revenue will be $12,000 annually.

THE SHANGTUNG RAILWAY CO.—The report for 1909 shows an increase in revenue from $3,400,000 to $3,700,000 equal to 9% compared with the previous year, while the expenditure increased from $947.339 to $999,723 or over 5½%. There are 436 kilometers in operation and the freight, comprised principally of coal, represented 769,192 tons as against 641,279 in 1909, while the passengers carried numbered 654,128 compared with 641,279 in 1909. The total of net profits available for distribution, including 124,390 marks brought forward from previous account, were 4,696,229 marks disposed of as follows: reserve fund, 228,591 marks; special reserve, 228,591 marks; 6½ % dividend, 3,510,000 marks; preferred shares, 7.50 marks each, 405,000 marks, and balance forward of 182,580 marks.

SZECHUEN RAILWAY REDEMPTION LOAN.—The Peking government is now prepared to take over the property of the provincial company and will float a foreign loan for Tls. 10,000,000 for that purpose.

A. H. COLLINSON, M. INST. C. E.

Recently appointed Engineer in Chief of the Hunan-Hupeh section of the Canton-Hankow Ry.

TRAVELING RAILWAY LIBRARY FOR JAPANESE LINES.—The Japanese Railway Board has decided to place a library on all the express trains of the Tokaido line and extend a system of libraries throughout the country for use of passengers.

SIAM'S NORTHERN RAILWAY.—According to the Bangkok *Daily Mail*, the Northern line has been completed to Sala Me Puak and trains are running regularly to that point, but now it is in contemplation to extend the line about four miles to the Northwest to a place called Den Chai, and make this the terminus for the railway for the present. From Den Chai a road will be made to Phrae by the Government, and motor cars and motor lorries will be run on this to carry passengers and freight in connection with the trains. The ground between Den Chai and Phrae is practically level and the cost of a road will be much less than that of one from Sala Me Puak to Phrae.

The Railway Dept. also prefers Den Chai as a terminus as it is a broad level plain giving plenty of room for the construction of sheds and tracks for the railway yards, whereas the level space at Sala Me Puak is too confined. The expense of levelling more ground at the latter place would also be somewhat heavy.

The above plans are not absolutely settled yet, but they find favor with the high officials, so there is but little doubt that they will soon be carried through.

ACKLEY BRAKE EXPANSION.—This company has established agencies in Argentina and Brazil where Mr. Griffin S. Ackley has just concluded a successful business trip. The initial orders covered over 850 brakes for the tramways of the principal cities of South America.

In Australia, the Ackley Adjustable Brake is meeting with favor. An order was recently placed by the Adelaide Tramways Trust for the equipment of 50 cars with the Ackley brake, superseding the old style brake in use there. Substantial orders have also been placed in Japan. Mr. Ackley is at present on a trip to Europe where he established an agency at Milan, Italy, and organized a German Ackley Brake Agency.

CHINESE MANAGING DIRECTORS APPOINTED.—Peking advices are to the effect that the following appointments are under consideration: Wang Hsiao-cheng, managing director of the Hupeh section; Li Pao-hsun, of the Hunan section; Yew Liang, of the Szechuan section, and Feng Ko-chun of the Canton section. Director General Tuan Fang is said to have approved the appointments.

CHANGCHIAKAO-KULUN RAILWAY.—We are advised that the survey of this line has been completed and that upon approval of final location work of construction will begin immediately.

SUPPLY OF RAILWAY MATERIAL.—The Gloucester Railway Carriage and Wagon Company, Limited, England, have a contract for the supply of ten sets of metre gauge carriage underframes to the Assam-Bengal Railway. Messrs. Owen and Dyson, Limited, have an order for the supply of 20 pairs of steel wheels and axles which are required for these carriages. The Vacuum Brake Company, Limited, Queen Victoria Street, London, E.C., have supplied one thousand rolling rings, indiarubber, to the Burma Railways Company; Messrs. W. and T. Avery, Limited, Weighing Machine Makers, have in hand an order for the supply of six self-contained weighbridges and one combined weighbridge to this railway. The Heart Accumulator Company, Limited, had a large order for the supply of train lighting cells and acids to the East Indian Railway Electrical Department, and Messrs. J. Stone and Company, Limited, have an order for the supply of a complete train lighting equipment. The Birmingham Battery and Metal Company, Limited, Birmingham, have complied with an order for the supply of one thousand brass locomotive boiler tubes to the Bengal-Nagpur Railway. Messrs. J. Reid and Company, Limited, had a contract from this line for the supply of eight copper firebox plates for locomotives; and Messrs. Geo. Turton, Platts and Company, Limited, for the supply of 1,500 volute springs for rolling stock. Messrs. Dean, Smith and Grace (1908), Limited, Keighley, have supplied the Bengal-Nagpur Railway with a capstan lathe; and Messrs. John Lang and Sons, Lathe Makers of Johnstone, North Britain, some lathe chucks. Messrs. Cammell, Laird and Company, Limited, Victoria Street, Westminster, S.W., and proprietors of the Cyclops Street and Iron Works at Sheffield, had supplied this line with three dozen steel tyres for locomotive engines; and Messrs. Geo. Spencer and Moulton, Limited, have a contract for the supply of 500 indiarubber springs. The Birmingham Railway Carriage and Wagon Company, Limited, have a contract from the Burma Railways for the supply of the following 20 steel bogie underframes for the construction of third class passenger carriages, two spare bogie trucks and 270 bogie pivots. The Edison and Swan United Electric Light Company, Limited, Queen Street, London, E.C., and Messrs. Dorman and Smith, Limited, have supplied a quantity of electric light fittings to the Bengal-Nagpur Railway. The Brush Electric Engineering Company, Limited, England, had an order from the same line for the supply of a motor frame and switch pillar; and the Lancashire Dynamo and Motor Company, Limited, for a motor frame and control gear. Messrs. Siemens Brothers' Dynamo Works, Limited, have supplied a quantity of electric wire to the Bengal-Nagpur Railway.
—*Railways and Shipping.*

PHILIPPINE MINING NEWS

THE BENGUET CONSOLIDATED.—The return for the month amounted to 99.5 ounces.

THE HEADWATERS MINE.—Mr. F. L. Cole, of Messrs. Cole & Hanlon, mining engineers, has assumed charge of the Headwaters plant in Benguet as consulting engineer. The installation is now complete and a few test runs have been made but no definite reports as to when the plant will be in full operation has been received.

THE MANCAYAN COPPER.—The work on the Chambers Group is still progressing. The crosscut has been driven about 655 feet and the owners anticipate an early contact with the main body. This is the only development work at present under way. We have been informed that foreign inquiries are being received and should the result of the work on the Chambers group meet expectations there is little doubt but that the properties in that section will soon be undertaken.

FAR EASTERN ENGINEERING, CONSTRUCTION, FINANCIAL AND COMMERCIAL NEWS

THE COLORADO MINING CO.—The installation of this company's plant on their property in Masbate is progressing favorably and by the latter part of August will be ready for preliminary runs. The company expects to be in full operation by September 15.

DIVISION OF MINES BULLETIN—Mr. Warren D. Smith, chief of the division, has issued the following bulletin: "An examination of the Northern portion of Pangasinan has been made by Mr. Fanning of the Division of Mines, Bureau of Science, in order to investigate the reported occurrence of oil, gold, copper and other materials. About 300 square miles of territory was covered and the essential features of the geology, stratification, etc., were determined and mapped. The detailed report and geological map is on file at the Bureau of Science and is open to the inspection of those interested.

"In brief tertiary sedimentaries of limestone, sandstone and shale occur over the area except to the south and east. The structure is monoclinal with gentle dip to the northwest. Some slight folding has taken place but there is no evidence of extensive faulting or shearing.

"Many persons have reported that oil seepages are frequently seen in the rainy season, and that the smell of gas is very distinct. The examination was made in the dry season and no evidence of oil was seen, although the structure is adapted to oil accumulation.

"The area most favorable for such accumulations extends from Anda on the north to Balincaguin on the south and from west of Bani to Alaminos on the east.

"Artesian wells are soon to be bored at Anda, Bani and Alaminos which will probably give some evidence as to the possibility of oil. Some of the adjacent area can still be located as placer claims; or lease on occupied land can be had for small sums.

"The district was further examined for the occurrence of the valuable metals and the existence of gold, silver, copper, lead, zinc, and bismuth has been confirmed. However, as far as is now known, the deposits are of no commercial value.

THE EAST BATAN COAL MINING CO.—The new coal bunkers costing ₱38,000 are about completed. The cost was defrayed by a loan from the Bureau of Navigation under agreement to supply coal to the latter at ₱5 a ton until the obligation is met.

PHILIPPINE PRECIOUS STONES.—Specimens of precious stones, reported found in the islands, submitted to the Division of Mines, were found genuine and "the color and clearances, and freedom from flaws were noteworthy." The stones were of three species: beryl, variety emerald; garnet; and the spinel ruby. In testing positive optical and heat tests were employed in addition to those for defining the hardness of the specimens.

PARACALE MINING DISTRICT.—The Malaguit dredge was laid up for repairs on July 10 awaiting a new lower tumbler which arrived from the United States on the 16th. This is being installed. The return for the last half of June was 50 ounces.

THE PARACALE GOLD DREDGING CO. reported 252 ounces in one shipment. The period covered is not definite and this amount probably represents returns from the mill as well as the dredge.

The expert in the employ of Melbourne capitalists has been busy testing the ground of the Paracale district held under option from the owners and an agreement with the present lessees. It is expected that the preliminary work will be completed by the end of July. Upon this report will rest the immediate future of the district and the measure of participation by Australian capital.

ELECTRIC RAILWAYS, LIGHT, POWER, TELEGRAPHS, TELEPHONES, AEROPLANES, ETC.

F. M. S. AVIATION.—The week at Penang was featured by flights by Mr. Kuller with his monoplane the "Antoinette." The average heights were from 250 to 300, and 800 to 1,000 were the maximum. At Kuala Lumpur, Mr. Kuller gave exhibitions during the month.

AVIATION AT VLADIVOSTOK.—M. Sedoff, a Russian aviator, has been making flights at this port, but owing to area being within the fortified zone, foreign aviators were not permitted to make the ascent.

CHANGSHA ELECTRIC LIGHT.—Advices from Hunan announce the opening of the electric plant at Changsha where 4000 lights have been installed.

CEYLON WIRELESS.—A wireless station is to be installed at Welikada, Colombo, having a range of 500 miles by day and 800 miles by night. It is expected completed by the end of the year.

TOKYO UNDERGROUND LINE.—A special committee representing the municipality is investigating an application for a charter to construct an underground railroad starting from Iidamachi near Kudan and connecting with the Nejiro railway station via Ushigome and Takata. The estimated cost is placed at yen 3,500,000.

TOKYO ELECTRIC LIGHT CO.—The following accounts and distribution of profits for the half year were approved at the recent general meeting:

	Yen.
Sum carried over from previous half-year	316,676
Sum transferred from reserve fund..	950,000
Profit for the half year	1,599,844
Total	2,866,521
Reserve fund	80,000
Reserve fund for equalization of dividends	950,000
Dividend (11 per cent. per annum, *ie.* 2.75 *yen* per old share and 22.92 *sen* per new share	1,439,184
Sum carried forward to next half-year	397,337

YOKOHAMA ELECTRIC CO.—The following accounts and distribution of profits for the half year were approved last month:

Profit for the half-year	241,255.47
Sum carried over from previous half year	12,747.85
Total	254,003.32
Legal reserve fund	13,000.00
Reserve fund for redemption of debt	20,000 00
Bonuses	19,300.00
Dividend (12 per cent. per annum)..	192,000.00
Sum carried forward to next half-year	9,703.32

At an extraordinary meeting held later a proposal to increase the capital from 2,200,000 yen to 6,500,000 yen was approved. The amalgamation with the Yokosuka Electric Light and Gas Co. and the Enoshima Electric Tramway Company was approved. For this purpose the Yokosuka company increased its capital from 250,000 to 500,000 yen and the Enoshima Co. from 360,000 to 500,000 yen. This brings the capitalization of the amalgamated company up to yen 7,500,000.

JAPANESE TEST FOREIGN AEROPLANES.—Captain Tokugawa has been using the Farman and Bleriot machines in a series of tests in which he made short trips at 45 miles an hour at an altitude of about 1400 feet.

CHINESE TELEGRAPHS.—The head office has been transferred from Shanghai to Peking and the latter has now the status of a branch office. Taotai Chow Wan Pang, formerly director at Shanghai, is in charge of the office in Peking.

M. E. R. R. & L. Co.—The report of the Manila Electric Railroad and Lighting Corporation for 1910 states that the result of the operation for the year shows an increase in gross earnings over the previous year of $175,340, or 15.36 per cent., an increase in operating expenses and taxes of $10,589, or 1.76 per cent., and an increase in the net earnings of $164,751, or 3.45 per cent. The apparently abnormal increase in the earnings is largely due to the strike of 1909, which increased the expenses and reduced the gross earnings of that year. After allowing for this, the net earnings still show a satisfactory increase. The interest charges amounted to $275,625 and sinking fund requirements called for $25,889, and the directors have set aside $60,000 from the balance to establish a replacement and renewal fund, leaving an available surplus for the year of $344,356. The directors have declared and paid on the outstanding capital stock four quarterly dividends of 1 per cent. each, aggregating $200,000, leaving $144,356 over all disbursements and reserves, which has been transferred to surplus account, an increase over the previous year of $103,332, bringing the total surplus account, with reserves, up to December 31, 1910, to $750,124.

PUBLIC WORKS, DOCKS, WHARVES, BUILDINGS, ETC.

NEW MATADERO FOR MANILA.—The insular government has selected a site for an isolated matadero and animal quarantine station at Siliman on the Bataan coast near Mariveles for the better protection of the islands from animal disease and to insure a liberal supply of fresh meat.

THE BANGKOK WATERWORKS.—The *Bangkok Mail* says:

The contract for the installation of the filter plant for the Bangkok Water Works has been awarded to the Jewell Export Filter Co. of New York, London and Calcutta who will supply and instal a complete plant known as the Jewell open Gravity type which is generally acknowledged to be among the best systems of filtration for municipal uses.

The canal for the Bangkok water works will tap the river at Chiengreak 25 miles above the city and bring the water to Samsen where the purifying plants will be erected. It will first be pumped into four large settling tanks, 15' high, built of ferro-concrete, and run by gravity into the filters which are 17' in diameter and 12' ft. high, and after filtration passes into underground reservoirs, and then is again pumped to raised reservoirs, so that it will flow through the distributing pipes by its own gravity.

The daily capacity of this plant is 28,800 cubic meters or 6,336,000 gallons.

The supply of pipes was awarded, last July, to the Société de Pont-à-Mousson, the length of piping amounting to about 93 kilometers and the diameter of the pipes varying from 700 down to 40 millimetres. The total tonnage is about 5800 tons. The pipes began to arrive here last March, and four shipments of pipes with some of their accessories have so far been received, amounting to about 1300 tons.

The laying of the pipes, in the streets of

the town, will begin in August or September, as soon as the accessories, such as bends, reduction pipes, cocks, valves, penstocks, etc., shall have arrived in sufficient quantities.

The necessary plans for the buildings required for the filters, settling tanks, filtered water reservoirs at the station and the elevated reservoirs for the distribution in the town, are ready and the Government will not be long in calling for the necessary tenders for their construction.

Lastly, the supply of the centrifugal pumps with their electric motors will soon be given out to public tender.

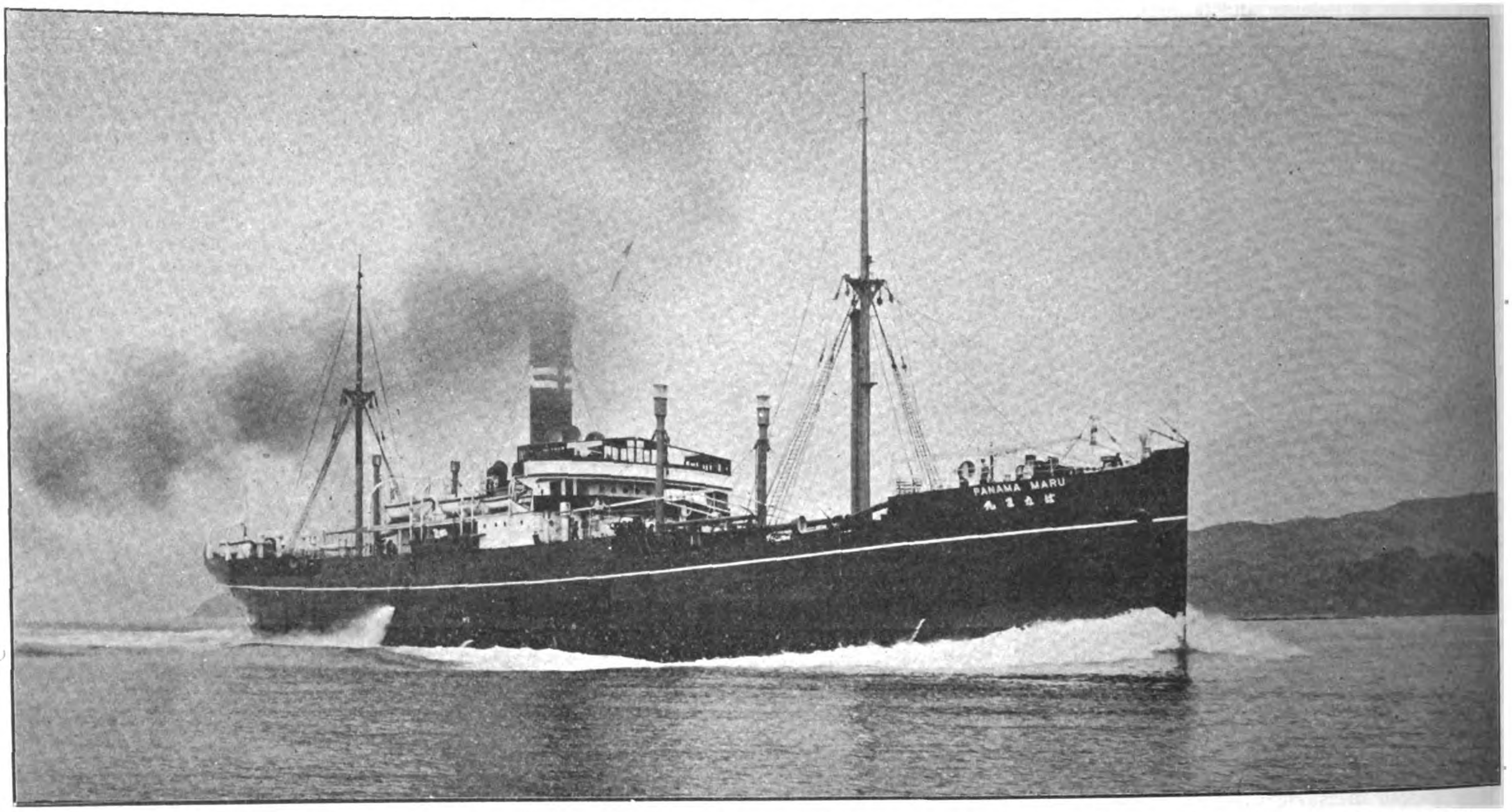
NEW PEKING CLUB.—The construction of the new club at Peking which will cost $50,000 is now under way and it is expected completed by July, 1912.

is to be taken from a mountain stream, the Muko River, in the vicinity of Sanda, Arima County, about 22 miles northeast of Kobe. Two reservoirs will be situated on this stream, one at Sengari-mura, Arima County, and one at Arai-dani-mura, Kawabe County, 19½ and 17 miles, respectively, from Kobe. Water will be piped from these reservoirs to the Kasugano filter beds, on the east side of Kobe, through five tunnels (total length, 2½ miles) and six water-pipe bridges (length, 2½ miles). When completed the city will be able to supply 2,500,000 cubic feet of water per day.

OSAKA WATER SUPPLY.—Water is taken from the Yodo River, and the intake tower, 11 filter beds, 5 settling ponds, and pumping stations are situated at Nakanomachi, Kita-ku,

writing Account, which will then stand at £114,200, and £3,000 has been written off the expenses of the debenture issue. After providing for the usual depreciation and the interim dividend paid in November last there remains a balance of £27,998, out of which the Board of Directors recommend the payment to the holders of Preferred Ordinary shares of 3 per cent., being balance of the dividend for 1908, and 6 per cent., being the dividend for 1909, leaving the dividend for 1910 still in arrear. A balance of £5,683 is carried forward.

THE SHANGHAI DOCK REPORT.—The report of the Directors of the Shanghai Dock and Engineering Co., Ltd., for the year ended April 30, 1911, has now been issued to the shareholders. The net profits, including the



S. S. PANAMA MARU, SISTER SHIP TO THE CANADA MARU, THE LAST SHIP, CONSTRUCTED BY THE MITSU BISHI SHIPBUILDING YARD AT NAGASAKI FOR THE O. S. K.

FUSAN HARBOR WORKS.—The construction of Fusan harbour, started by the old Korean Government, costing 1,500,000 yen, was completed in June. Harbor improvement planned by the Government to cost 3,820,000 yen, defrayable in three consecutive years, has begun. The scheme comprises removal of sunken rocks, construction of quays and reclamation of foreshore.

BURMAH PUBLIC WORKS.—During 1910 there were 1,732.75 miles of roads constructed throughout the dependency. Many wooden bridges were superseded by reinforced structures.

SHAMEEN WATER SUPPLY.—At a recent meeting of the ratepayers of the British Concession it was decided to secure an estimate from Messrs. Howarth, Erskine & Co., for the installation of a Jewell Rapid Filter and plant with mains, etc., for the supply of 120,000 gallons daily from the Canton River. The proposed plant will probably cost $100,000. The proposal to bore artesian wells for the purpose has been considered for some time but no definite estimate of cost or that water might be secured at reasonable rates had been made.

KOBE WATER SUPPLY.—The sum of $4 925,000 has been voted by the municipality of Kobe for the construction of a new system to be completed in 12 years. Water

and three service reservoirs are inside of Osaka Castle, holding 626,428 cubic feet of water each. Fifteen pumps are in use, of which 9 are American (Washington system, 30 volts) and 6 of English make. These can pump 3,000,000 cubic feet of water per day. There are 12 boilers of English make. The total length of pipe is about 350 miles.

An extension is proposed costing 9,000,000 yen to be finished in 1914, capable of supplying 8,640,000 cubic feet daily with sufficient pressure to force water to a height of 90 feet. The new works will be located at Kunyama on the Yodo River and will comprise two intake towers 22½ feet high, 14 filter beds, 7 settling ponds and four service reservoirs. There will be intake pumps with a capacity each of 1 000 cubic feet of water per minute to a height of 25½ feet, 8 boilers and forwarding pumps capable of forcing 1,000 cubic feet of water to a height of 150 feet per minute. The intake pipe will be 45 and 48 inches, to the filter beds from the towers, 46 and 36 inches and to the pumping station 36 inches. The city mains will be from 27 to 42 inches.

SHIPBUILDING, MERCHANT MARINE AND FISHERIES.

INDO CHINA S. N. CO.—At the annual meeting of the shareholders the following report was submitted for approval:

£20,000 has been transferred from the Under-

amount brought forward from last year, are Tls. 149,531.02. This amount the Directors recommend be dealt with as follows:—A dividend of Tls. 2.50 per share, Tls. 188,000.00; and amount to be carried to new account Tls. 11,531.02.

CHINA'S FOREIGN SHIPPING.—The total number of foreign ships entering Chinese ports was 219,810, with an aggregate tonnage of 88,796,699. Of this number 28,000 were British ships (34,253,439 tons), 31,197 Japanese (18,903,146 tons), 5,367 German (7,060,521 tons), 3,766 French (4,923,492 tons), 2,541 Russian (1,441,345 tons), 1,286 American (725,279 tons), and 146,075 Chinese (19,597,821 tons). The total value of goods transported in and out of Chinese ports on foreign vessels amounted to 19,177,372,633 taels, of which goods valued at 785,542, 852 taels were carried by British ships. Japan comes next with cargoes valued at 306,329,807 taels, then Germany 157,303,503 taels, France 77,430,955 taels, and Russia 61,828,000 taels, while American ships carried cargoes from China valued at 7,869,630 taels.

NEW C. P.R. SERVICES.—Two new steamers are reported under construction for this company to be placed on the Pacific run and include Honolulu as a port of call. They will be 17,000 tons and have a speed of 23 knots.

HONGKONG SHIPPING.—According to the Harbor Master's report all records were broken during 1910 when 547,164 vesse s of 36,534,361 tons entered and cleared, an increase over the previous year of 19,884 vessels and 1,703,516 tons and exceeding all previous records by 15,052 vessels and 506,051 tons.

CHINA'S SHIPPING.—The Ministry of Posts and Communications intends to raise a foreign loan of 25,000,000 taels for the pur ose of expanding the shipping business by ordering 13 new steamers to ply between Europe and Asia.

SHELL TRANSPORT AND TRADING CO.—The Shell Transport and Trading Company last month announced a final dividend of 2s. 6d. per share, free of tax, making 22½ per cent. for the year 1910 and a first interim dividend of 1s per share for the year 1911.

SHIMONOSEKI FERRY STEAMERS.—The Kawasaki Dockyard has secured an order to build two ferry vessels (3,000 tons each) for the run between Shimonoseki and Fusan, from the Railway Bureau. The cost of the vessels, it is said, will exceed 600,000 yen each. These vessels are to be completed within 21 months.

P. & O. DIVIDEND.—The Directors of the Peninsular and Oriental Steam Navigation Company announce a dividend at the rate of 5 per cent per annum on the Preferred Stock, and an interim dividend at the rate of 7 pert cent. per annum on the Deferred Stock of the Company for the half-year ended 31st March and that warrants for the same will be posted to-day.

FIRST JAPANESE TRAMP STEAMER TO EUROPE.—The Japanese steamer "*Koju-Maru*," 8,060 tons, is to ship a cargo of beans and proceed to Europe. This, the *Japan Chronicle* says, is said to be the first Japanese tramp steamer to carry freight to Europe.

LAUNCH OF JAPANESE DREDGER.—The launch of a big dredger, to be used in connection with the improvement of Shimonoseki Strait, which is now completed at the Uraga Dockyard, will take place on March 15th. The dredger, which is the biggest of the kind ever built in this country, is of 1,250 tons gross.

NEW O.S.K. STEAMER.—The work of fitting the *Canada-maru* at the Mitsu Bishi Shipbuilding Yard, Nagasaki, is now being pushed forward, and the vessel is expected to be ready for sea this month. She will be placed on the Pacific service of the Osaka Shosen Kaisha.

JAPANESE NAVAL DOCK EXTENSION.—The Yokosuka arsenal is to construct another large dock-yard. The projected dock will be 780 by 288 feet, and will accommodate ships of 30,000 tons displacement.

MINES, MINERALS AND THE METAL TRADE, MACHINERY, ETC.

F. M. S. TIN RETURNS.—The May output amounted to 15,226 piculs.

SARAWAK OIL FIELD.—The *Sarawak Gazette* reports that at Miri where the deposits of oil are found a bore has been driven to a depth of 800 feet from the top of a hill and another is being made at the foot. Tanks with a capacity of 4,000 tons will soon be erected and the site for a refinery covering 430 acres has been selected. Pipes are to be laid a distance of about 50 miles to Maura Besai where wharves and tanks will be erected to supply oil burners.

TIN DREDGING AT TONGKAH.—Chas. Ruwolt Prop., Ltd., recently designed and constructed a very powerful bucket dredge to the order of the Tongkah Compound Dredging Co. N. L., to operate on their leases at Puket, Siam. The plant is for the recovery of tin, and is said to be the most powerful and complete bucket dredge ever built in the Commonwealth, says the Bangkok *Times*.

The buckets are 6 cubic feet capacity, close-connected type, and will handle as much as 20,000 cubic yards per week of 130 hours when working in favourable ground. The total weight of the complete plant will be about 550 tons, and the price of the plant ready for work at Tongkah Harbour will be about £18,000.

The output for May, with five dredges working, was 2,041 piculs, which is a record. For five months in 1911 it is 6,336 pikuls, against 4,005 for this period in 1910 and 2,652 piculs in 1909.

STRAITS TRADING CO.—The net profits for the half year ended March 31, 1911, amounted to $525,780.58 and with a balance of $86,664.95 forward from former account made $612,445.53 available for distribution as follows: dividend of $1, and a bonus of 50 cents per share to shareholders, absorbing $450,000; $50,000 added to the reserve fund, which will then stand at $1,500,000; $25,000 transferred to employees' bonus account, and the balance of $87,445 53 be carried forward to a new account.

GOLD DISCOVERY NEAR IPOH.—The Malay *Mail* publishes a dispacth from Ipoh to the effect that gold in large nuggets has been found on Foo Choo Choon's property in Batang Padung.

MALAYAN TIN DREDGING.—A prospectus has been issued with the object of working alluvial tin ground by bucket dredging. The capital to be issued is 80,000 shares of £1 each. Mr. H. D. Griffiths, the general manager of the Tronoh mines, has reported favourably on the project.

SECOND SAGHALIEN SYNDICATE.—At the first ordinary meeting in London the discussion developed the fact that a subsidiary company has been organized to take over fifty oil claims and five coal claims. It appears that on the company's property coal was developed in 15 places with seams 15 to 20 feet in width. Borings demonstrated that the deposits had a depth of 1,200 feet. The quantity of coal blocked out is estimated at about 30,000,000 tons.

FINANCIAL, COMMERCIAL AND MISCELLANEOUS.

PAPER PULP FROM BAMBOO.—The report of Consul General O'Brien Butler at Yunnanfu states that the Société de Pulpes de Papeteries du Tonquin that has secured large concessions in Indo China proposes restricting their operations to the manufacture of pulp from bamboo for export to Japan. The concessions are located in the districts of Vietre and Yenbay and its factory located at Vistri will be in running order next month.

CHINA TO MINT SILVER.—The silver mines of Nanking, Mukden, Kwantung, Hupeh and Szechuan have been directed to supply sufficient bullion for the minting of Tls. 10,000,000 worth of silver coins.

THE DAI NIPPON SUGAR REFINERY CO.—The following is the accounts and recommendations approved at the recent general meeting:

Net income	749,285.68
Carried over from previous account	168,895.78
Total	918,181.46
Legal Deposit	50,000.00
Special Deposit	300,000.00
Special reward for Directors and employes	75,000.00
Dividends (5 per cent.)	232,500.00
Carried to next account	260,681.46
Total	918,181.46

FORMOSAN SUGAR CONTROL.—The Formosan sugar manufacturers agreed last year to confine the output of centrifugal to 317,000,000 in allowing 165,000,000 kin for refined sugar 116,350,000 for Japan, 3,000,000 for home consumption and 20,000,000 for foreign export, leaving a margin of 12,000,000. This arrangement has been enforced and the output was well within the figures named, and as anticipated prices were maintained.

SHANGHAI TIMES SOLD.—The announcement is made that Mr. John O'Shea has purchased the *Times* from Dr. J. R. Ferguson who has been appointed general adviser to the minnister of posts and communications.

THE SHANGHAI MERCURY LTD.—A final dividend of 6%, making 10% for the year ended April 30, was directed paid.

FORMOSAN SUGAR CO.—The Horisha Sugar Manufacturing Company is to be established in Horisha, Formosa, under the auspices of Mr. Jiro Katsura, the younger brother of Prince Katsura, the Premier, M. Y. Ataka, of Kobe, and thirty others. The new company, which has a capital of Y2,000,000, is to install up-to-date machinery, the annual output being expected to reach 50,000 bales. A profit of Y177,000 a year is estimated.

BANQUE DE L'INDO-CHINE.—The Banque de l'Indo Chine reports a net profit for the year 1910 of f.6,114,089, against f.5,281,273 for the previous twelve months. After appropriations for reserves, depreciations, &c., there is a sufficient amount to pay a dividend to the shareholders of f.50. The reserve, provident, and agency capital funds amount in all to nearly f.43,000,000, whilst the Bank's capital is f 48,000,000, of which a quarter is paid up.

LONDON METAL MARKET

JUNE 9, 1911.

COPPER.	£ s. d.		£ s. d
*Tough cake and ingot	59 0 0	..	59 10 0
*Best selected	59 0 0	..	59 10 0
*Electrolytic	59 5 0	..	59 15 0
*Sheets and sheathing	70 0 0	..	—
*Flat bottoms	73 0 0	..	—
STANDARD †Cash	55 11 8	..	—
STANDARD †Three months	56 1 3	..	—
*Copper tubes, seamless per lb.	0 0 8¼	..	—
*Lake	59 10 0	..	60 0 0

* Less 3½ per cent. † Net.

ALLOYS.			
BRASS: Wire	0 0 6⅝	..	—
,, Tubes (solid drawn)	0 0 6⅜	..	—
,, Sheets	0 0 6⅞	..	—

TIN.			
English ingots, f. o. b.	202 0 0	..	204 0 0
,, bars	204 0 0	..	206 0 0
,, refined	206 0 0	..	208 0 0
Straits... Cash	222 0 0	..	—
Straits... Three months	190 0 0	..	—
Australian spot	—	..	—
Banka (in Holland) Cash	207 10 0*	..	—
Banka (in Holland) Three months	—	..	—

*Close of market for prompt.

LEAD.			
Spanish or soft foreign	13 2 6	..	13 5 0
English pig, common	13 5 0	..	13 7 6
,, L. B.	13 15 0	..	—
,, sheet and bar lead	14 17 6	..	—
,, pipe	15 7 6	..	—
,, red	15 17 6	..	—
,, white	18 15 0	..	—
,, patent shot	13 5 0	..	—

SPELTER.			
Silesian ordinary brands	24 5 0	..	24 10 0
,, special brands	24 15 0	..	25 0 0
English Swansea	25 2 6	..	25 5 0
Sheet zinc	29 0 0	..	—

ANTIMONY.			
Antimony	29 0 0	..	30 0 0
,, Crude	14 0 0	..	14 10 0
,, Ore (basis 50%)	9 0 0	..	9 5 0

QUICKSILVER.			
Flasks, 75 lbs. warrants	8 5 0	..	—

ALUMINIUM.	Per ton.		Per ton.
98-99 per cent.	60 0 0	..	61 0 0

NICKEL.	Per ton.		Per ton.
98-99 per cent. guaranteed	167 10 0	..	171 0 0

PLATINUM.

Per oz. Troy, 166s. 6d.; nominal and subject to negotiation.

MANGANESE ORE. One c. i. f., U. K. ports	Per unit.*		
Indian or Brazilian, 50 per cent.	£0 0 9½	to	£0 0 9¾
,, ,, 48 ,,	0 0 9	..	0 0 9¼
,, ,, 45 ,,	—	..	0 0 8¾
Caucasian 50 per cent	—	..	0 0 7¾
,, 48 ,,		..	0 0 7½

* Unit corresponds to 1 per cent.

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Hongkong and Shanghai Banking Corp.
International Banking Corp.
Banco Español Filipino
Russo-Chinese Bank

BOILER MAKERS
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Anderson & Co., W. H.
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Chee Hsin Cement Co., Ltd.
Chinese Engineering and Mining Co., Ltd.
Green Island Cement Co., Ltd.
Racine, Ackermann & Co.

CIGAR AND CIGARETTE MANUFACTURERS
Alhambra Cigar & Cigarette Factory.
Cia. Gral. de Tabacos de Filipinas
Germinal Cigar Factory
Olsen & Co.. Walter E.
La Prueba

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South Manchuria Railway Co.
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Germann & Co. Ltd.
H Berry & Co., Ltd.
Shewan Tomes & Co.
Frank L. Strong
Siemens China Electric Engineering Co

CONSULTING ENGINEERS
White & Co., Inc. J. G.
C. G. Young

DIVING APPARATUS
A. J. Morse & Son

DREDGERS
Middleton & Co., Ltd.
Melchers & Co.

New York Engineering Co.
Priestman Bros. Ltd.
Rose, Downs & Thompson, Ltd.

DRILLING MACHINES
The Keystone's Driller Co.

DRY CELLS
F. H. Thompson.

DRY GOODS, WHOLESALE
The H. B. Claflin Co.

ELECTRIC LIGHTING PLANTS
Anderson Meyer & Co.
Arnhold, Karberg & Co.
Boulton & Paul Ltd.
Fearon, Daniel & Co.
General Electric Co.
Siemens China Electric Eng. Co.
Shewan, Tomes & Co
U. S. Steel Products Co.
Western Electric Co.

ELECTRICAL SUPPLIES
Allis-Chalmers Co.
American Trading Co.
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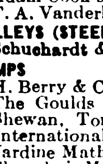

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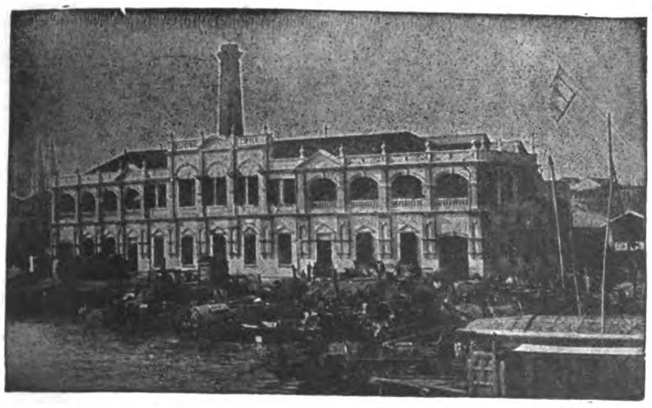

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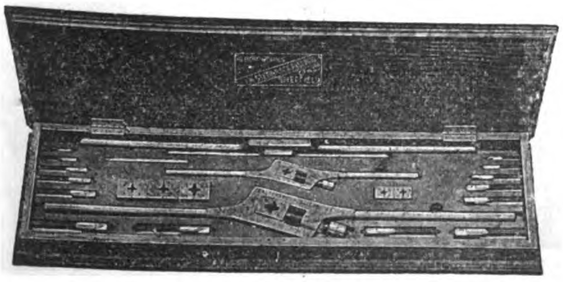

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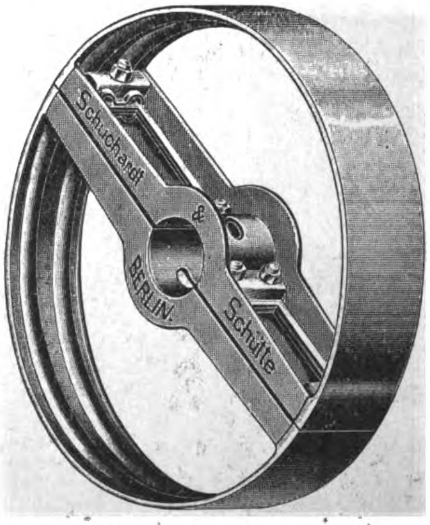

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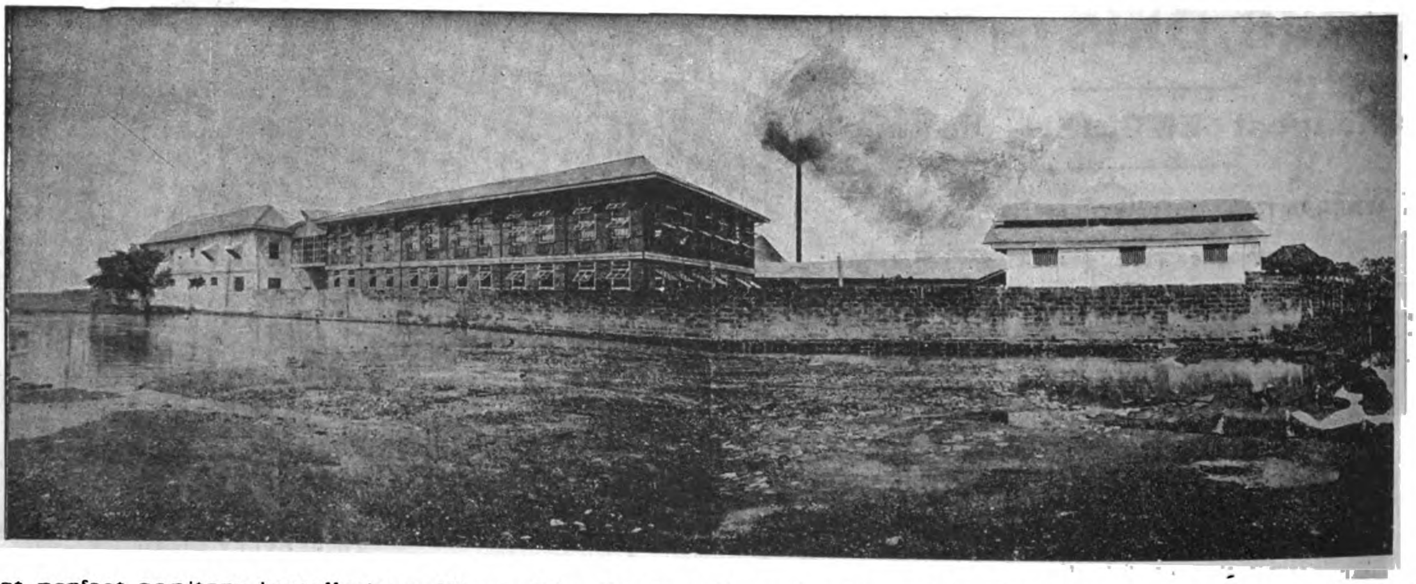

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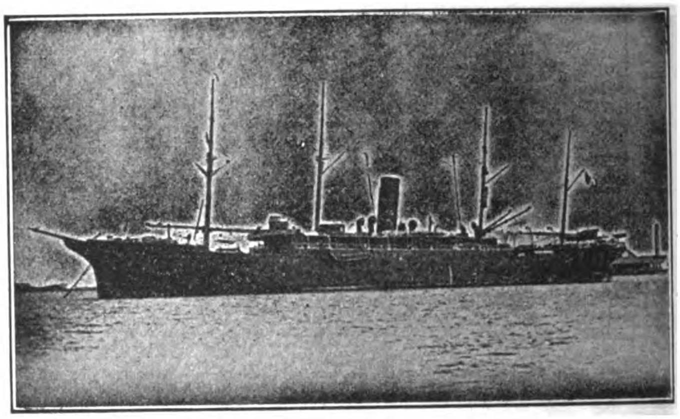

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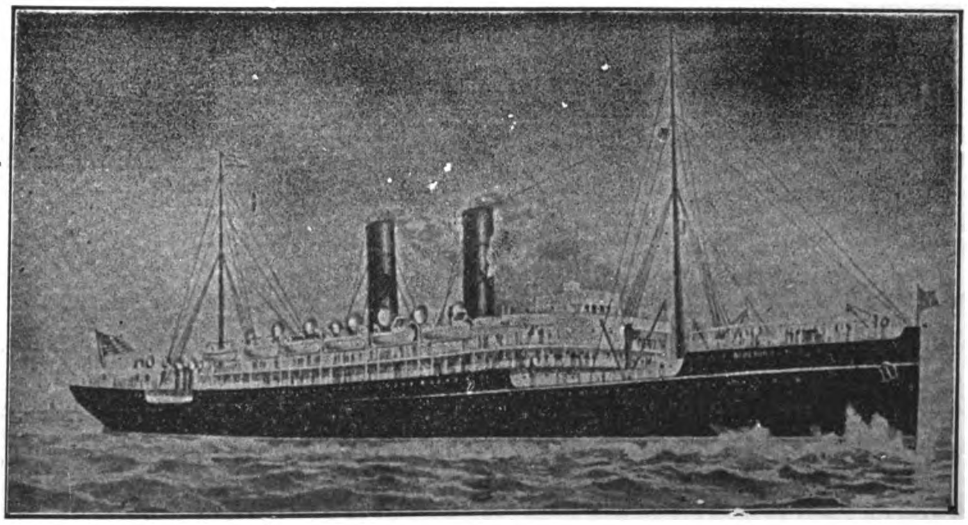

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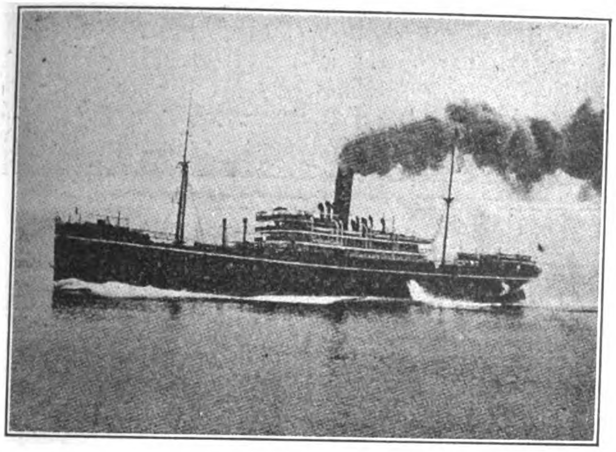

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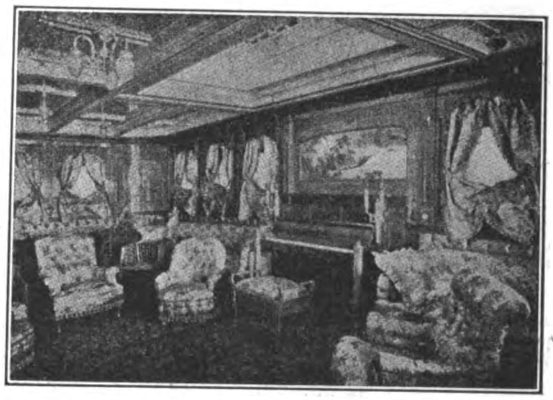

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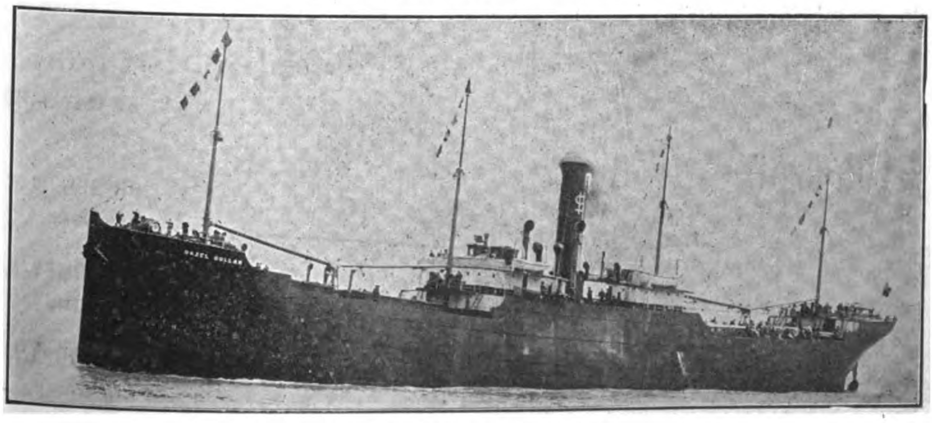

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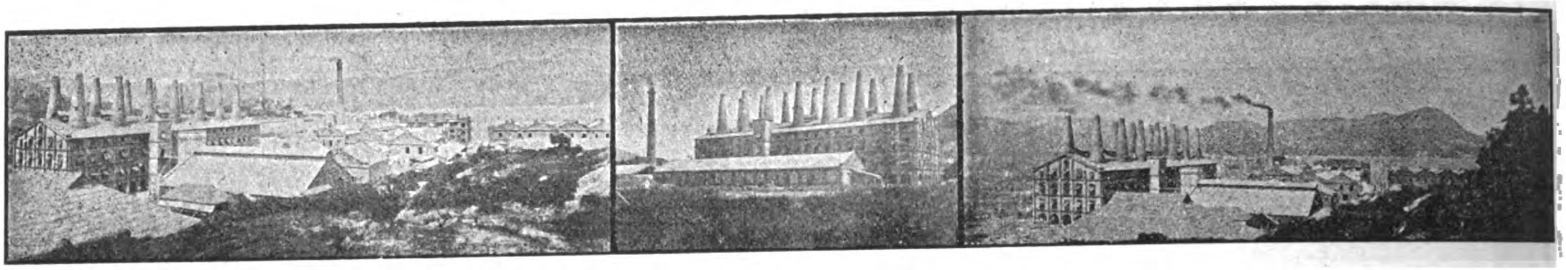

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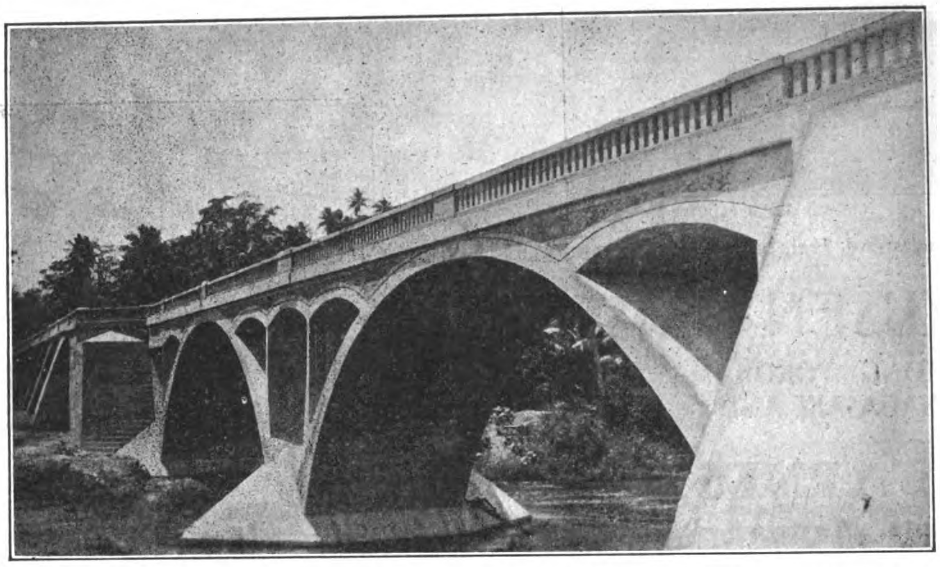

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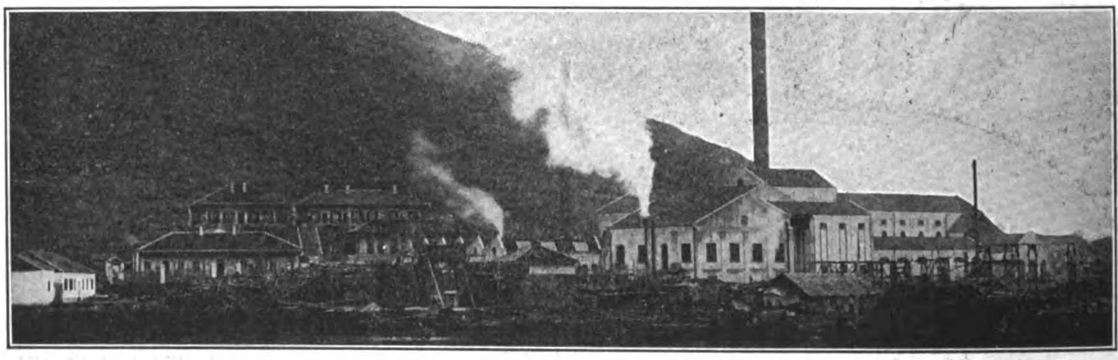

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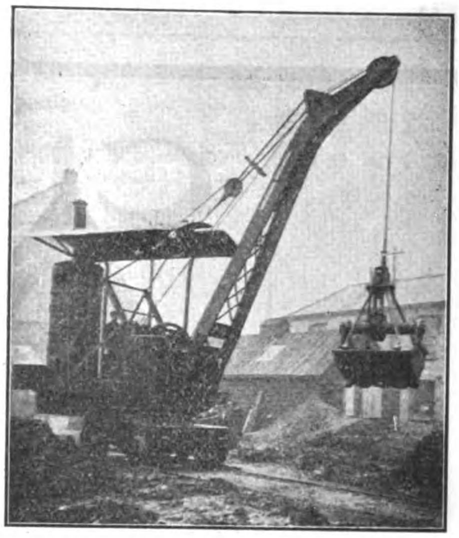

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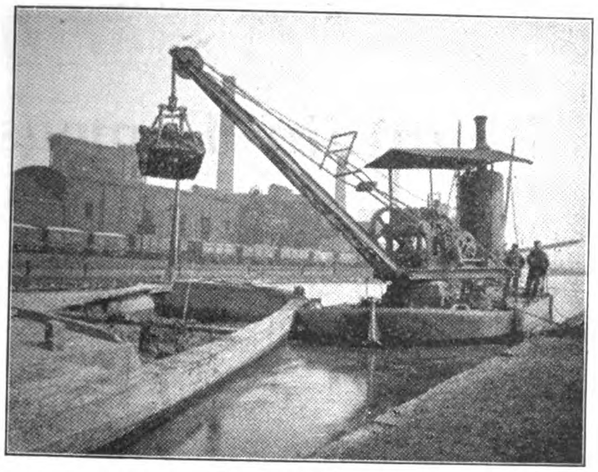

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Registered under Hongkong Ordinances and under the Life Assurance Companies Acts, England.

SUBSCRIBED CAPITAL	PAID UP CAPITAL
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Income	Tls.	2,896,553.27
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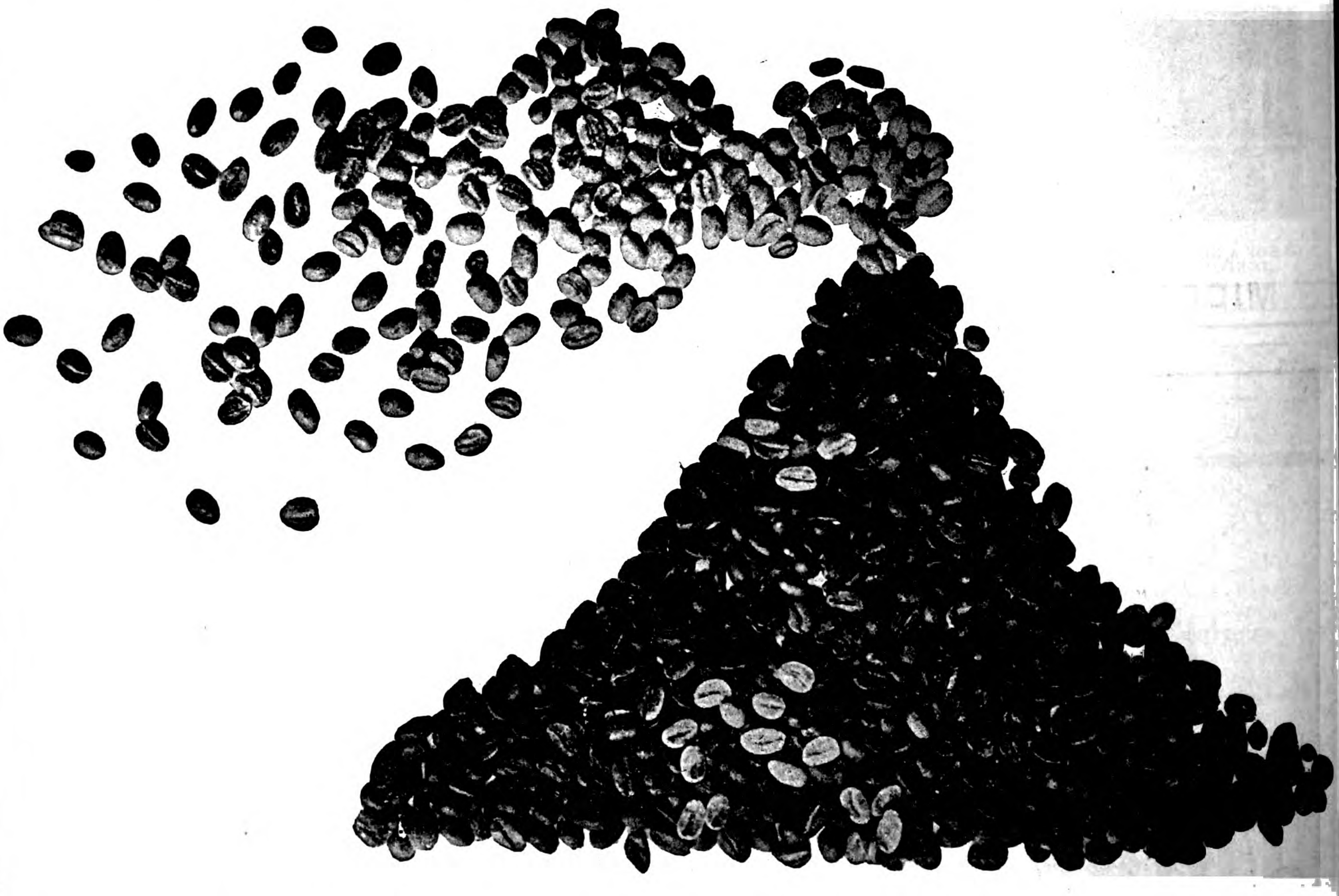

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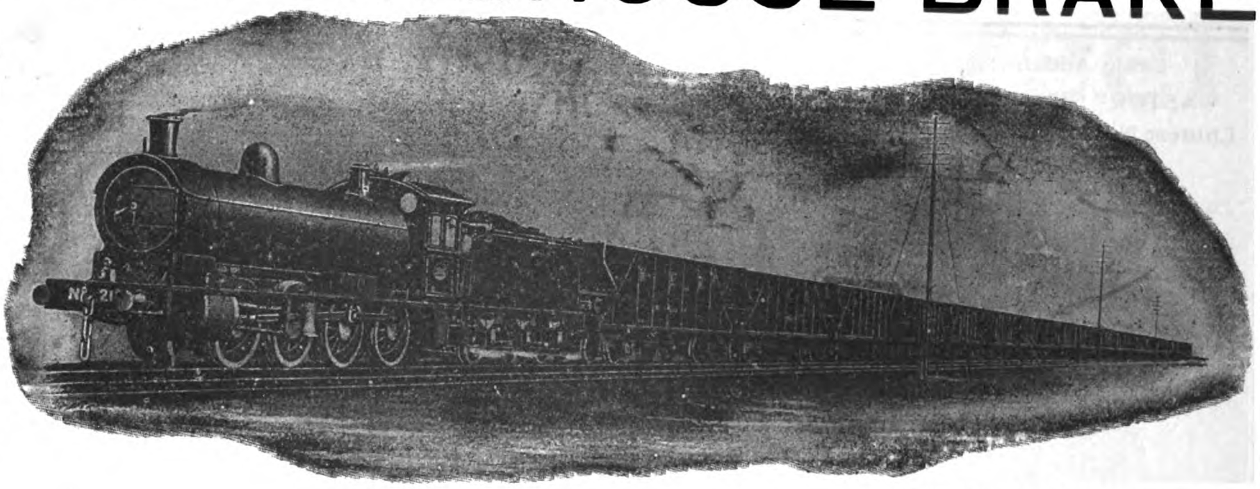

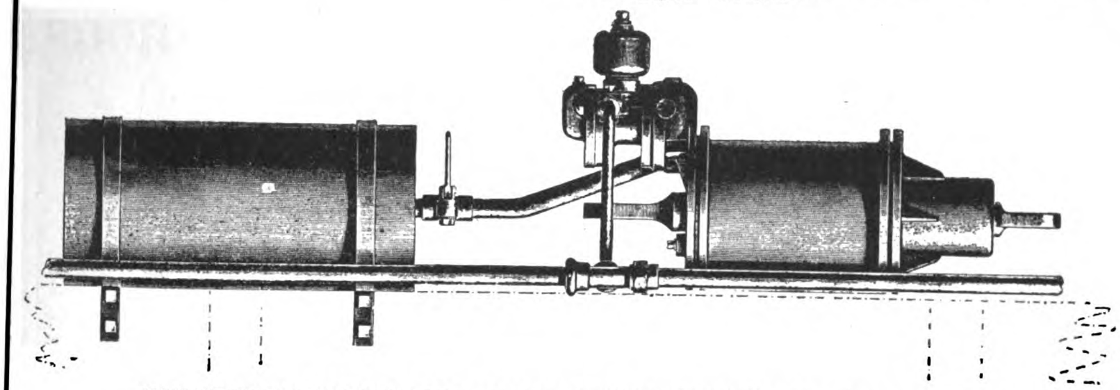

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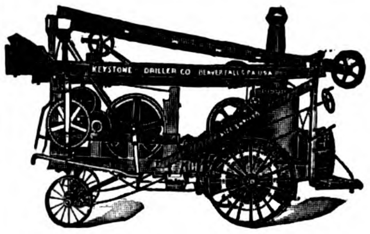

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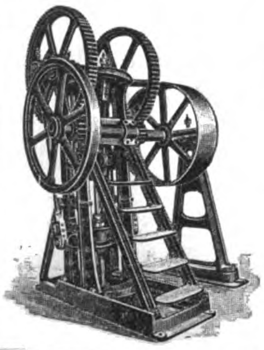

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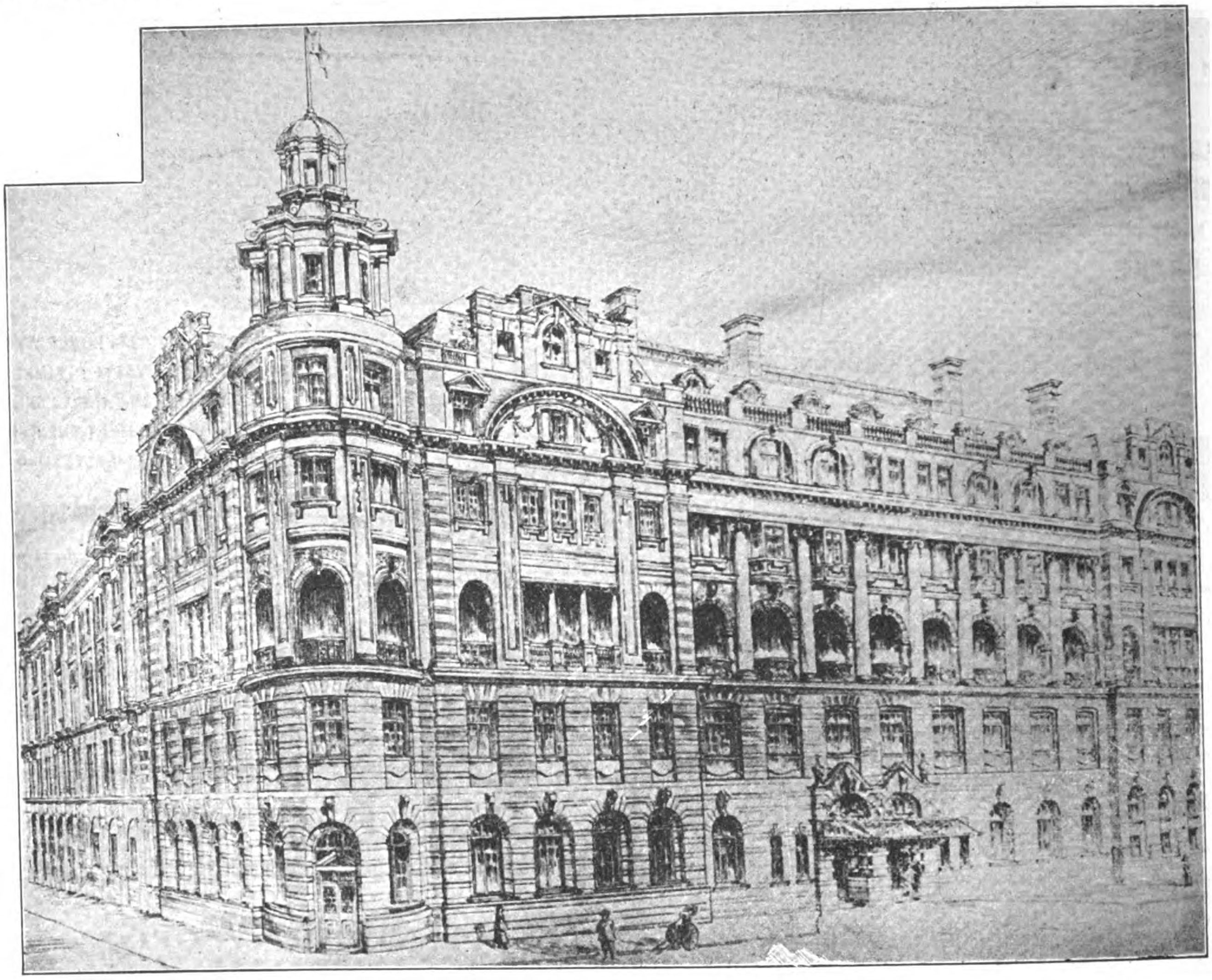

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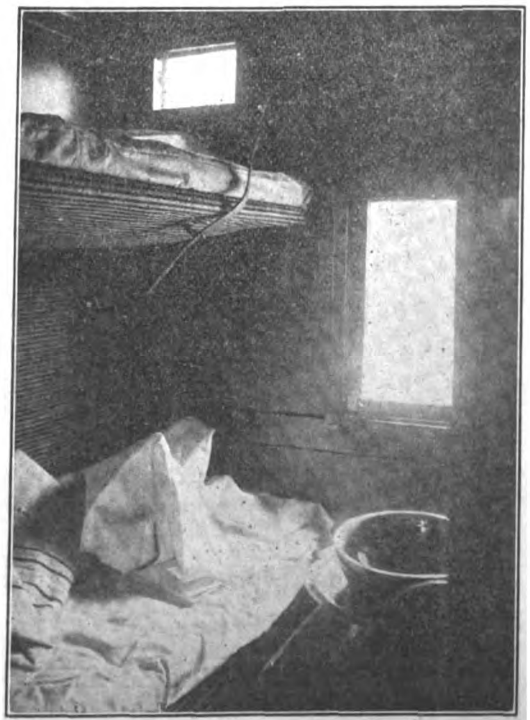

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"THE ROAD THROUGH THE HEART OF CHINA"

Avoid the Cold and Rough Weather in the Sea Trip between Shanghai and the North by the more comfortable Route up the Yangtsze to Hankow, and from there via the Ching-Han Railway to Peking, where through connections for Europe are made with the Trains de Luxe of the Imperial Railways of North China.

This line passes through the Heart of the Empire and enables the traveller to and from Europe to catch a glimpse of Old China. Ancient walled cities, temples and pagodas are seen from the comfortable seats of the weekly trains de luxe operated by this line. From Peking, the great capital of the oldest civilization in the world, the train departs from the famous Chien-Men and carries the traveller through the historical and legendary portions of the Empire, to the modern industrial center at Hankow—the Chicago of China. Connections are made with the Cheng-tai Railway at Chengtingfu, with the Tao-Ching Line at Sin Siang-sien, and at Chengchowfu with the Pienlo Line.

A weekly express train de luxe leaves Peking every Tuesday, and Hankow every Friday, making the trip of over 700 miles in less than thirty hours.

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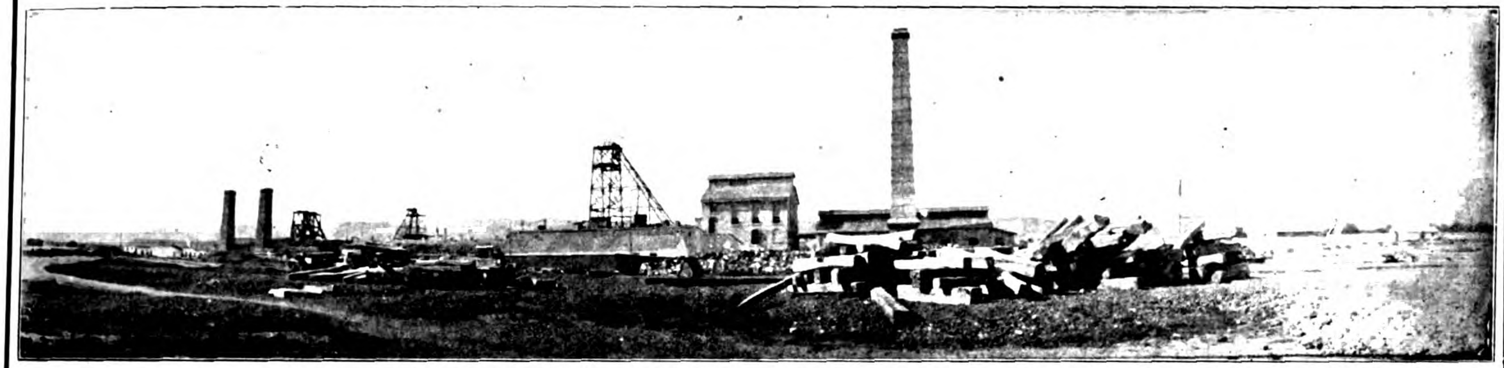
IMPERIAL CHINESE RAILWAYS

THE TAO-CHING RAILWAY

TAOKOU TO CHINGHUA

(Imperial Chinese Government Honan Line)



GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

"China's Road of Anthracite"

THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

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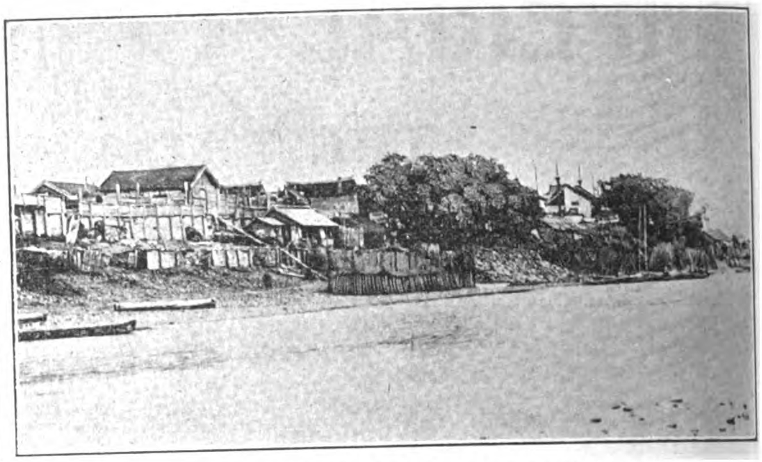
CHUNG-HUAN TEMPLE, KAIFENG-FU.

This line connects with the through service of the Peking-Hankow Railway at Tcheng Tchéou, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

IMPERIAL CHINESE RAILWAYS
KIRIN-CHANGCHUN LINE

CHINESE MARKET AT CHANG-CHUN



VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

TIME TABLE
The Kirin-Changchung Railway

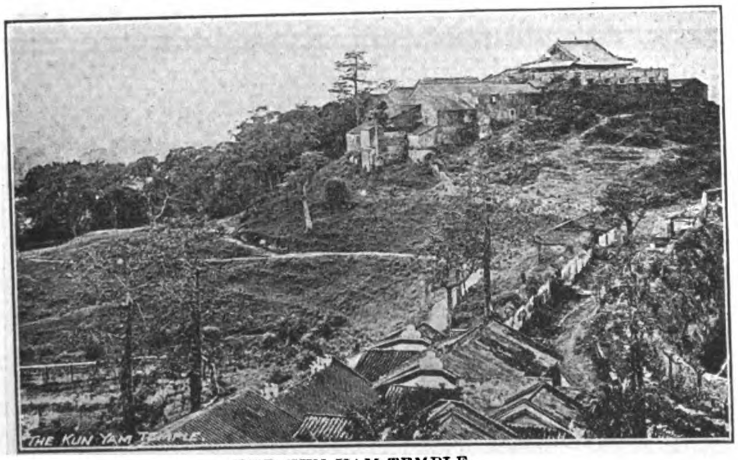
DOWN TRAIN

Station	*No. 1* a. m.	*No. 2* a. m.
Changchung	7:00	12:00
Coran	8:17	1:17

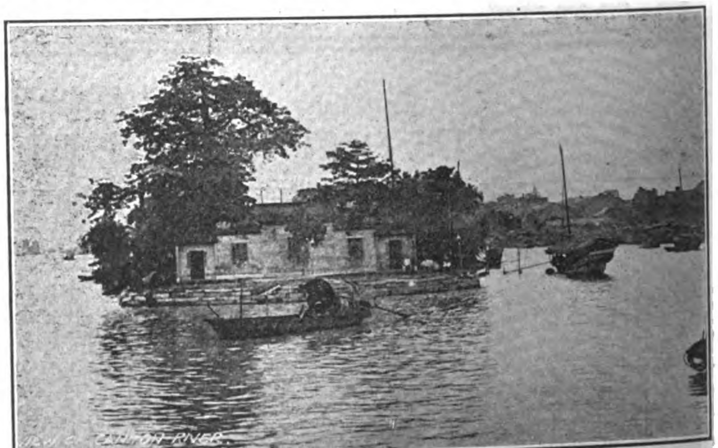
UP TRAIN

Station	*No. 2* a. m.	*No. 4* p m.
Coran	10:00	5:00
Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS
CANTON-KOWLOON LINE



THE KUN YAM TEMPLE



VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 24th APRIL, 1911, UNTIL FURTHER NOTICE.

Canton (Ta Sha Tou) to Shek Lung

Miles	STATION		Daily Passenger Trains. No. 1 A. M.	No. 3 P M.	No. 5 A. M.
	Canton (TAI SHA TOU)	dep	7.30	11.00	8 00
3.63	Shiek Pai	arr	7.39	11.09	8 09
		dep	7.42	11.12	3.12
7.90	Che Pi	arr	7.53	11.23	3.23
		dep	7.56	11.26	3.26
12.58	Wu Chung	arr	8 07	11.37	3.37
		dep	8.10	11 40	3.40
17.09	Nam Kong	arr	8.21	11.51	3.51
		dep	8.25	11 55	3.55
21.67	Sun Tong	arr	8.37	12.07	4.07
		dep	8.41	12.11	4.11
23.61	Tong Mei	arr	8.46	12.16	4.16
		dep	8.50	12 20	4 20
25.64	Nga Yeo	arr	8 55	12 25	4 25
		dep	8 58	12.28	4 28
29.00	Sien Tsun	arr	9.07	12 37	4.37
		dep	9.11	12 41	4 41
82.25	Shek Ha	arr	9 22	12 52	4 52
		dep	9-24	12.54	4 54
34.77	Shek Tan	arr	9 33	1 03	5 03
		dep	9 37	1.07	5 07
86.34	Shek Lik Kou	arr	9.43	1.13	5.13
		dep	9.45	1.15	5.15
40.15	Shek Lung	arr	9.58	1.28	5.28

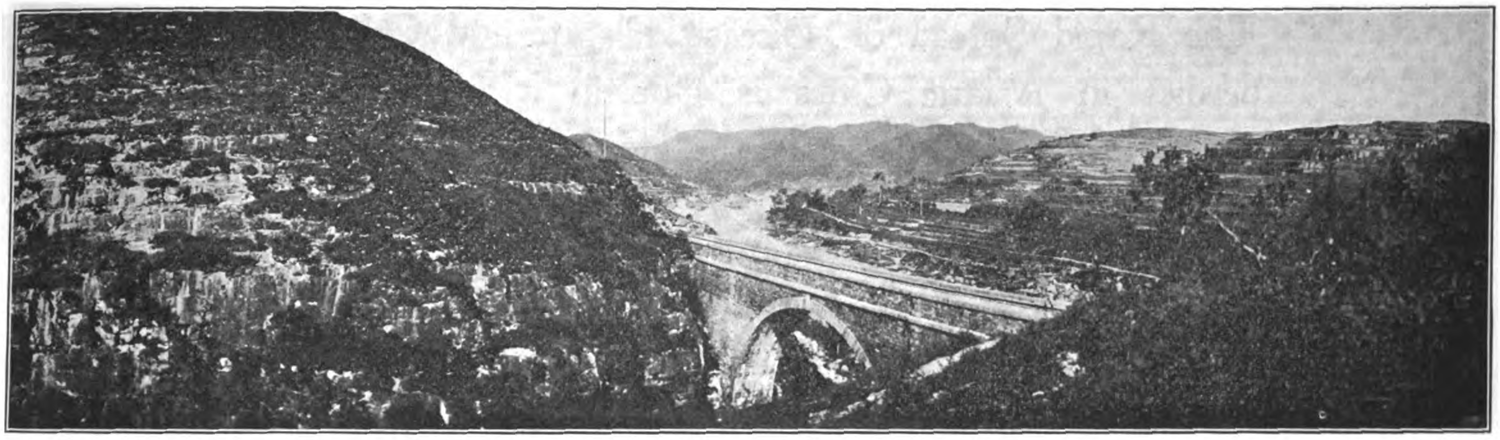
Shek Lung to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2 A. M.	No. 4 P. M.	No. 6 P. M.
	Shek Lung	dep	7.35	11.05	3 05
3 81	Shek Lik Kou	arr	7.48	11.18	3.18
		dep	7.50	11 20	3.20
5.38	Shek Tan	arr	7.56	11.26	3 26
		dep	8.00	11.30	3.30
7 90	Shek Ha	arr	8 C9	11.39	3.39
		dep	8.11	11.41	3.41
11.15	Sien Tsun	arr	8.22	11 52	3.52
		dep	8.26	11.56	3.56
4.61	Nga Yeo	arr	8.35	12 05	4 05
		dep	8 ?8	12 08	4.08
16.54	Tong Mei	arr	8.43	12.13	4 13
		dep	8.47	12.17	4.17
18. 48	Sun Tong	arr	8.52	12.22	4.22
		dep	8.56	12 26	4.26
23.06	Nam Kong	arr	9.08	12.38	4.38
		dep	9 12	12.42	4.42
27.57	Wu Chung	arr	9.23	12.53	4.53
		dep	9.26	12.56	5 56
32 25	Che Pi	arr	9 37	1.07	5.07
		dep	9.40	1.10	5.10
86 52	Shek Pai	arr	9.51	1.21	5.21
		dep	9.54	1.24	5.24
40.15	Canton (TAI SHA TOU)	arr	10.03	1.33	5.33

IMPERIAL CHINESE RAILWAYS

The Cheng-Tai Railway

(IMPERIAL GOVERNMENT SHANSI LINE—CHENGTINGFU TO TAIYUANFU)

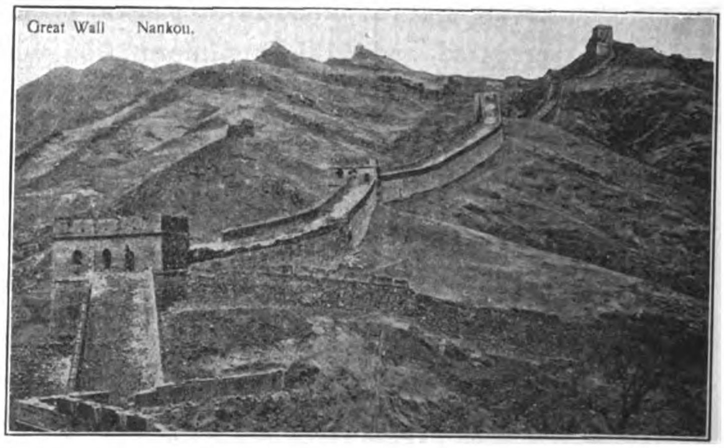


VIEWS ALONG ROUTE OF CHENG-TAI RAILWAY.

The trains of this line connect with the through service of the Peking-Hankow Railway, affording Travellers the opportunity of seeing the most picturesque part of China. The line passes through a mountainous section of country, rich in Mineral Resources to the Provincial Capital of Shansi at Taiyuanfu. This interesting city is a great educational center, and famous for the fine quality of its artistic embroideries.

The Peking-Kalgan Line

"THE ROAD TO THE GREAT WALL"



This line follows the ancient caravan route and military highway from Mongolia into China by the way of the historic Nankow Pass. This pass is the Key to Peking, and Kalgan is the gate of the Empire. From here the great camel caravans set out on their long journeys across Mongolia to Siberia and Central Asia. This old frontier mart, retaining its time-honored characteristics, one of the most interesting sights of the Old World, is made accessible by the new railway. The line also carries the passenger in two hours from Peking to Nankow, when the Great Wall of China and the Ming Tombs may be seen. A foreign hotel is operated by the railway authorities at Nankow, where chairs and guides may be secured for the Tombs.

TAOTAI JEME TIEN-YU, Director General

DUST CARRIES DISEASE

The Rapid Spread of Disease, Plague and Other Epidemics in Asiatic Cities is Due in a Large Measure to the Inhalation of the Germ Laden Dust of the Streets

ALLAY THE DUST—PRESERVE
The Health of the Community

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For Allaying the Dust, Preserving the Surface and Binding the Road

Experience and experiment have demonstrated that asphalt or oil with an asphaltum base are the *only* substances successfully applied to roads to insure *permanency of dust relief* and to *maintain the roads in perfect condition.*—In our three preparations we offer products that are suitable for road construction or road maintenance.—Adapted for all conditions of roads and for use in all localities. Our free book treats of each of these three products at length, explaining the uses for which they are particularly prepared, and furnishing information which will be found invaluable to Public Works Officials, Road Engineers, Government, Colonial and Municipal authorities, and to owners of private estates.—A copy will be mailed free on request.

Asphalt Road Oil is an asphalt-bearing oil and is intended for use on well-made roads as they are. One application, if properly applied, suffices for a season. Specially adapted for the Roads and Streets of the Cities of North China.

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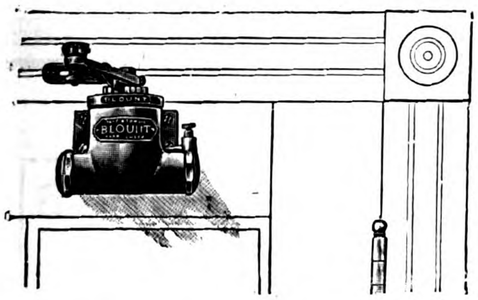
YALE

Blount Door Check



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Prevents Slamming

THIS is one of the well-known "Yale Products,"—a device which makes homes more *habitable.*

It is a combination check and spring,—the spring closes the door while the check prevents the slam. It works easily and quietly—and always *works.*

The Blount Door Check may be applied to any door in homes, offices, stores and hotels. It means better order greater comfort, and less draft and dust.

Another style is the Blount Holder Check which serves not only *to close* the door, but to *hold it open* as well. Both are of "Yale Quality" which guarantees *reliability.*

Put these devices on all your doors. Your hardware merchant can supply you, or will get them for you.

We shall be glad to send you—free—a little book telling you all about Blount Door Checks.

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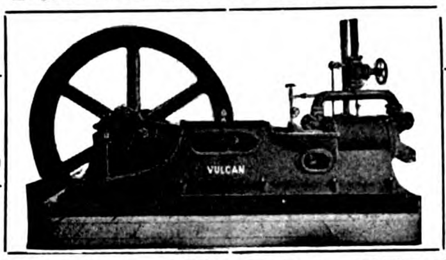
VUL  CAN

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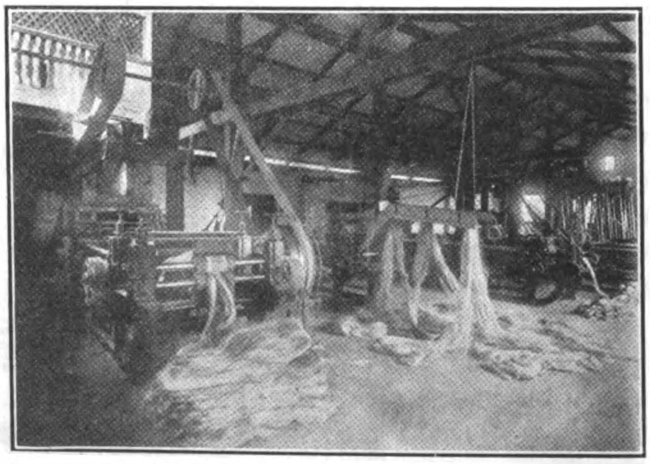

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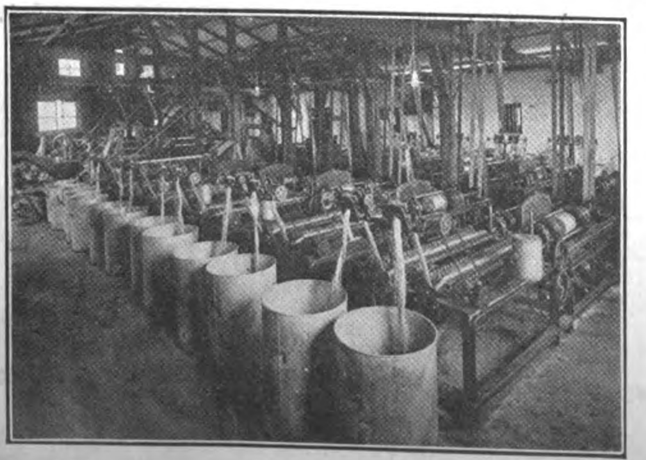

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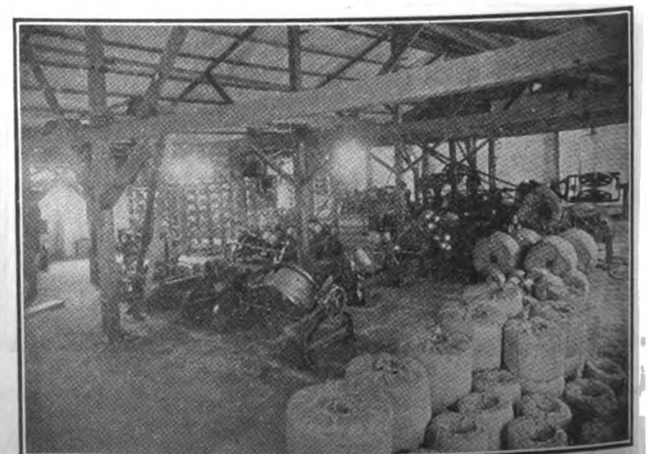

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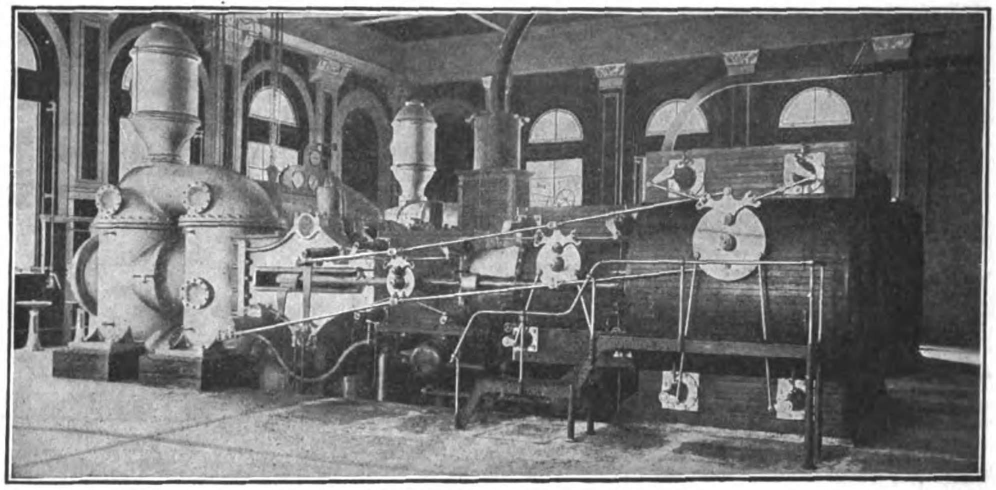

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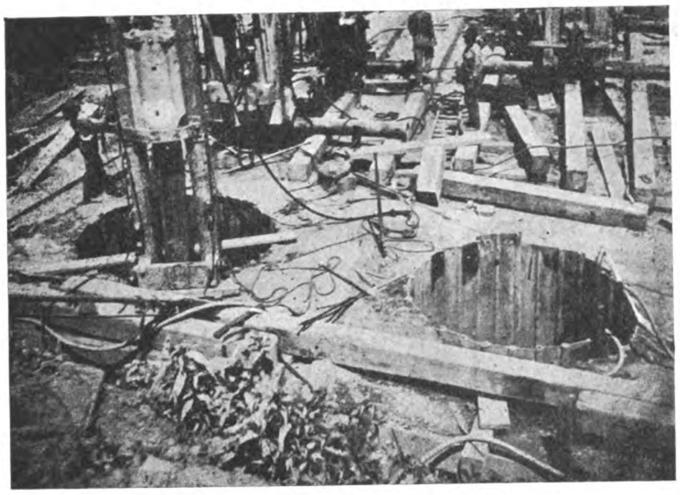

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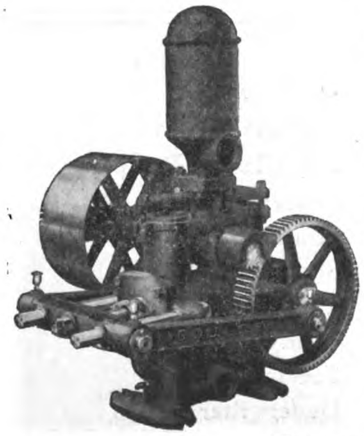

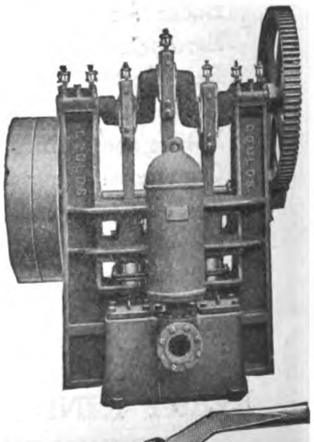

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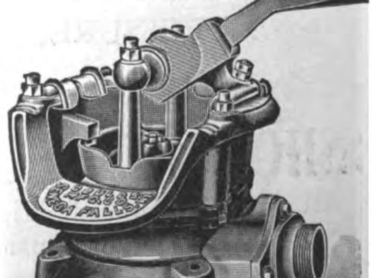

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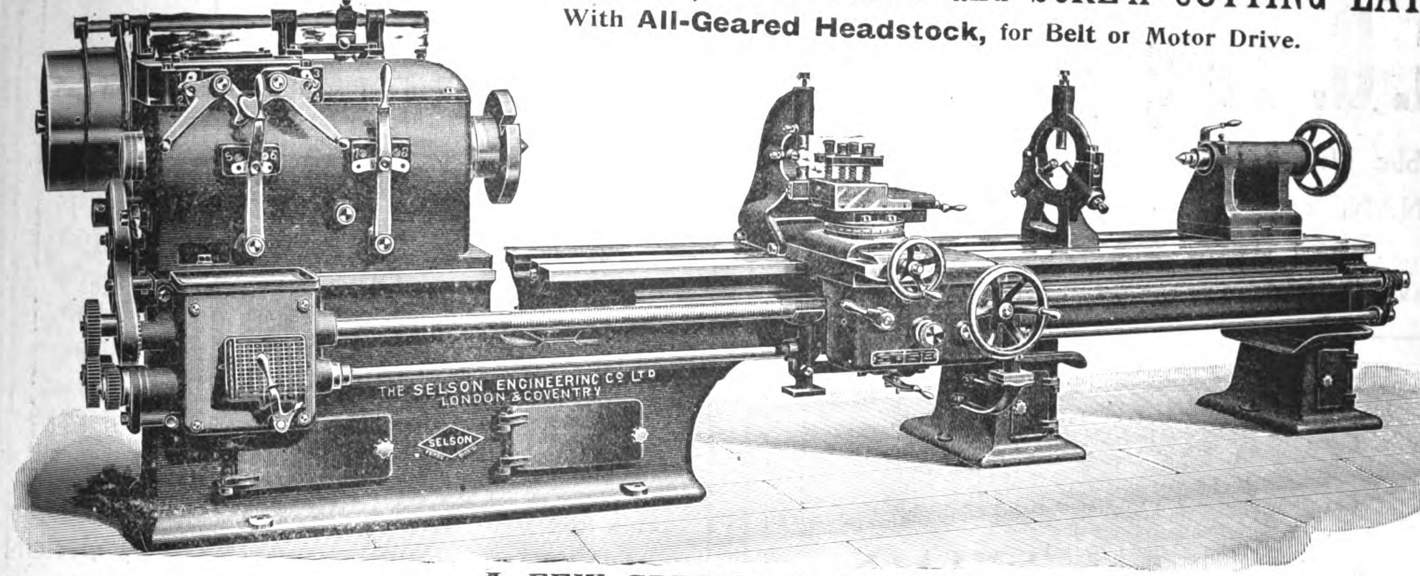

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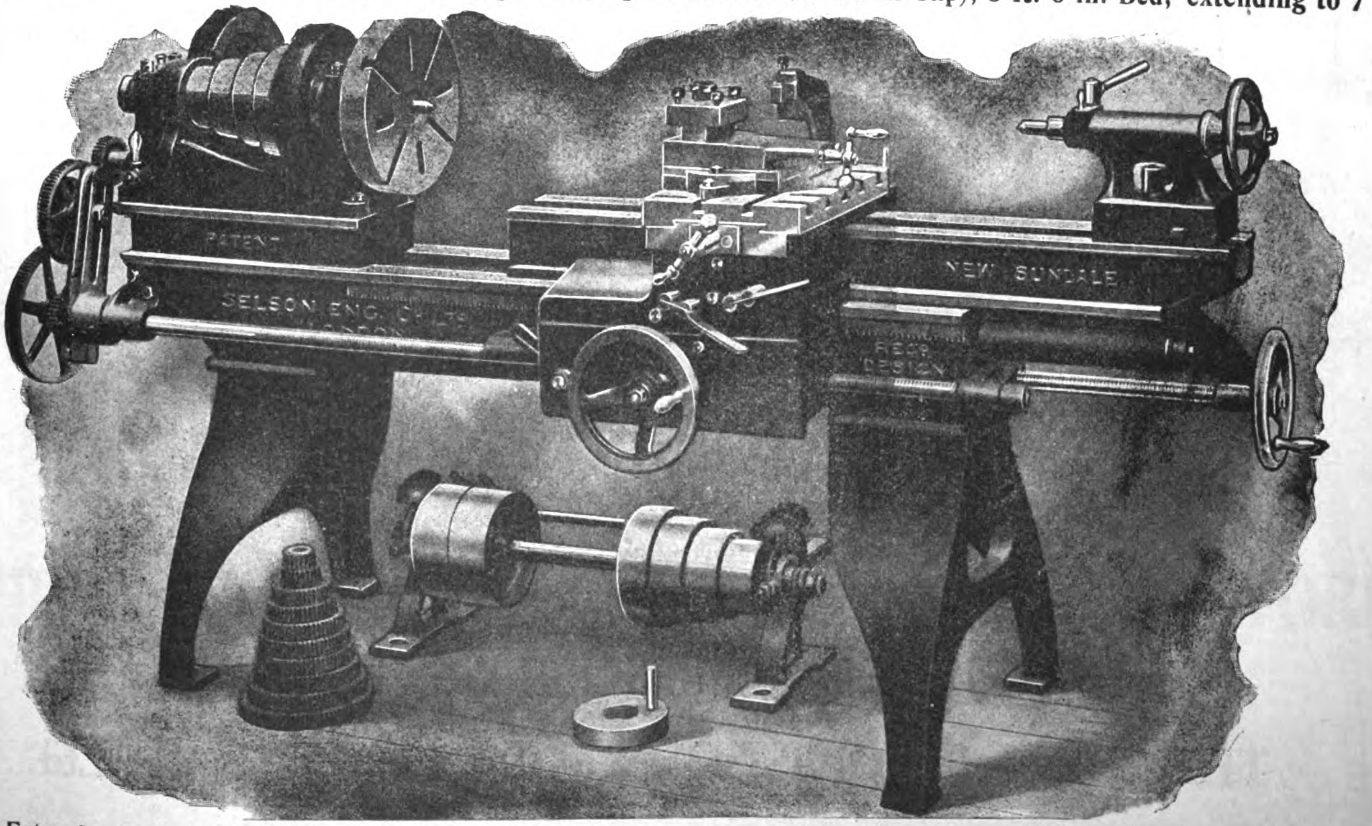

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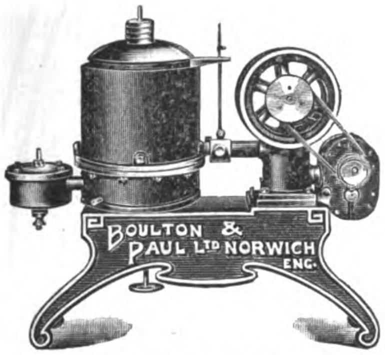

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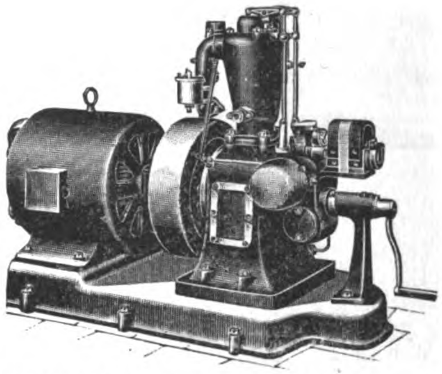

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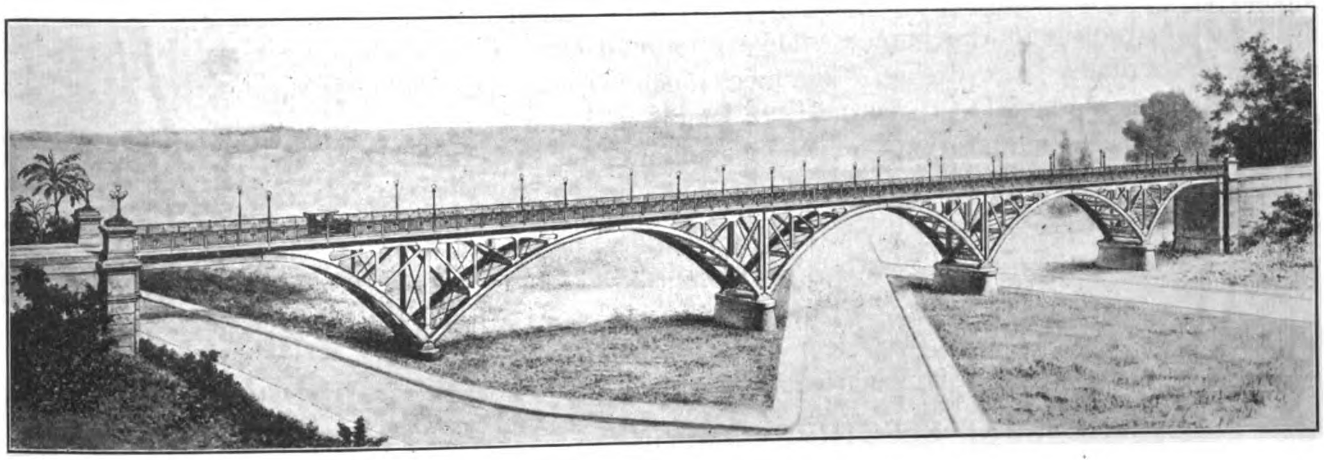

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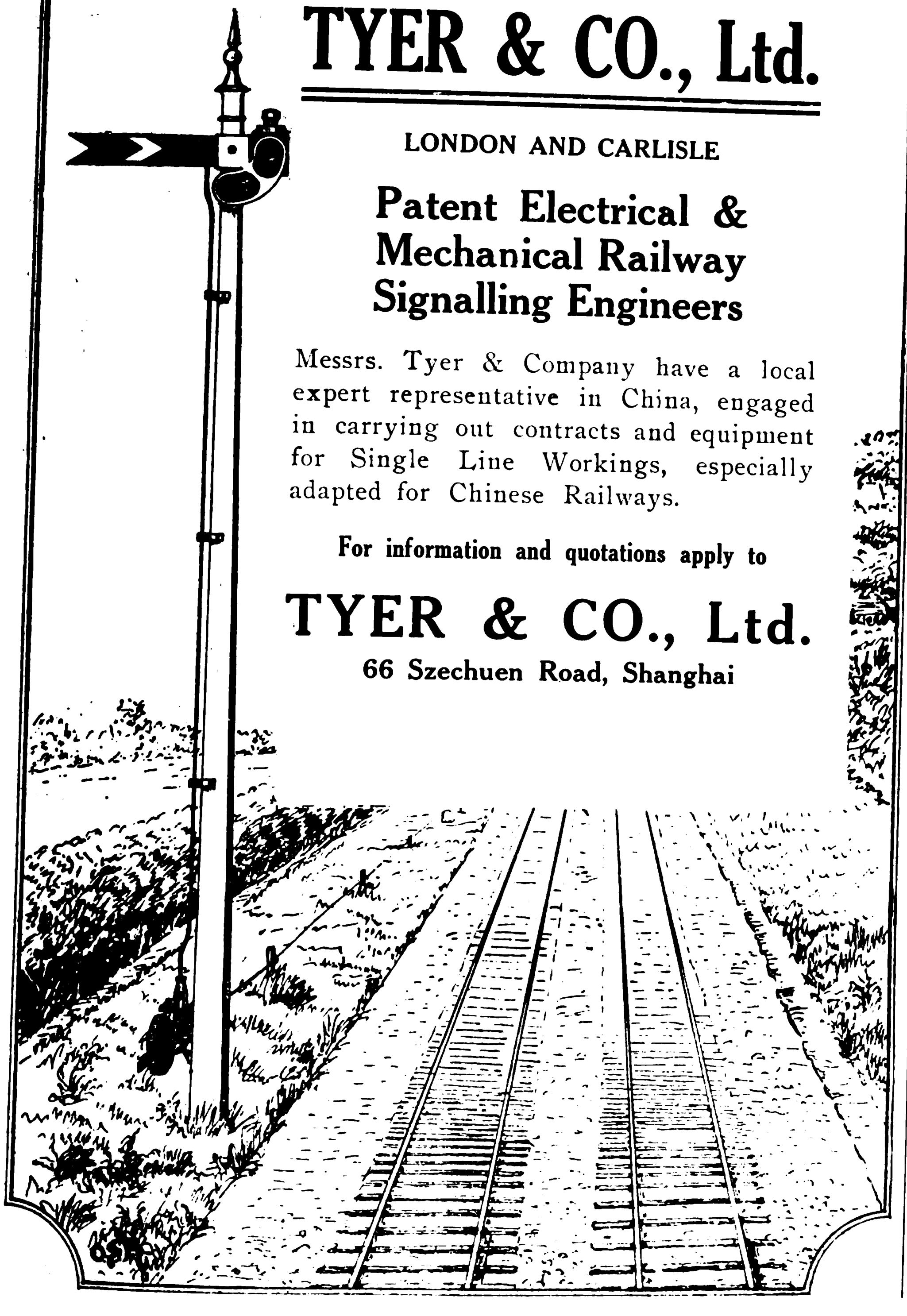

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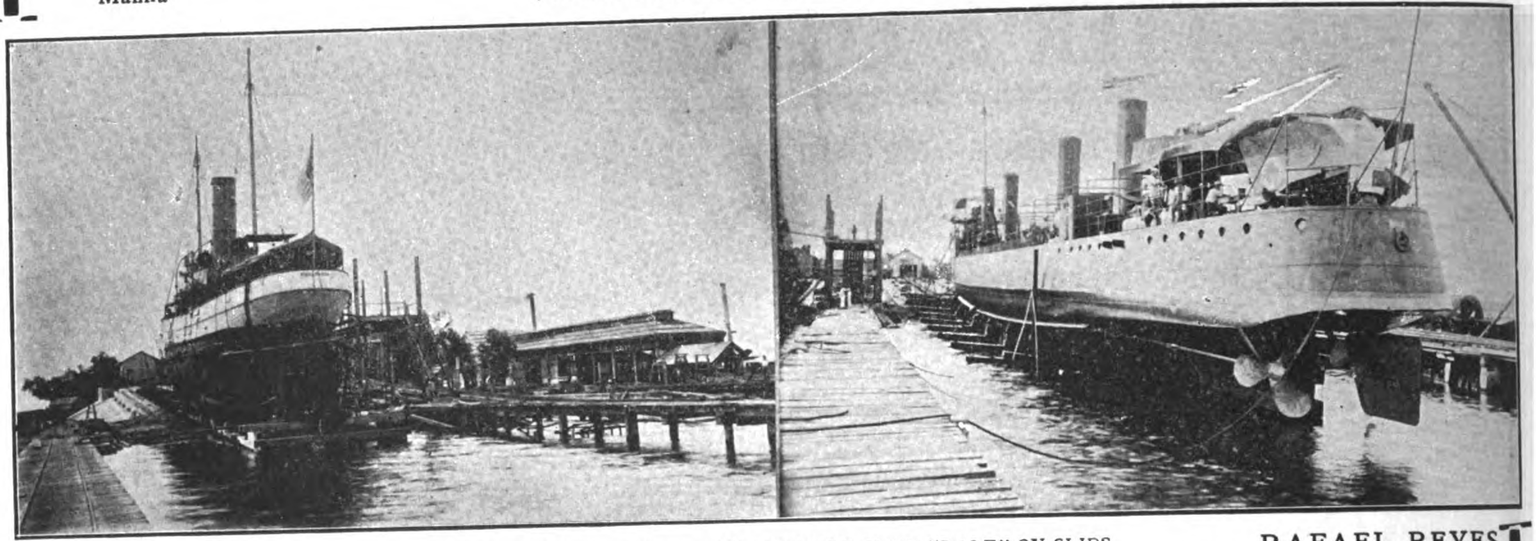

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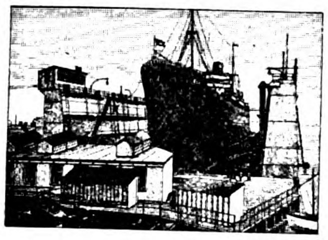

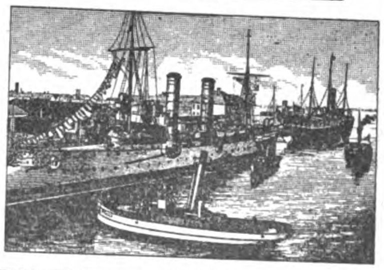

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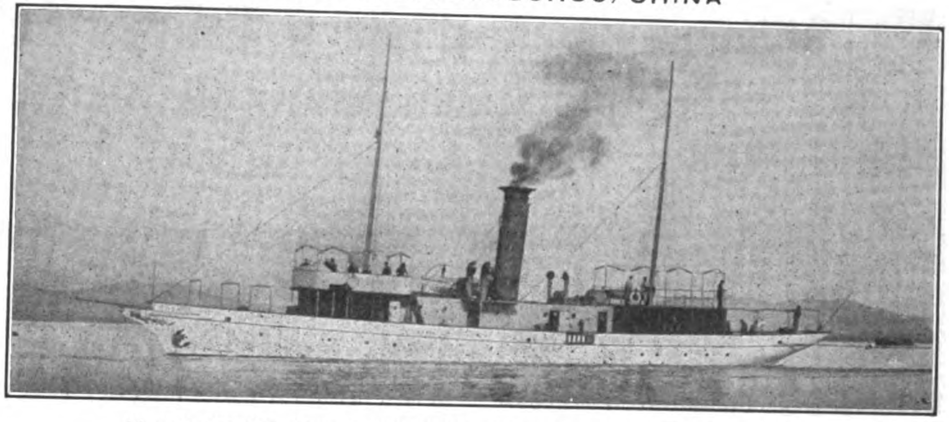

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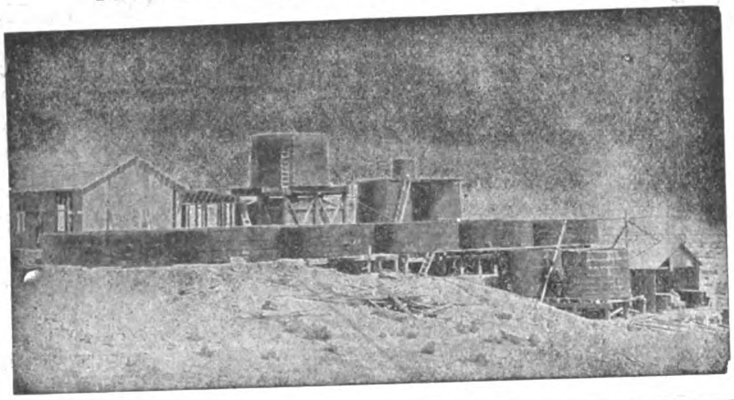

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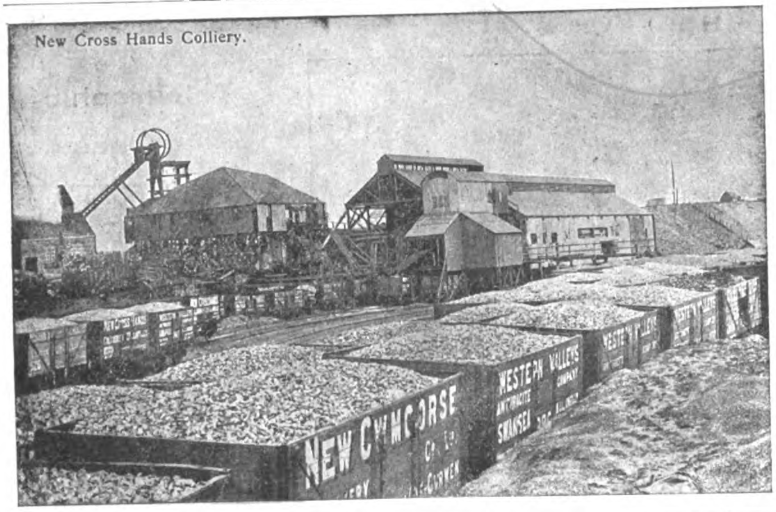

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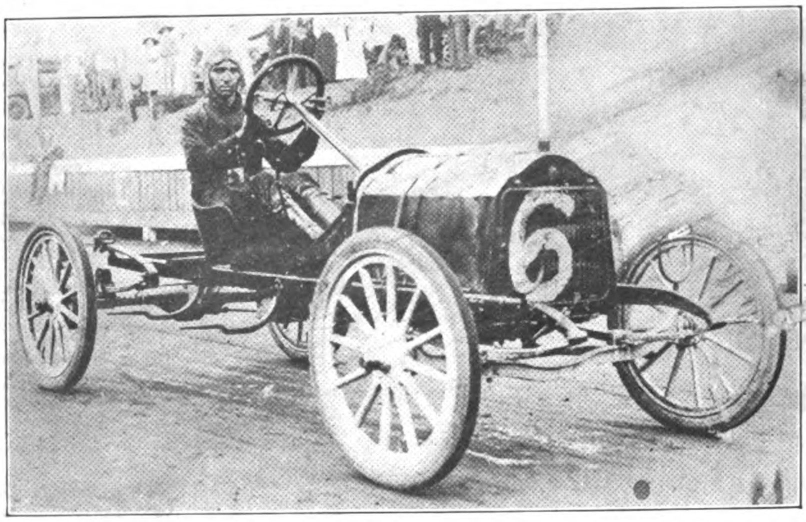

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BY

CHINA

The Reasons Why It Is Impossible For American Manufacturers Of Railway Materials To Secure Fair Play Under The Present Conditions Of Awarding Tenders

By GEO. BRONSON REA

The Kung-Pao Sheng-Hsuan-Huai
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Supplement to

THE FAR EASTERN REVIEW

August, Nineteen Hundred and Eleven

Hukuang Imperial Government Railways

FINAL AGREEMENT

THIS AGREEMENT is made at Peking on the twenty second day of the fourth month of the Third year of the Emperor Hsuan T'ung, corresponding to the twentieth day of May, One thousand nine hundred and eleven, Western Calendar, and the Contracting Parties are:

His Excellency the Kung-Pao Sheng Hsuan-Huai, Minister of Posts and Communications, duly authorized by Imperial Decree to act on behalf of the Imperial Government of China, of the one part, and

The Deutsch-Asiatische Bank,

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The First National Bank, and The National City Bank, all of New York, constituting the American Group, hereinafter called the "Banks" of the other part,

Witnesseth as follows:

ARTICLE I.

The Imperial Government of hina authorizes the Banks to issue a Five per cent Gold Loan for an amount of Six Million Pounds Sterling (£6,000,000). The Loan shall be of the date on which the bonds are issued to the public, and shall be called "The Imperial Chinese Government Five Per Cent Hukuang Railways Sinking Fund Gold Loan of 1911."

ARTICLE II.

This Loan is designed to provide capital, first.—

For the redemption at a premium of Two and one-half per cent, with accrued interest, of certain unredeemed Gold Bonds of the total par value of Dollars Two million two hundred and twenty-two thousand United States Currency, (G $2,222,000) issued by The American China Development Company on behalf of the Imperial Chinese Government, and secondly—

For the construction of a Government railway main line from Wuchang, the capital of the Hupei Province, through Yo-chou and Chang-sha, the capital of the Hunan Province, to a point in the District of Yi-chang-hsien in the Prefecture of Ch'en-chou-on the southern boundary of Hunan, connecting with the Kuang-tung section of the Canton-Hankow Railway line, the total length of this line, hereinafter known as "The Hupei-Hunan Section of the Canton-Hankow Railway line," being an estimated distance of 1,800 Chinese li, or 900 kilometres, and of

A Government railway main line from a point at or near Kuangshui in the Province of Hupei, connecting with the Peking Hankow Railway line and passing through Hsiang-yang, and Chingmenchou to Ichang, an estimated distance of 1,200 Chinese li, or 600 kilometres, and from Ichang to Kueichoufu in the Province of Szechuan, an estimated distance of 600 Chinese li, or 300 kilometres,—this latter section of the main line having been added in substitution for the branch line from Chingmenchou to Hanyang originally agreed upon,—the total length of this main line, hereinafter known as "The Hupei Section of the Szechuan-Hankow Railway line" being about 1,800 Chinese li, or 900 kilometres.

The survey lines shall be open to revision by the Ministry of Posts and Communications.

The Chinese Imperial Government undertakes to call in, after having received from the Banks application in writing to do so, the aforesaid Gold Bonds, and the Banks will apply the amount necessary for the said redemption out of the proceeds of the Loan, and will deliver the redeemed Bonds to the Chinese Government after having made the Bonds valueless. The Chinese Imperial Government will, after receipt of the redeemed Bonds, cancel the inscription of the pledge of the Canton-Hankow Railway Line in their archives, and will advise the Banks in writing after having done this.

It is understood that any surplus of the nominal amount of Five hundred thousand pounds Sterling (£500,000) hereby allotted for the redemption of the Gold Bonds issued by the American China Development Company, aforesaid, which may remain after complete redemption of those bonds, shall be allotted to the above named Railway Lines.

ARTICLE III.

After deduction of the amount required for the redemption of the Gold Bonds referred to in Article II of this Agreement, the balance of the Loan proceeds shall be solely devoted to the construction of the aforesaid railway lines, including the purchase of land, rolling stock and other equipment, and to the working of the lines, and to payment of interest on the Loan during the period of construction, which is estimated at three years from the actual beginning of the works, a longer period, however, being allowed for the completion of the section from Ichang to Kuei choufu in consideration of the engineering difficulties to be encountered. Work shall be commenced simultaneously at Wu-chang, Chang-sha, Kuang-shui and Ichang within six months after this Agreement has been signed, within which period the Banks shall notify the Ministry of Posts and Communications that the sum of Six Hundred Thousand Pounds Sterling (£600,000) has been placed at its disposal, in case funds should be required for survey or construction purposes, or for ordering of materials, and for the resumption by the Imperial Chinese Government of the portion of these lines already constructed by the Provinces concerned, the said sum to be held in Europe and/or in the United States of America or remitted to China as the Ministry may direct as a first instalment on account of the proceeds of the Loan. This amount of £600,000, or whatever portion thereof is actually advanced, together with interest thereon at the rate of six per cent per annum, shall be deducted from the first proceeds of the sale of the bonds.

It is understood that the lines of railway already constructed by the two provinces of Hupei and Hunan prior to the signature of this Agreement with capital provided by those Provinces themselves, together with the property of those two provincial railways shall henceforward be taken over by and incorporated in the Canton-Hankow and the Szechuan-Hankow Government Railways Administration, and further that any supplementary funds which may be furnished in the future by the Ministry of Posts and Communications on account of a deficiency in the amount required for the construction of the Canton-Hankow and Szechuan-Hankow main lines within the boundaries of the two Provinces of Hupei and Hunan, as provided for in Article XV of the present Agreement, shall also rank as capital of the Canton-Hankow and Szechuan-Hankow Railway main lines within the boundaries of the two Provinces aforesaid. But the returns due upon such capital shall not in any manner impair the arrangements for payment of interest and repayment of principal of the present Loan.

ARTICLE IV

The rate of interest for the Loan shall be Five per cent per annum on the nominal principal, and shall be paid to the bond-

holders half-yearly. The said interest shall be calculated from the date on which the Loan is issued to the public, and shall be paid by the Imperial Chinese Government during the time of construction either from the proceeds of the Loan or from other sources, and afterwards, in the first place, out of the revenues of the railways, and then from such other revenues as the Chinese Government may think fit to use for the purpose, in half yearly instalments according to the amounts specified in the Schedule attached to this Agreement, and twelve days before their due dates, Western Calendar, as calculated half-yearly from the date on which the Loan is issued to the public.

ARTICLE V.

The term of the Loan shall be Forty Years. Repayment of Principal shall commence after the expiry of Ten years from the date of the Loan and except as provided in Article VI hereinafter, shall be made by yearly amortization to the Banks in half-yearly instalments out of the revenues of the lines, or such other revenues as the Chinese Government may think fit to use for the purpose, according to the amounts specified in the Schedule attached to this Agreement, but twelve days before their due dates, Western Calendar, as calculated half-yearly from the date on which the loan is issued to the public.

ARTICLE VI.

If at any time after the lapse of Ten years from the date of the Loan the Imperial Chinese Government should desire to redeem the whole outstanding amount of the Loan or any part of it not yet due for repayment in accordance with the Schedule of repayments hereto attached, it may do so up to the end of the seventeenth year by payment of a premium of Two and one-half per cent on the face value of the bonds, that is to say, by the payment of £102 10/—for each £100 bond, and after the lapse of seventeen years without premium: but in each and every case of such extra redemption the Imperial Chinese Government will give six months previous notice in writing to the Banks and such redemption shall be effected by additional drawings of bonds to take place on the date of an ordinary drawing as provided for in the Prospectus of the Loan.

When the Loan has been fully repaid this Agreement will immediately become null and boid. Bonds and interest coupons which have matured will be collected in due order and cancelled by the Banks as they are presented for payment and will be delivered by them to the Chinese Ministers in Great Britain, Germany, France and the United States of America. The Banks will refund in full to the Imperial Chinese Government the amounts of any drawn bonds and/or interest coupons which have not been presented for payment within thirty years from the respective due dates for redemption or payment of interest.

ARTICLE VII.

The half-yearly payments due for amortization and interest referred to in Articles IV and V, shall be made in accordance with the amounts of the Schedule attached to this Agreement, and twelve days before their due dates as fixed by Articles IV and V, in equal shares to the Banks by the Ministry of Posts and Communications which shall hand to the Banks in Shanghai or in Hankow, twelve days before the said due dates, funds in Shanghai "Kuei-yuan" sycee or Hankow "Yang-li" sycee and/or coin of the National Currency (so soon as the said Currency shall have been effectively established) sufficient to meet such payments in Gold in Europe and the United States of America, exchange for which shall be settled with the Banks on the same day, the Ministry of Posts and Communications having, however, the option of settling exchange with the Banks simultaneously at any date or dates within six months previous to any due date for the payment of interest and/or principal. Those payments may, however, be made in gold in Europe and/or in the United States of America twelve days before their due dates if the Imperial Chinese Government should happen to have gold funds bona fide at their disposal in Europe and/or in the United States of America not remitted from China for the purpose, and desire so to use them.

In reimbursement of expenses connected with the payment of interest and repayment of principal of the Loan the Banks will receive from the Chinese Government a commission of one quarter per cent on the Annual Loan service.

ARTICLE VIII.

The Imperial Government of China hereby engages that the interest and principal of this Loan shall duly be paid in full and should the revenues of the railways and/or the proceeds of the Loan not be sufficient to provide for the due and full payment of interest and repayment of principal, the Ministry of Posts and Communications shall memorialize the Throne and the Imperial Government of China will thereupon make arrangements to ensure that the amount of deficiency shall be met from other sources and handed over to the Banks on the date upon which funds are required to complete full payment of interest and repayment of principal.

ARTICLE IX.

The present Loan of Six Million Pounds (£6,000,000) Sterling together with the second series thereof, provision for the issue of which is made under the terms of Article XV hereinafter is hereby secured, in respect to both principal and interest, as a first charge upon:—

1. Hupei General Lekin amounting to Two million (2,000,000) Haikwan Taels a year.

2. Hupei Additional Salt Tax for River Defence amounting to Four Hundred Thousand (400,000) Haikwan Taels a year.

3. Hupei New Additional Two Cash Salt Tax of September, 1908, amounting to Three hundred thousand (300,000) Haikwan Taels a year.

4. Hupei collection of Hukuang inter-provincial Tax on imported Rice, to the amount of Two hundred and fifty thousand (250,000) Haikwan Taels a year.

5. Hunan General Lekin amounting to Two million (2,000,000) Haikwan Taels a year.

6. Hunan Salt Commissioner's Treasury Regular Salt Lekin to the amount of Two hundred and fifty thousand (250,000) Haikwan Taels a year.

The above Provincial Revenues amounting to a total of Five Million two hundred thousand (5,200,000) Haikwan Taels a year, are hereby declared to be free from all other Loans, Charges or Mortgages.

So long as principal and interest of this Loan are regularly paid, there shall be no interference with these Provincial revenues; but if principal or interest of the Loan be in default at due date, then, after a reasonable period of grace, lekin and other suitable internal revenues of the Provinces of Hupei and Hunan sufficient to provide the amounts above stated shall forthwith be transferred to, and administered by the Imperial Maritime Customs in the interests of the bondholders. And so long as this Loan or any part thereof shall remain unredeemed, it shall have priority, both as regards principal and interest, over all future loans, charges and mortgages charged on the aforesaid Provincial Revenues. No loan, charge or mortgage shall be raised or created which shall take precedence of, or be on an equality with this Loan, or shall in any manner lessen or impair its security over the aforesaid Provincial Revenues, and any future loan, charge or mortgage charged on the said Provincial Revenues other than the second series of the present loan provided for in Article XV aforementioned shall be made subject to this Loan, and it shall be so expressed in every agreement for every such future loan, charge or mortgage.

After redemption of the existing gold bonds referred to in Article II of this Agreement it is understood and agreed that, so long as this Loan is unredeemed, the railways shall, under no circumstances, be mortgaged nor their receipts given as security to any other party.

In the event of the Chinese Government, during the currency of this Loan, entering upon definite arrangements for the revision of the Customs tariff, accompanied by stipulations for the decrease or abolition of lekin, it is hereby agreed on the one hand, that such revision shall not be barred by the fact that this Loan is secured by lekin and provincial revenues and, on the other hand, that whatever lekin is required to provide the security of this loan shall neither be decreased nor abolished except by previous arrangement with the Banks and then only in so far as an equivalent is substituted for it in the shape of a first charge upon the increase of Customs revenue consequent upon such revision.

ARTICLE X

The Banks are hereby authorized to issue to the subscribers to the Loan, bonds for the total amount of the Loan in Gold, for such amounts as may appear advisable to the Banks. The form and language of the bonds shall be settled by the Banks in consultation with the Ministry of Posts and Communications or the Chinese Minister in Berlin, London, Paris or Washington: they shall bear the facsimile of the signature of the Minister of Posts and Communications and of his seal of office, in order to dispense with the necessity of signing them all in person, and the Chinese Minister in Berlin and/or London and/or Paris and/or Washington at the option of the Banks shall, previous to the issue of the bonds, put his seal upon each bond, with a facsimile of his signature, as a proof that the issue and sale of the bonds are duly authorized by and binding upon the Imperial Chinese Government. The representatives of the Banks in Berlin, London, Paris or New York, as the case may be, shall countersign the bonds as Agents for the issue of the Loan.

In the event of any bond or bonds issued for this loan being lost, stolen or destroyed, the Group and/or Bank or Banks concerned shall immediately notify the Ministry of Posts and Communications and the Chinese Minister in Berlin, London, Paris or Washington, as the case may be, who shall authorize the Group and/or Bank or Banks concerned to insert an advertisement in the public newspapers notifying that payment of such bond or bonds has been stopped, and to take such other steps as may appear advisable or necessary according to the laws and customs of the country concerned, and should any bond or bonds be destroyed or should such lost or stolen bond or bonds not be recovered after a lapse of time to be fixed by the Group and/or Bank or Banks concerned, the Chinese Minister in Berlin, London, Paris or Washington, as the case may be, shall seal and execute a duplicate bond or duplicate bonds for a like amount and hand the same to the Group and/or Bank or Banks representing the owner or owners of such lost, stolen or destroyed bond or bonds, which Group and/or Bank or Banks shall pay all expenses in connection with such delivery and execution of such bond or bonds for the account of the owner or owners of such bond or bonds.

ARTICLE XI

All bonds and coupons and payments made and received in connection with the service of this Loan shall be exempt from all Chinese taxes and imposts during the currency of this Loan.

ARTICLE XII

All details necessary for the Prospectus and connected with the payment of the interest and repayment of the principal of this Loan, not herein explicitly provided for, shall be left to the arrangement of the Banks in consultation with the Chinese Ministers in Berlin, London, Paris and Washington. The Banks are hereby authorized to issue the Prospectus of the Loan as soon as possible after the signing of this Agreement; and the Imperial Government will instruct the Chinese Ministers in Berlin, London, Paris and Washington to co-operate with the Banks in any matters requiring conjoint action, and to sign the Prospectus of the Loan.

ARTICLE XIII

This Loan of £6,000,000 Sterling shall be issued to the public in one amount as soon as possible after the signature of this Agreement, and not later than twelve months from the date thereof. The price of the bonds to the Imperial Chinese Government shall be Ninety five per cent of their nominal value. Subscriptions will be invited by the Banks in Europe, in the United States of America and in China from Chinese, Europeans and Americans on equal conditions, preference being given to the application of the Chinese Government provided such application be made not less than four days before the issue of the Prospectus to the public. Seven days' notice of the issue of the Prospectus will be given by the Banks to the Imperial Chinese Government.

ARTICLE XIV

The proceeds of the Loan shall be placed to the credit of a "Hukuang Government Railways Account" with the Deutsch-Asiatische Bank, the Hongkong & Shanghai Banking Corporation, and the Banque de l'Indo-Chine in China, Berlin, London or Paris as the case may be, and with the American Group, in New York or such Banks in China as from time to time shall be designated by the American Group, the International Banking Corporation being now so designated. Payments of the loan proceeds into the credit of this account shall be made in instalments and on dates conforming to the conditions allowed to the subscribers to the loan.

Interest at the rate of 3% per annum shall be granted on the credit balance of the portion of this account kept in Berlin, London, Paris or New York, and interest on the credit portion kept in China by the above Banks, will be allowed at the Banks' rate for current accounts to be arranged.

Subject to the payments and deductions to be made from the loan proceeds in terms of Articles II and III of this Agreement the Banks will hold the net balance with accrued interest to the order of the Ministry of Posts and Communications.

Transfers of the loan funds to China in amounts not exceeding Two hundred thousand Pounds Sterling (£200,000) transferred in any one week, will be made by the Ministry of Posts and Communications at its discretion, the transfers being effected through the Deutsch-Asiatische Bank, the Hongkong & Shanghai Banking Corporation, the Banque de l'Indo-Chine, and/or the Bank or Banks to be designated by the American Group, the International Banking Corporation being now so designated.

Transfers of the loan funds to China from the Banks in Europe and America, and transfers from the Banks in China to the Chinese Banks which are hereinafter designated shall be made as nearly as possible in equal amounts from each of the Banks, the rate of exchange for each transfer from Europe and America being settled simultaneously with the transferring Banks, either on the day on which such transfer is to be made, or at the option of the Ministry of Posts and Communications, on any date or dates within six months previous to the day on which the transfer is to be made. In the event of equal transfers being found to be impracticable a mutually satisfactory procedure for making the transfers above referred to shall be arranged between the Ministry of Posts and Communications and the Banks.

The transferred funds, to the extent of one half of the net balance of the Loan proceeds above referred to may, at the discretion of the Ministry of Posts and Communications, be deposited in a Hukuang Government Railways Account with the Bank of Communications (Chiao-Tung Bank) and/or with the Ta-Ching Government Bank, which Banks have been designated by the Ministry of Posts and Communications as its Agents for this purpose, and the Imperial Chinese Government hereby declares itself responsible for all the funds of this Loan deposited with the said Chinese Banks.

The Ministry of Posts and Communications shall from time to time make transfers from the loan funds held in China by the Banks and by the designated Chinese Banks to the credit of a construction account for the Hupei section of the Szechuan-Hankow Railway Line with the Deutsch-Asiatische Bank and of a construction account for the Hupei-Hunan section of the Canton-Hankow Railway Line with the Hongkong and Shanghai Banking Corporation, in amounts sufficient to cover one month's construction estimates in advance, so as to insure the uninterrupted continuance of construction. The Ministry of Posts and Communications shall hand to the Banks, for the information of the Auditors (hereinafter referred to) quarterly statements of the loan funds held on deposit by the aforesaid designated Chinese Banks, and these funds shall not be withdrawn from the said Banks except for the purpose of transfer to the construction accounts above named. Funds shall be drawn from these construction accounts in sycee by the Managing Director as hereinafter provided, and it will rest with the Managing Director under the instructions of the Ministry of Posts and Communications to make all necessary arrangements for the distribution of such funds through Chinese Banks or otherwise to the points where they are required.

Requisitions upon these Construction Accounts will be drawn in amounts to suit the progress of construction of the railway lines by orders upon the Deutsch-Asiatische Bank or the Hongkong & Shanghai Banking Corporation signed by the Managing Director of the line concerned or, in his absence, by his duly authorized representative, who shall, moreover, two days previous to the presentation of such order, issue in duplicate a certificate stating clearly the object for which the funds are to be drawn, handing one copy to the Auditor concerned (hereinafter referred to) and one copy to the Bank concerned. If the Auditor should find that there are irregularities in the payments to be made, he may in the first place ask the Managing Director for specific explanations, and if the Managing Director is unable to furnish definite explanations, the Auditor may refer the matter to the Ministry of Posts and Communications for its instructions.

The accounts of the Railways shall be kept in Chinese and English in accordance with accepted modern methods, and will be supported by all necessary vouchers. During the period of construction the said accounts and vouchers will be open at any time to the inspection of two Auditors for the Hupei-Hunan section of the Canton-Hankow Railway Line, and the Hupei section of the Szechuan-Hankow Railway Line respectively, appointed and paid by the Banks, whose duty it will be to satisfy the Banks as to the due expenditure of the loan funds in accordance with the provisions of Article III of this Agreement, and to certify to monthly statements of the foreign materials purchased by the Railway Administration under the provisions of Article XVIII hereinafter. The Railway Administration will publish annually upon the close of its financial year a Report in the Chinese and English languages, showing the working accounts and traffic receipts of the railways, which Reports shall be procurable by the public on application.

ARTICLE XV

If after the deduction of the amount required for the redemption of the Gold Bonds referred to in Article II of this Agreement, and of the sums necessary for the service of interest on the Loan during the time of construction, the balance of the Loan proceeds, with accrued interest, should not be sufficient to complete the construction and equipment of the railway lines named in Article II of this Agreement, the amount of deficiency shall be provided, in the first place, from such Chinese funds, as may be available so as to permit of the uninterrupted continuance of the work of construction, and any balance then uncovered shall be supplemented by the issue by the Banks, under the terms of the present Agreement, of a second series of the present Loan, for an amount not exceeding Four Million Pounds (£4,000,000) Sterling. This second series shall be secured pari passu as an equal charge in every respect on the internal revenues specified in Article IX of this Agreement, and the time of its issue shall be left to the discretion of the Banks. Should foreign capital still be required for the completion of the Railway Lines aforesaid it shall be provided by a further loan to be issued by the Banks on terms to be arranged. If after the completion of the lines there should be a balance at the credit of the Railways Account, such unused balance will be transferred to the credit of the Interest Reserve Fund, hereinafter mentioned in Article XX, as a provision for payments for which the Imperial Chinese Government is responsible under this Agreement, or will be devoted, if necessary, to the improvement of these railways or otherwise to their advantage.

ARTICLE XVI

If before the publication of the Prospectus for the issue of the Loan any political or financial crisis should take place by which the markets and the prices of existing Chinese Government Stocks are so affected as to render, in the opinion of the Banks, the successful issue of this Loan impossible on the terms herein named, the Banks shall be granted a reasonable extension of time for the performance of their contract. If within this time limit, to be arranged, the Loan shall not have been issued, then this contract shall become null and void, and any advances made by the Banks under the provisions of Article III of this Agreement, shall be repaid by the Chinese Government with accrued interest, but without any other compensation or remuneration whatsoever.

ARTICLE XVII

The construction and control of the railway lines shall be entirely and exclusively vested in the Imperial Chinese Government. For the work of construction the Imperial Chinese Government will select for appointment a fully qualified British Engineer-in-Chief for the Hupei-Hunan section of the Canton-Hankow railway line from Wuchang to Yichang-hsien, and a fully qualified German Engineer-in-Chief for the Kuangshui-Ichang section of the Szechuan-Hankow railway line, with a fully qualified American Engineer-in-Chief for the section of that line from Ichang to Kueichoufu at the same time informing the Banks of the selection made. If the Banks have objections to offer against the Engineers-in-Chief thus selected for appointment, they shall, in stating their objections, give definite reasons therefor. The said Engineers-in-chief shall be under the orders of the Director General and the Managing Directors of the respective lines or, in their absence, of their duly authorized representatives, and will carry out all the wishes of the

Ministry of Posts and Communications with regard to the plan and construction of the lines. In their general conduct they shall pay all due respect to the Ministry of Posts and Communications, the Director General and the Managing Directors. The terms of their respective agreements will be arranged by the Ministry of Posts and Communications.

Whenever appointments are to be made or functions defined of the technical members of the railway staff, as well as in the case of their dismissal, the Director General, the Managing Director or, in his absence, his duly authorized representative, will act in consultation with the Engineer-in-Chief concerned, and in the case of disagreement the matter will be referred to the Ministry of Posts and Communications, whose decision shall be final.

After completion of construction, and during the currency of this Loan, the Imperial Chinese Government will continue to employ Europeans and/or Americans as Engineers-in-Chief of the said railway lines, these appointments being made without reference to the Banks.

ARTICLE XVIII

For the Hupei-Hunan section of the Canton-Hankow railway line, and the Hupei section of the Szechuan-Hankow railway line respectively (a) The British & Chinese Corporation, Limited, and (b) the Deutsch-Asiatische Bank will act as Agents of the Railway Administration during construction for the purchase of all materials, plant and goods required to be imported from abroad. From this category rails and their accessories are excepted; for the purchase of which the Ministry of Posts and Communications has memorialized the Throne recommending that they should be manufactured and supplied by the Hanyang Iron Works. Their price will be settled by the Ministry of Posts and Communications with the Hanyang Iron Works, after comparison with the current quotations for rails purchased by other lines from Europe or America. No delay will be allowed, and it is understood that if the Hanyang Iron Works are unable to supply the requirements of the lines in question in such manner as to insure uninterrupted construction, the Purchasing Agents will be instructed to procure from abroad the additional supplies required. For all important purchases of materials tenders shall be called for by the Director General or the Managing Director concerned: in the case of all tenders, indents and orders for the importation of goods and materials from abroad, the said Agents shall purchase the material required on the terms most advantageous to the railways, and shall charge the original net cost of the same, plus a commission of five per cent (5%). It is understood that no orders for materials shall be executed or any expenditure incurred without due authorization by the Managing Director concerned.

In return for payment of commission as above stated the British & Chinese Corporation, Limited, and the Deutsch-Asiatische Bank as Agents for the respective railway lines, shall be prepared to superintend the purchase of all foreign materials required for their construction and equipment, which shall be purchased in the open market at the lowest rate obtainable, it being understood that all such materials shall be of good and satisfactory quality and that the aforesaid Agents will avail themselves of the services of engineering experts to be selected by the Ministry of Posts and Communications for the inspection of such materials. The fees of these Inspectors shall be borne in equal shares by the Ministry of Posts and Communications and the Purchasing agents. At equal rates and qualities goods of British, French, German and American manufacture shall be given impartial preference over other goods of foreign origin. The Railway Administration of the Ministry of Posts and Communications reserves the right, while paying the above stipulated commission to the said Agents in respect of all purchases of foreign materials, to avail itself of the services of other Agents in China, or abroad, should it see fit to do so.

The most favorable shipping and insurance rates are to be secured and statements thereof together with original invoices and Inspectors' certificates are to be submitted to the Director General and the Managing Director concerned: all return commissions and rebates of every description shall be credited to the railways, and all purchases made by the Agents on behalf of the railways shall be supported by manufacturers' original invoices and Inspectors' certificates. No commission shall be paid to the Agents except as above provided; but it is understood that the Railway Administration shall provide out of railway funds for the remuneration of Consulting Engineers whenever their services are engaged.

With a view to the encouragement of Chinese industries, preference will be given, at equal prices and qualities, over British, French, German, American or other foreign goods to Chinese materials and goods manufactured in China, such cases being left to the decision, in consultation with the Engineers-in-Chief, of an Inspector appointed by the Ministry of Posts and Communications. No commission will be paid on purchases of such Chinese materials and goods.

It is understood and agreed that, after the construction of the lines is completed, the British & Chinese Corporation, Limited, and the Deutsch-Asiatische Bank will be given the preference for Agency business for the respective lines, during the currency of the Loan, for the supply of foreign materials which the Railway Administration may require, on terms to be hereafter mutually agreed upon.

ARTICLE XIX.

Should the Imperial Chinese Government itself hereafter consider it desirable to construct extensions in connection with the railway lines named in Article II of this Agreement in order that the interests of the country may be better served, such extensions shall be built by the Imperial Chinese Government with funds at its disposal from Chinese sources, but if foreign capital is required, and the terms offered by the Banks are as favorable as those offered by others preference will be given to the Banks.

ARTICLE XX.

After payment of interest and repayment of principal of this Loan for any current year, the Railway Administration will deposit with the Banks in Shanghai or Hankow any surplus of the net revenue of the railway lines for that year up to the amount required to pay the following year's instalments of interest on the Loan the rate of interest on the deposit being arranged with the Banks from time to time with due regard to the conditions of the market.

ARTICLE XXI

All expenses in connection with the flotation and issue of this Loan, such as underwriting, commission and brokerage, telegraph charges, advertising, postage, engraving and printing of Prospectus and bonds, stamp and legal fees, shall be borne by the Banks.

ARTICLE XXII

The Deutsch-Asiatische Bank, The Hongkong & Shanghai Banking Corporation, the Banque de l'Indo-Chine and the American Group shall take the Loan in equal shares and without responsibility for each other.

ARTICLE XXIII

The Deutsch-Asiatische Bank, the Hongkong & Shanghai Banking Corporation, the Banque de l'Indo-Chine and the American Group may, subject to all their obligations under this Agreement, transfer or delegate all or any of their rights, powers and discretions hereunder to any German, British, French or American Company, Directors or Agents, with power of further transfer and sub-delegation; such transfer, subtransfer, delegation or sub-delegation to be subject to the approval of the Ministry of Posts and Communications.

ARTICLE XXIV

This Agreement is signed under the authority of an Imperial Edict dated the twenty-second day of the fourth month of the third year of the Emperor Hsuan T'ung corresponding to the twentieth day of May, 1911, Western Calendar, which will be officially communicated to the Ministers of Great Britain, France, Germany and the United States of America in Peking by the Wai Wu Pu.

ARTICLE XXV

Eight sets of this Agreement are executed in English and Chinese, four sets to be retained by the Imperial Chinese Government and four sets by the Banks. In the event of any doubt arising regarding the interpretation of the contract the English text shall rule.

Signed at Peking by the Contracting Parties this twenty second day of the fourth month of the third year of the Emperor Hsu n T'ung, corresponding to the tw ntieth day of May, One thousand nine hundred and eleven, Western Calendar.

Seal of Ministry of Posts and Communications.

The Minister of Posts and Communications,
SHENG HSUAN-HUAI

For the Deutsch-Asiatische Bank,
H. CORDES.

For the Hongkong & Shanghai Banking Corporation,
E. G. HILLIER,
Agent.

Banque de l'Indo Chine
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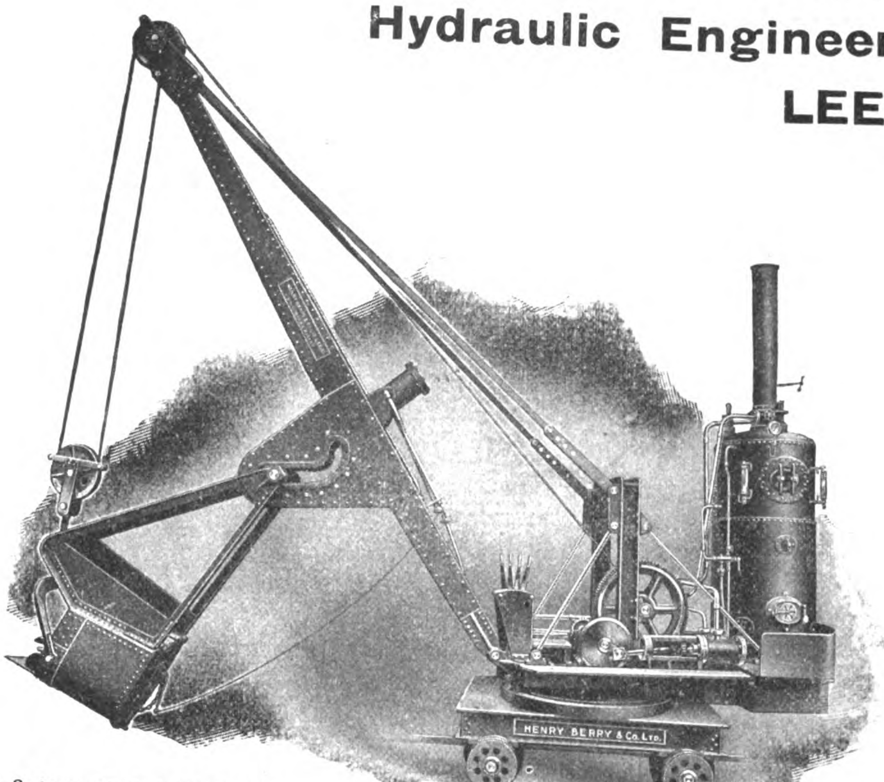

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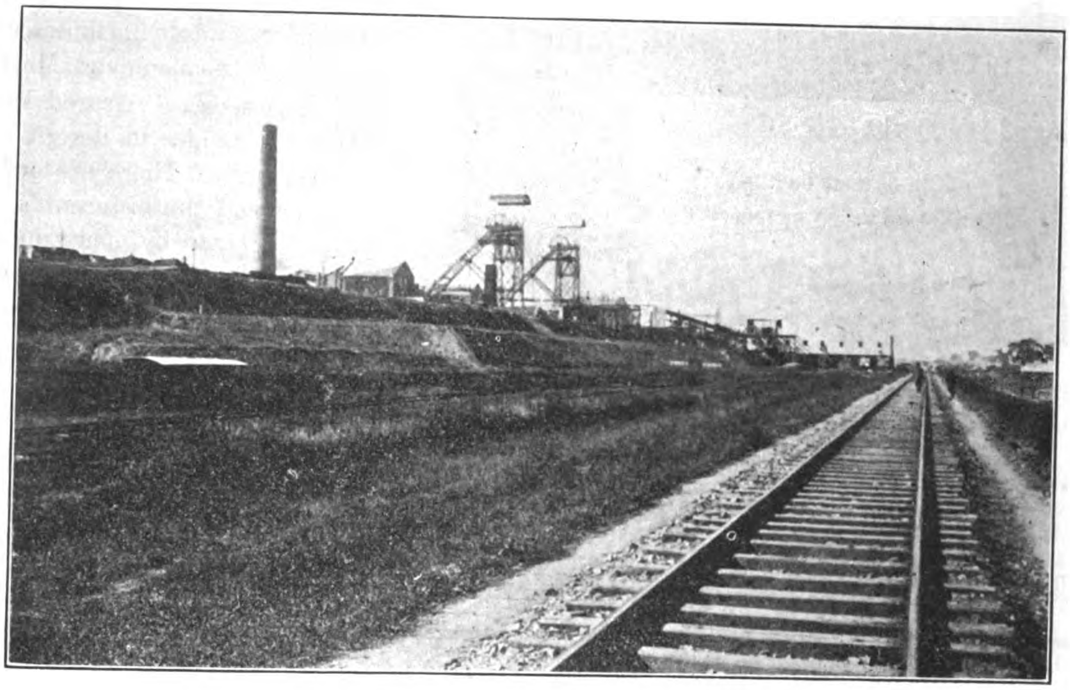

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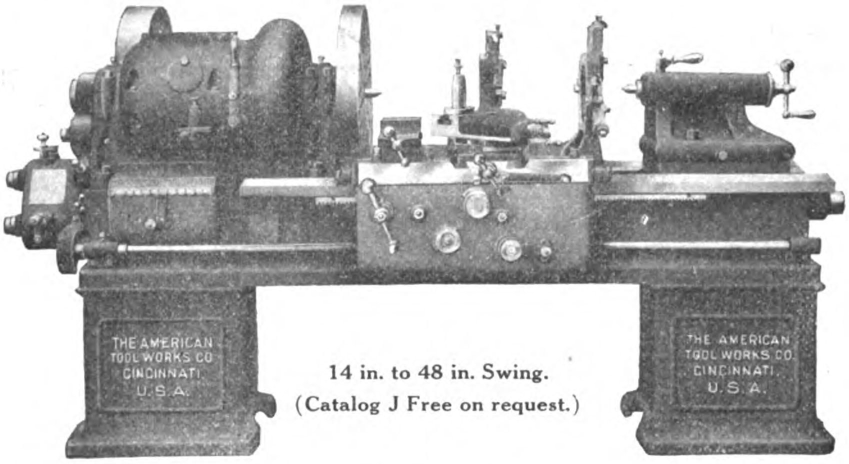

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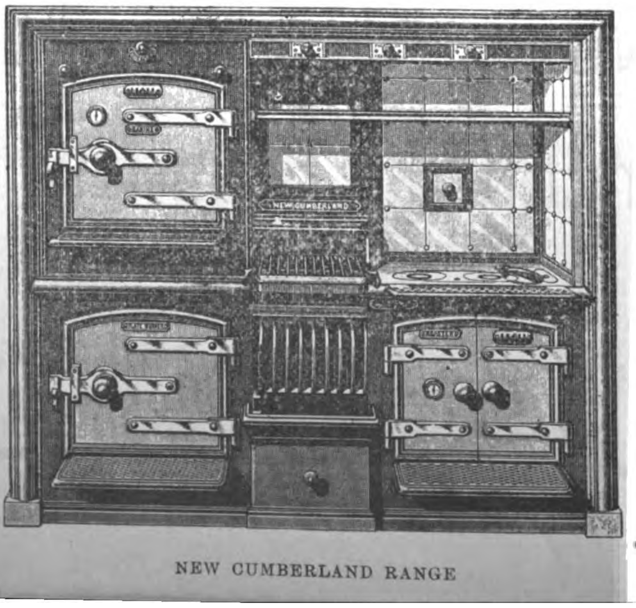

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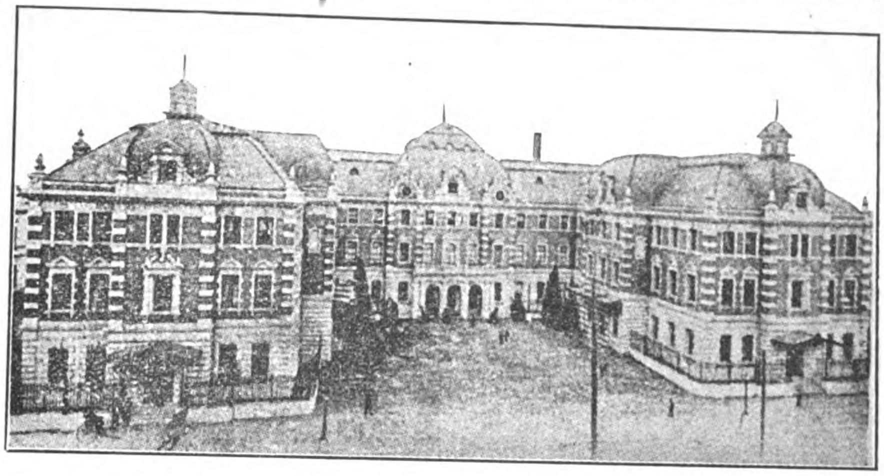

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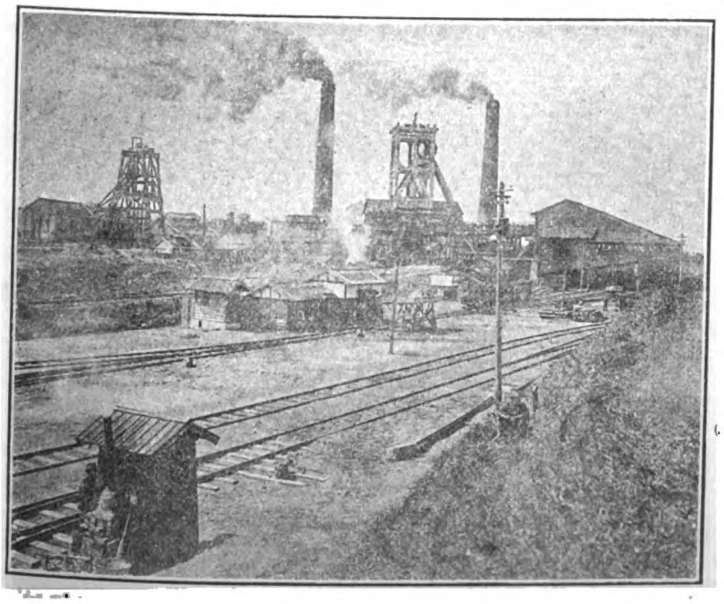
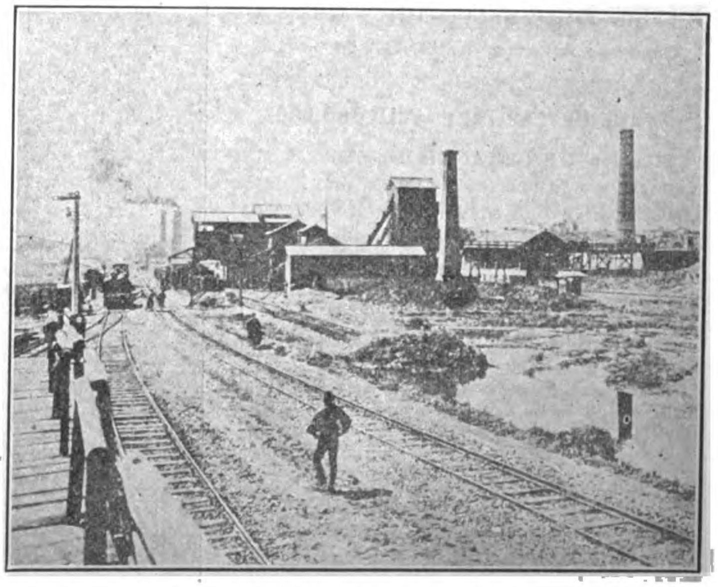
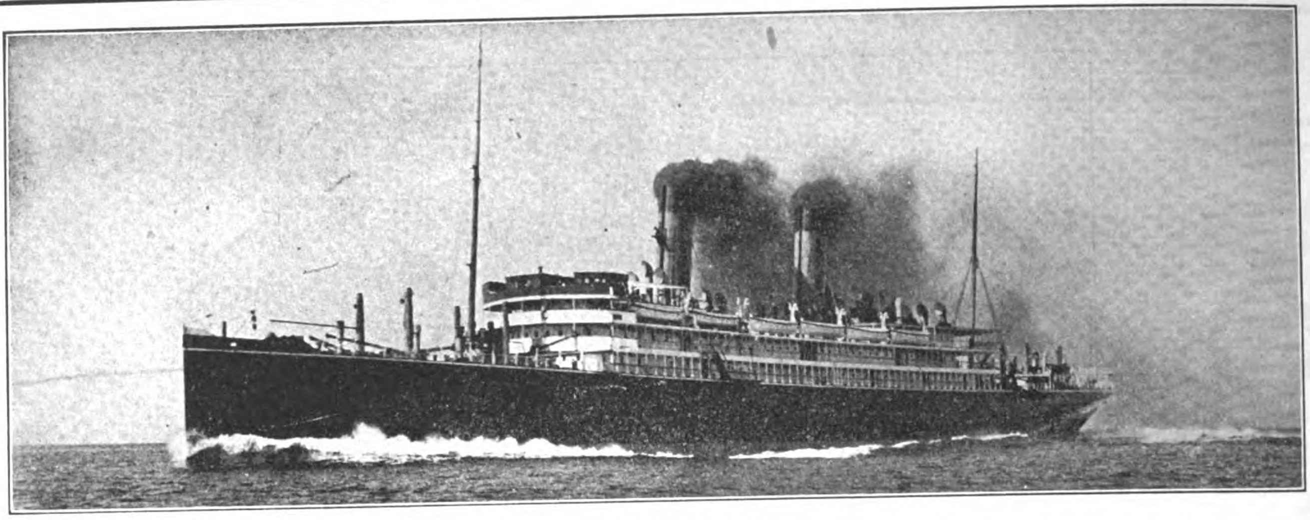


MIYANOHARA PIT, MIIKE MINE



WASHING PLANT, MIIKE MINE



S. S. "CHIYO-MARU"

TRANS-PACIFIC TURBINE DRIVEN PASSENGER STEAMER "CHIYO-MARU" FOR T. K. K.—Built and engined by the Mitsu Bishi Dockyard and Engine Works, Nagasaki, November 1908.—Length (overall), 570 feet 0"; Breadth, moulded, 63 feet 0"; Depth (shelter deck), 46 feet 6"; Gross tonnage, 13,426 tons; Displacement, 18,725 tons; Engines, Parsons' Three Shaft Arrangement; Boilers, Single Ended Scotch Boilers (13); I. H. P., 19,591; Speed, 21 knots. (This photo was taken on her full speed trials the 13th October, 1908.)

MITSU BISHI DOCKYARDS & ENGINE WORKS, NAGASAKI

DOCK NO. 1.

EXTREME LENGTH	523	FT.
LENGTH ON BLOCKS	513	,,
WIDTH OF ENTRANCE ON TOP	88	,,
,, ,, ,, ,, BOTTOM	77	,,
WATER ON BLOCKS AT SPRING TIDE	26½	,,

DOCK NO. 2.

EXTREME LENGTH	371	FT.
LENGTH ON BLOCKS	360	,,
WIDTH OF ENTRANCE ON TOP	66	,,
,, ,, ,, ,, BOTTOM	53	,,
WATER ON BLOCKS AT SPRING TIDE	22	,,

DOCK NO. 3.

EXTREME LENGTH	722	FT.
LENGTH ON BLOCKS	714	,,
WIDTH OF ENTRANCE, TOP	99½	,,
,, ,, ,, BOTTOM	88½	,,
WATER ON BLOCKS AT SPRING TIDE	34½	,,

THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST,

WITH SPECIAL FACILITIES FOR HANDLING THE HEAVIEST CASTINGS AND THE REPAIRING OR BUILDING OF SHIPS, ENGINES AND BOILERS, ALSO ELECTRICAL WORK.

LARGE STOCK OF MATERIAL, AND FITTINGS ALWAYS ON HAND

THE POWERFUL SALVAGE STEAMER "OURA-MARU" (712 TONS, 700 I. H. P.) EQUIPPED WITH NECESSARY PUMPS AND GEAR, IS ALWAYS READY AT SHORT NOTICE.

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Powerful Salvage & Towing Boats will be supplied at Shortest Notice.

All work guaranteed to be of the highest order and to be of most up-to-date improvements. All orders immediately attended to.

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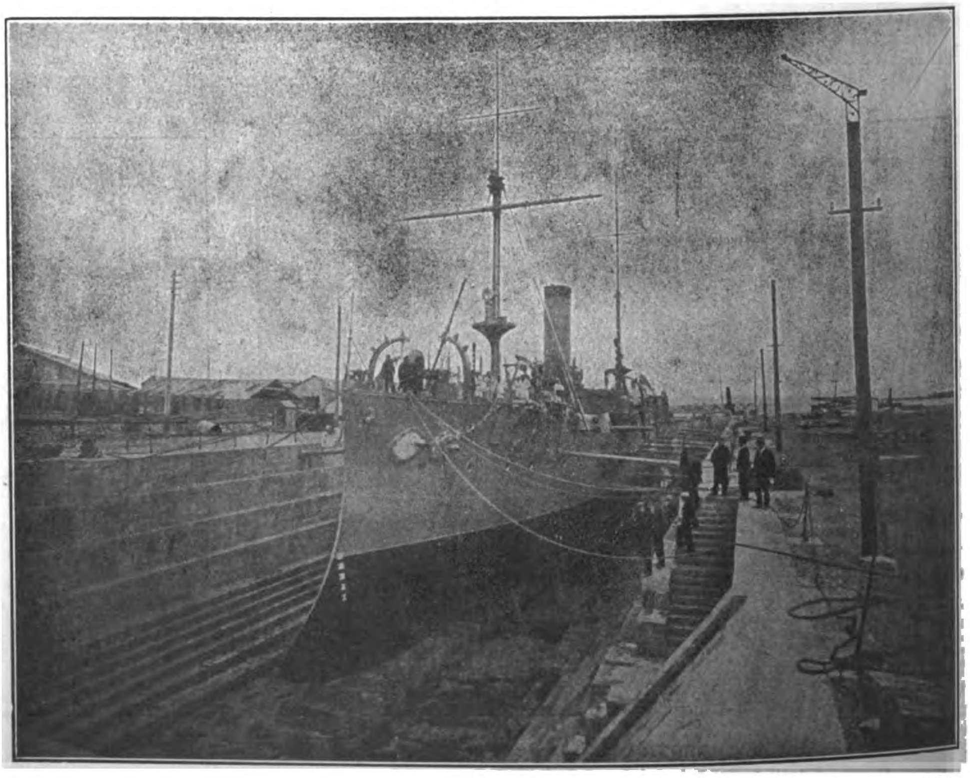
Length	380 ft.
Width	50 ft.
Depth over Sill	20 ft.

DOCKING CHARGES VERY MODERATE



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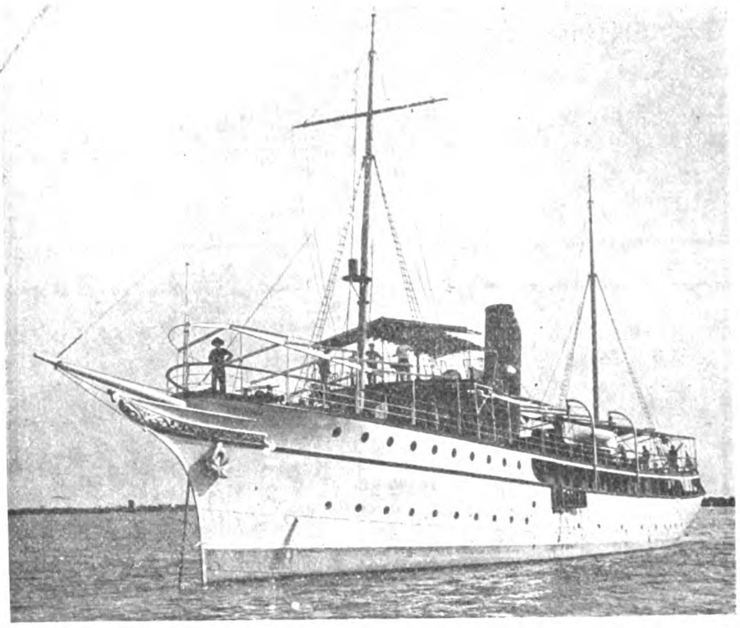

Yacht of H. I. H. Prince Hsui, Built by the Kiangnan Dock & Engineering Works.

KIANGNAN DOCK

Length over all, 385'; length on blocks, 575'; water on sill, 19'; dock entrance, top 70', bottom, 60'.

The dock accommodates the largest coasting steamers and is equipped with complete modern facilities for handling work thoroughly and promptly.

The new machine and boiler shops, and the foundry and shipbuilding plant are equal to any this side of Suez.

Patent slipway for small steamers and launches. Complete boat and launch building shops.

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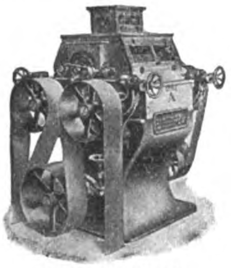

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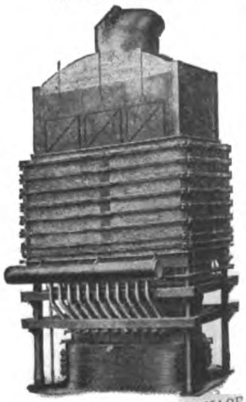
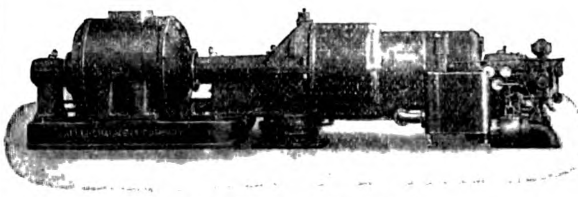


RECTANGULAR FURNACE



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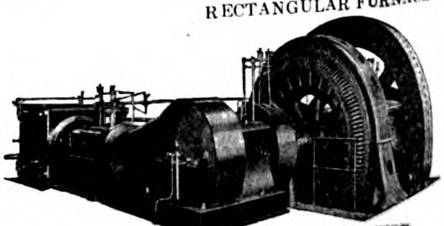
GAS ENGINE & A. C. GENERATOR



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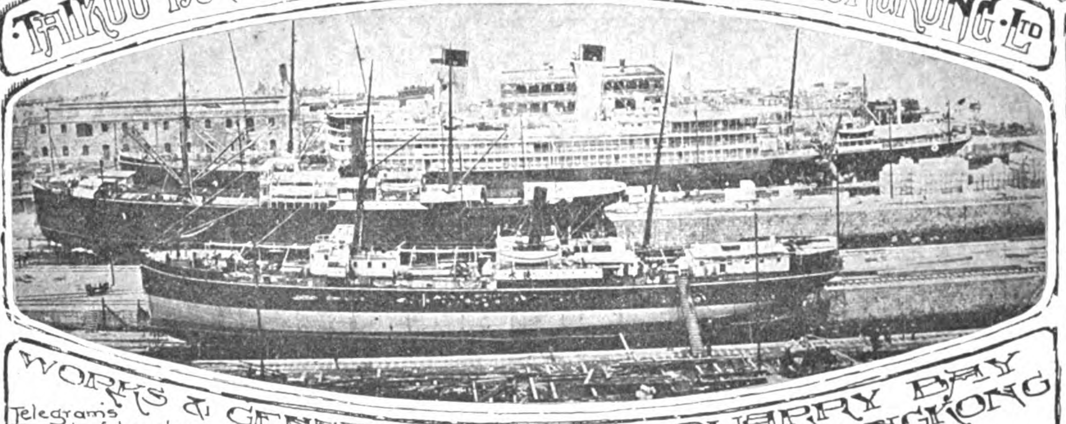
Engineers, Boilermakers, Repairers

WORKS COVER AN AREA OF 53 ACRES

DRY DOCK 787 FT. × 88 FT. DEPTH 34½ FT.

SLIPWAYS
NO. 1 1030 FT.
NO. 2 993½ FT.
NO. 3 993½ FT.



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A SECTION OF THE YARD SHOWING TURBINE STEAMSHIP "CHIYO MARU" 13,600 TONS IN DRY-DOCK, TWO COASTING STEAMERS ON SLIPWAYS, AND VESSEL LYING ALONGSIDE THE SEAWALL

THE BUILDING YARD IS LAID OUT WITH FURNACES AND PLANT SUITABLE FOR BUILDING VESSELS UP TO **20,000** TONS

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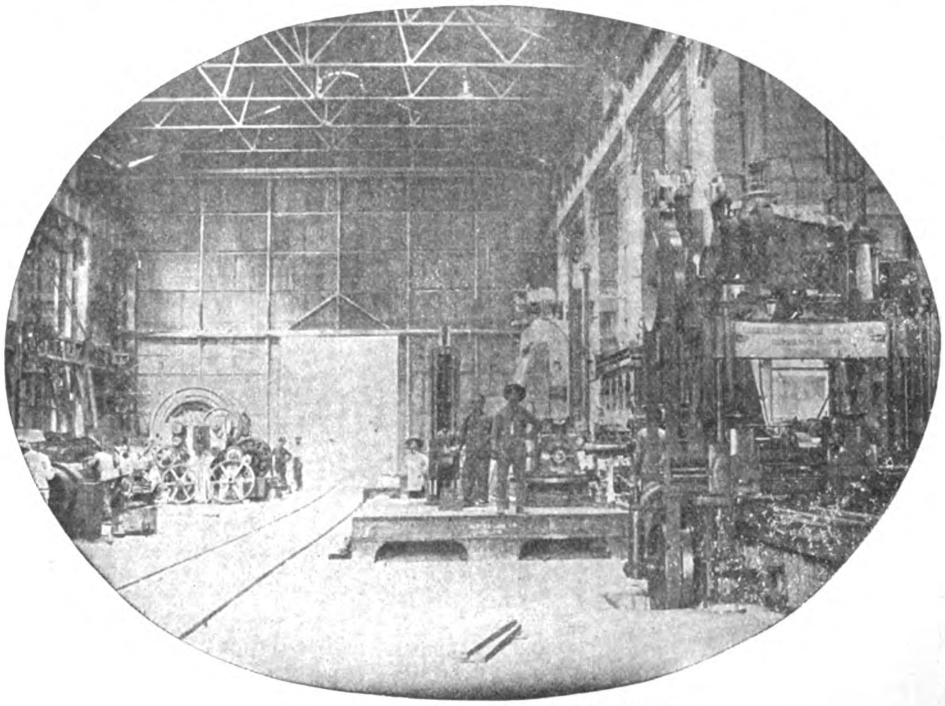

VIEW OF PORTION OF MACHINE SHOPS

GENTS IN HONGKONG, CHINA AND JAPAN
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THE POWER FOR THE ESTABLISHMENT is generated by Gas Producers, on the Mond System, supplying 4 Cockerill Gas Engines of 3,000 collective horse power, driving Electrical Generators, and is transmitted throughout the Works by means of Electrical Motors.

AN ELECTRIC DERRICK CRANE capable of lifting weights up to 100 tons, is erected on the Sea Wall, and 14 Electric Overhead Travelling Cranes ranging from 5 tons to 100 tons, are fitted throughout the Workshops.

AGENTS IN MANILA AND PHILIPPINE ISLANDS

CASTLE BROS.-WOLF & SONS

THE DOCK PUMPS consist of 2 sets of Centrifugal, Electrically driven, pumps, together capable of emptying the Dock with 35 feet of water on the Sill in 2¾ hours.

THE MACHINERY in the Engine Works is laid out for dealing with the heaviest classes of Engines.

THE SLIPWAY CARRIAGES are of the latest pattern by Morton of Leith, and the Winding Gear consists of large electrically driven winches operating massive wire cables.

TENDERS SUBMITTED AND ESTIMATES GIVEN FOR BUILDING AND REPAIRING ALL CLASSES OF VESSELS; ALSO FOR EVERY DESCRIPTION OF ENGINE AND BOILER, MECHANICAL, ELECTRICAL AND CONSTRUCTIONAL WORK

HONGKONG & WHAMPOA DOCK CO., LTD.

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Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians.

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All classes of CONSTRUCTIONAL and GENERAL ENGINEERING WORK undertaken, also LOCOMOTIVES, RAILWAY ROLLING STOCK and PLANT, BRIDGES, etc.

COAST and RIVER STEAMERS, TUG BOATS and LAUNCHES, SHALLOW DRAFT VESSELS and STERN WHEEL STEAMERS.

AUXILIARY MACHINERY for MARINE and LAND Purposes.

LAND and MARINE BOILERS of all sizes and classes.

GALVANIZING by the Electrical process.

IRON and BRASS CASTINGS of all descriptions.

FORGINGS in IRON and STEEL for SHIPS, ENGINES, and LAND WORK, large and small.

We make a specialty of HIGH SPEED MOTOR BOATS for PASSENGER and CARGO Traffic.

ALL CLASSES of COCKS, VALVES and FITTINGS in IRON and BRASS supplied.

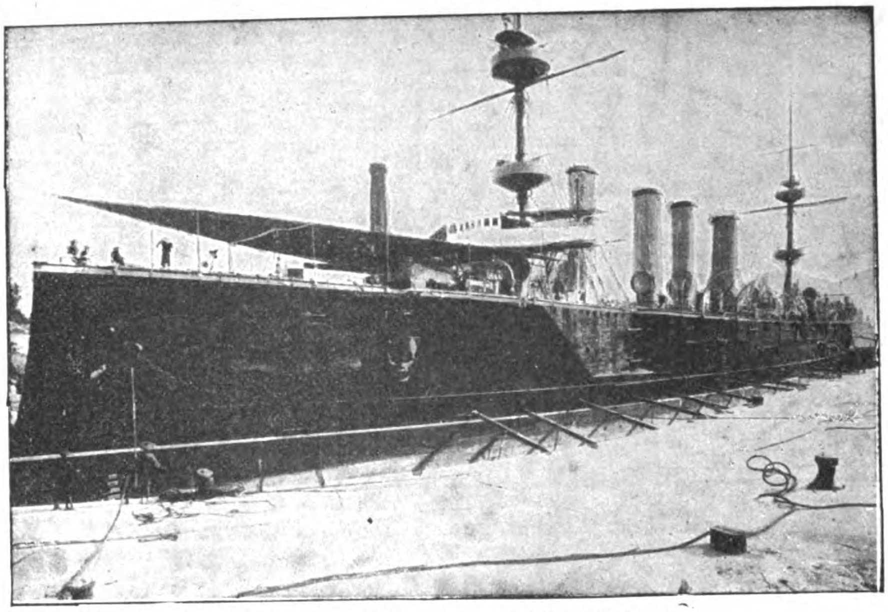
BOLTS, NUTS and RIVETS MANUFACTURED at SHORT NOTICE.

FINISHED NUTS in BRASS and IRON.

A LARGE STOCK of STEEL and IRON PLATES, BARS and ANGLES, always in hand.

The Company possesses SIX GRANITE DOCKS and TWO PATENT SLIPWAYS and these are equipped for EXPEDITIOUS WORK. Our plant is of the most modern type throughout.

Ship Owners and Captains are assured that DOCKING and REPAIRS are carried out PROMPTLY and at MODERATE CHARGES.



H. M. S. POWERFUL IN NO. 1 DOCK, KOWLOON

The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	Length on Keel Blocks	Entrance Breadth	Depth Over Sill at Ordinary Spring Tides	Rise of Tide	
				Springs	Neaps
	Feet	Feet	Feet	Feet	Feet
KOWLOON					
No. 1 Dock, Kowloon	700	86 ft. top / 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon	240	60′	14′	7′ 6″	—
Patent Slip, No. 2, Kowloon	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock	466	85′ 6″	20′	7′ 6′	—
ABERDEEN					
Hope Dock	430	84′	23′	7′ 6″	—
Lamont Dock	333	64′	16′	7′ 6″	—

Please Address Enquiries to the Chief Manager, R. M. DYER, B. Sc., M. I. N. A., Kowloon Dock, Hongkong.

Telephone No. 13 K. Head Office, Kowloon.

Town Office, Queen's Buildings Telephone No. 20, Hongkong

FINDLAY & CO.
AGENTS, MANILA, P. I.

RITER-CONLEY
MANUFACTURING COMPANY
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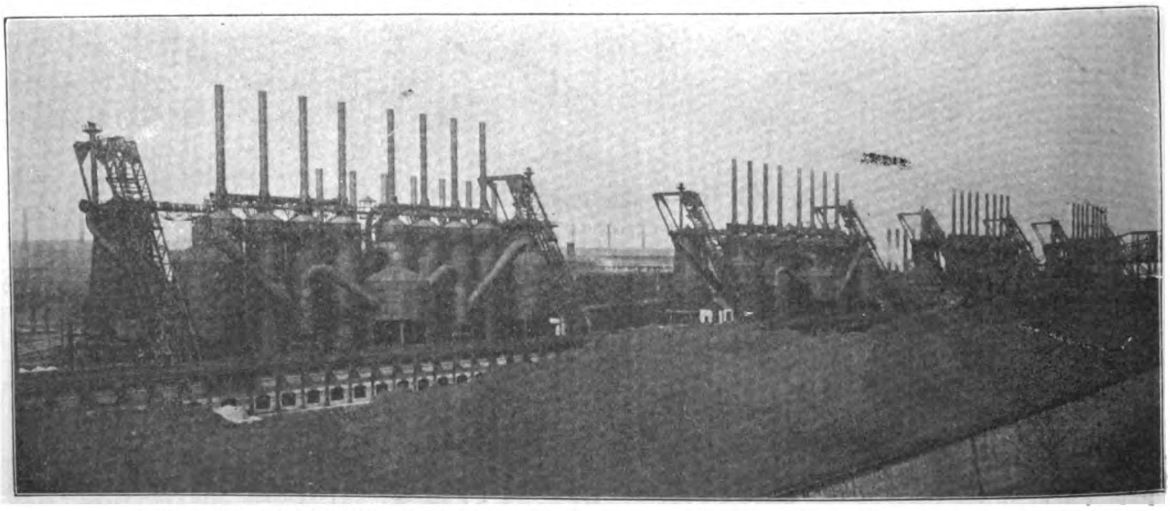

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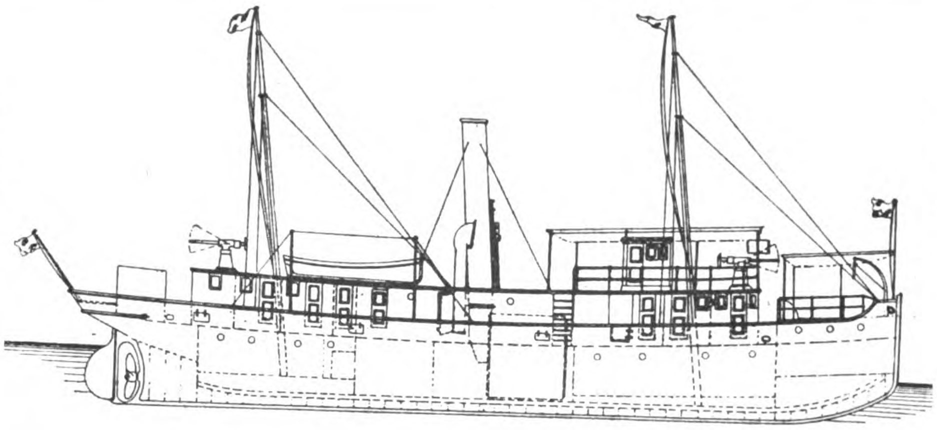

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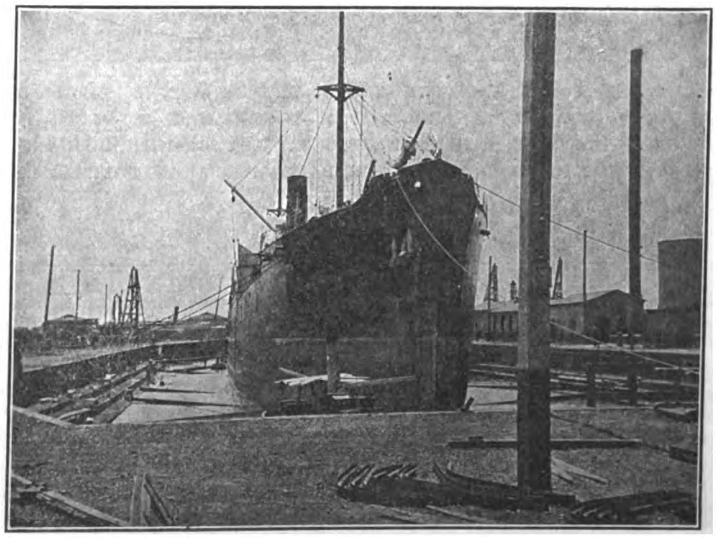
THE DOCK, WORKS AND OFFICE ARE LOCATED ON THE SHANGHAI SIDE OF THE RIVER, 15 MINUTES BY ELECTRIC TRAM FROM HEART OF THE CITY

THE WORKS ARE EQUIPPED WITH THE MOST MODERN MACHINERY, CAPABLE OF HANDLING THE LARGEST MARINE ENGINEERING WORK



VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK
LENGTH ON BLOCKS 455'0"
" OVERALL - 469'0"
WIDTH, ENTRANCE 74'0"
" SILL - - 64'0"
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21'0"
DEPTH ON 3'0" BLOCKS (H. W. O. S. TIDES) 19'0"
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
WORKSHOPS LOCATED AT HEAD OF DOCK

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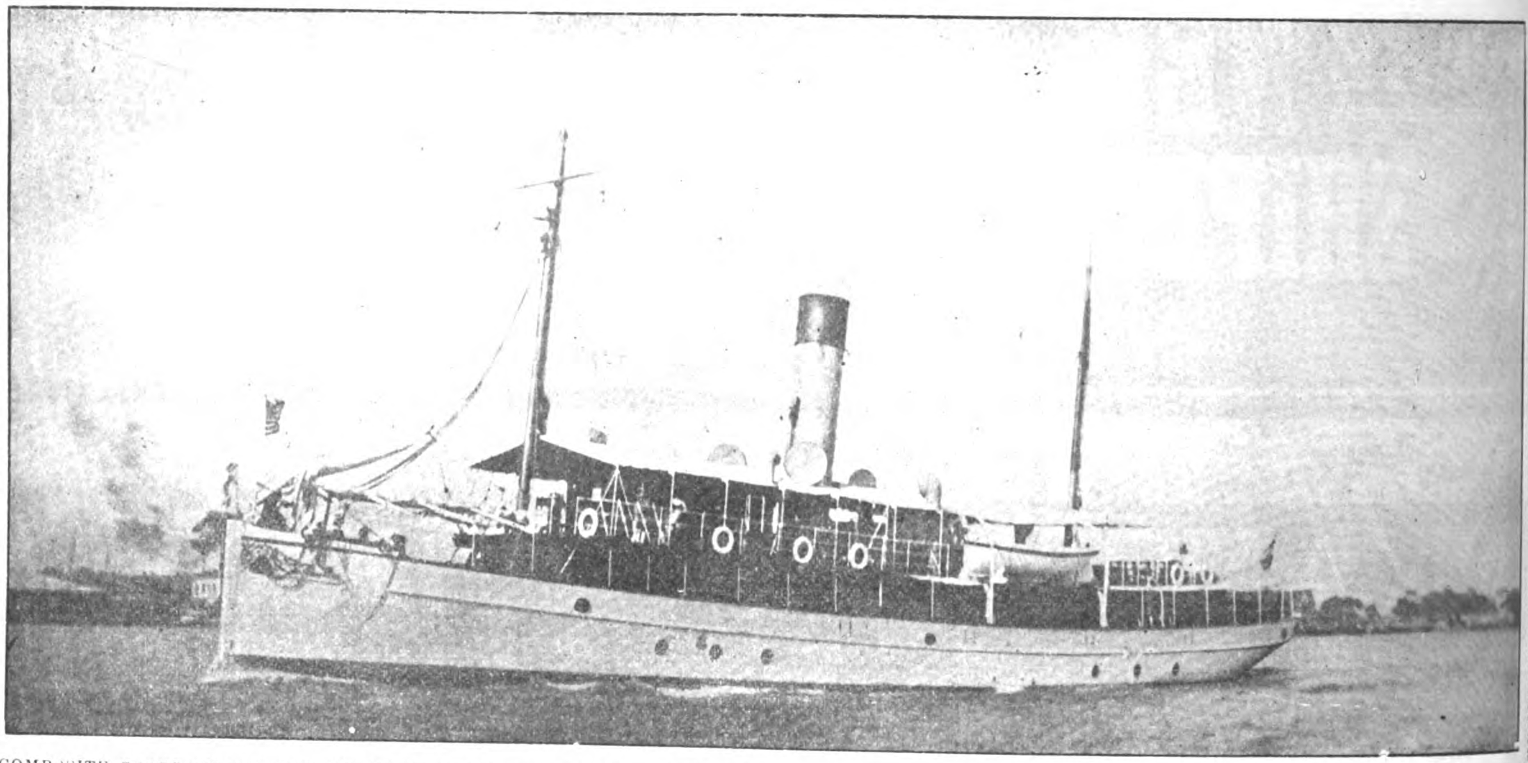

COMPOSITE COAST GUARD AND REVENUE CRUISERS FOR THE GOVERNMENT OF THE PHILIPPINE ISLANDS BUILT AND ENGINED BY THE SHANGHAI DOCK AND ENGINEERING CO. LTD.; LENGTH OVERALL—148; LENGTH B. P.—140; BREADTH—25; DEPTH—11′9″; SIZE OF ENGINES: H. P. CYLINDER—18″; L. P. CYLINDER—86′; STROKE—24″; I. H. P. 600. S. S. BALALAC, BASILAN, BUSUANGA, CORREGIDOR, LEYTE, LUZON, MASBATE, MINDANAO, MINDORO, NEGROS, PALAWAN, PANAY, POLILLO, SAMAR, TABLAS.

The Docks are five in number, ranging in length from 355 feet to 532 feet on the Blocks, and breadth of entrance from 53 feet to 77 feet, with a depth of water on the sill of from 16 feet to 24 feet.

The Dock charges are very moderate.

The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops are provided with the latest improvements in tools, traveling cranes of 60 tons' capacity, hydraulic and pneumatic machinery.

Lit up by Electric light with railway lines through workshops and yards.

A Staff of Divers, and powerful salvage appliances, can be supplied at short notice. Enquiries immediately attended to.

Estimates given for all classes of work; Coast Steamers, Side and Stern-Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools, Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and engineering accessories generally.

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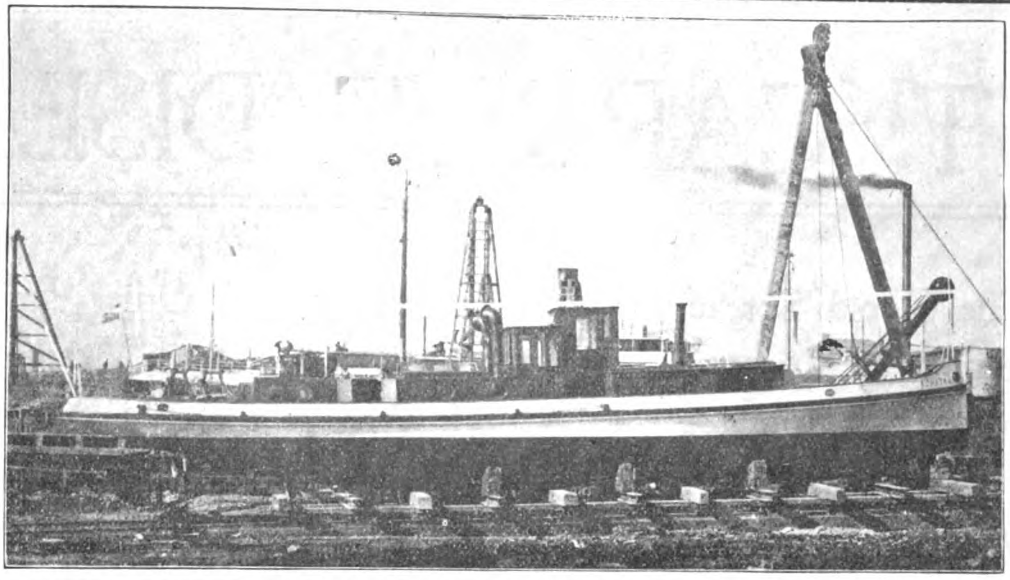

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THE WORKS are electrically driven, and are equipped throughout with up-to-date machinery and labour saving devices, including an HYDRAULIC PLANT, and appliances to undertake constructing or repairing SHIPS, ENGINES, BOILERS, etc.

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The Health of the Community

STANDARD ROAD OILS
For Allaying the Dust, Preserving the Surface and Binding the Road

Experience and experiment have demonstrated that asphalt or oil with an asphaltum base are the *only* substances successfully applied to roads to insure *permanency of dust relief* and to *maintain the roads in perfect condition.*—In our three preparations we offer products that are suitable for road construction or road maintenance.—Adapted for all conditions of roads and for use in all localities. Our free book treats of each of these three products at length, explaining the uses for which they are particularly prepared, and furnishing information which will be found invaluable to Public Works Officials, Road Engineers, Government, Colonial and Municipal authorities, and to owners of private estates.—A copy will be mailed free on request.

Asphalt Road Oil is an asphalt-bearing oil and is intended for use on well-made roads as they are. One application, if properly applied, suffices for a season. Specially adapted for the Roads and Streets of the Cities of North China.

Emulsifying Road Oil is a lighter asphalt-bearing oil so prepared that it will emulsify with water. It serves as a dust preventive, requires frequent application and is used only on side roads where traffic is light—on private grounds or parks.

Macadam Asphalt Binder is a heavy product, almost solid asphaltum, used in constructing macadam and all other roads where asphaltic material is required.

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THE AMERICAN GAS ACCUMULATOR CO.—Marine signal lighting using compressed acetylene in connection with the patented Dalen sun valve and flasher.

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We operate the only acetylene gas compressing plant in the Far East.

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WHOLESALE ONLY!

Posts, Pilings, R. R. Ties, Bridge Timber, Telegraph Poles.

Telegraph Cross Arms, and Lumber cut to dimensions.

Temporary Piles of 4 Group timber 10 to 70 ft. long.

Permanent Piles of Liusin, Molave, 10 to 70 feet long.

Total amount cut and manifested 12 months ending October 1st, 1908, 3,034,651 Board Feet.

The Harbor at Port Banga, where largest Ocean-going vessels can enter, is safe at all seasons of the year and anchorage is good. Ships always promptly loaded and we give absolute guarantee that material will be delivered alongside as rapidly as ship can take it. Ship Charter can be based on these facts. One to two ships per month calling at Port Banga makes it possible to make prompt deliveries.

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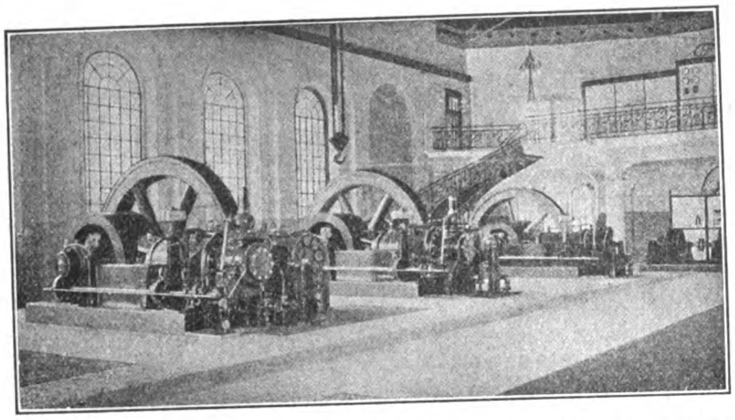

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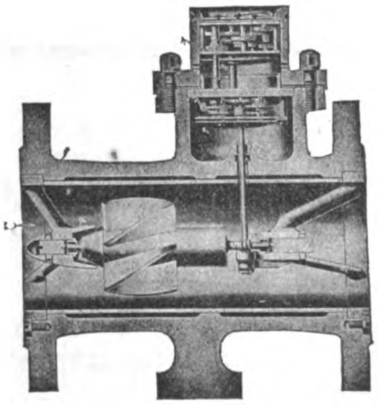

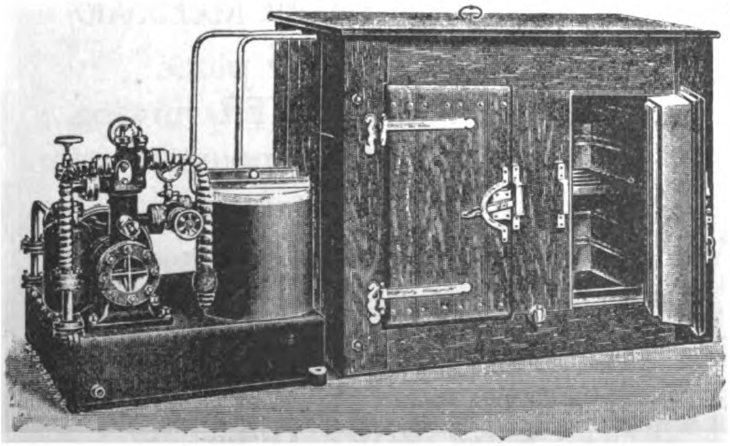

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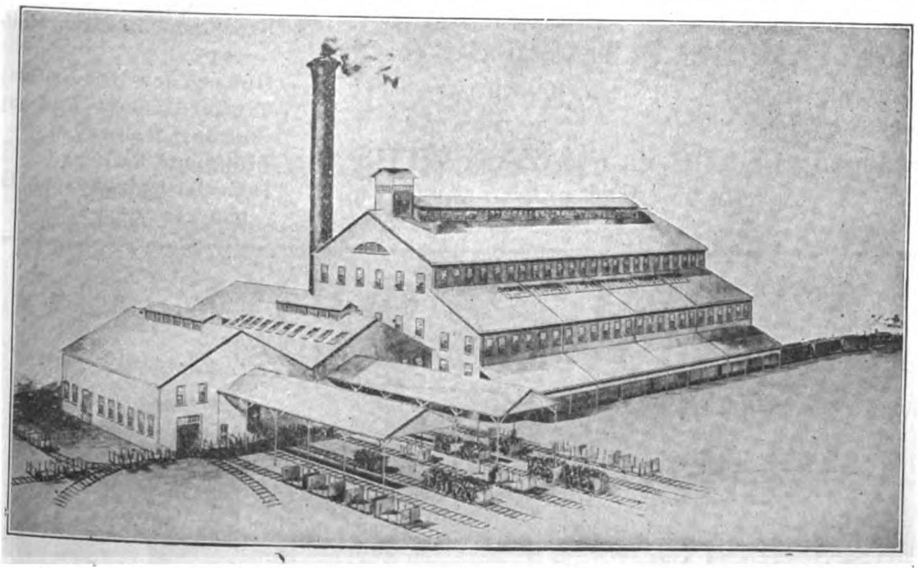

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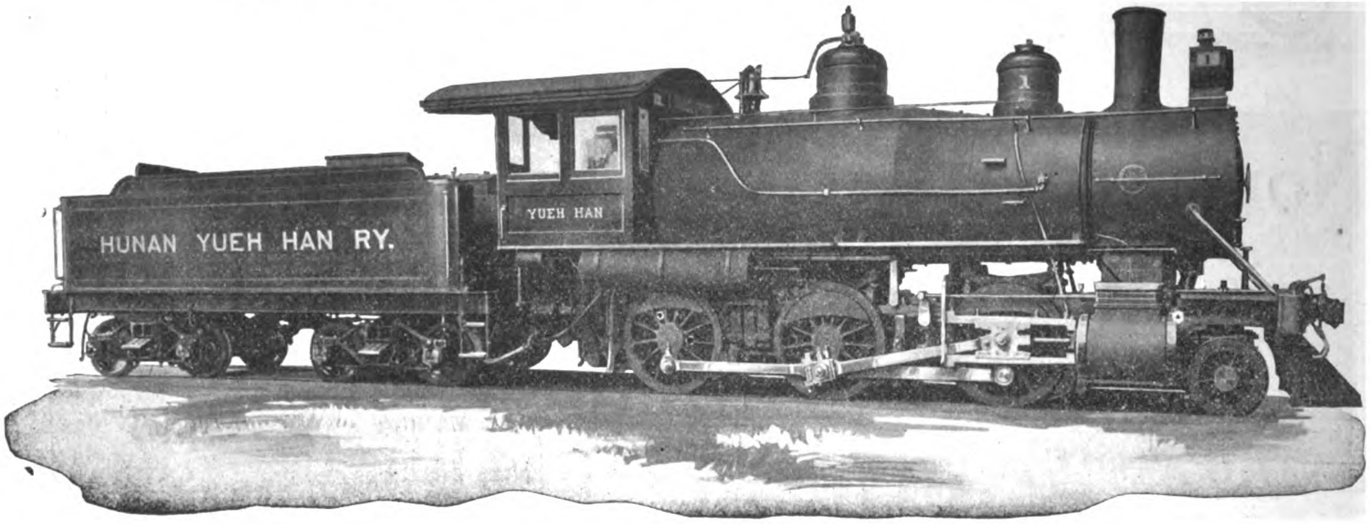

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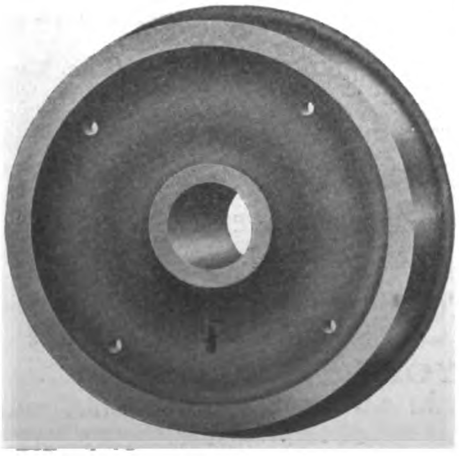

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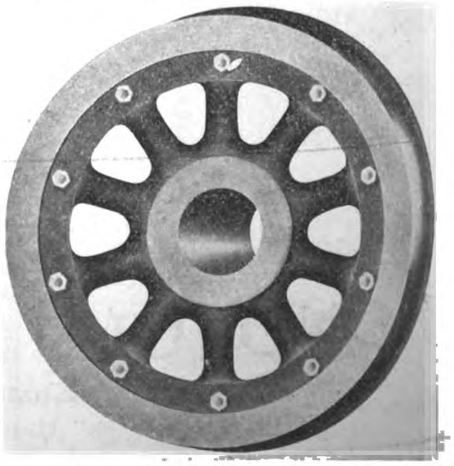

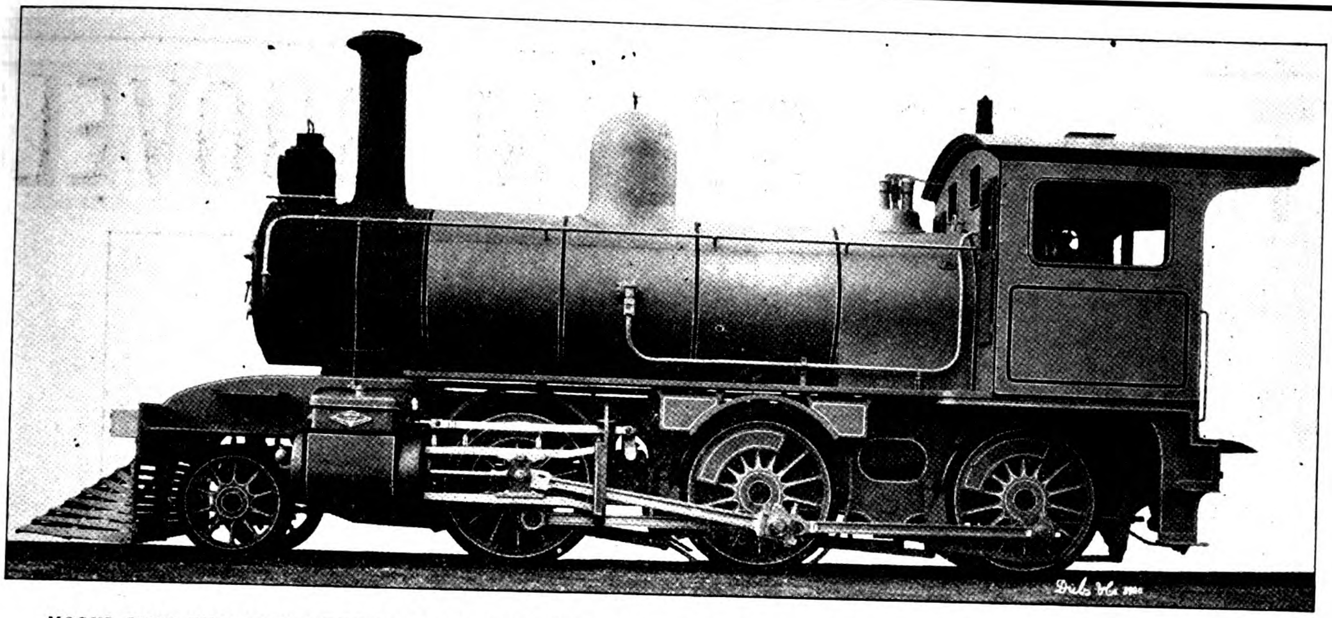

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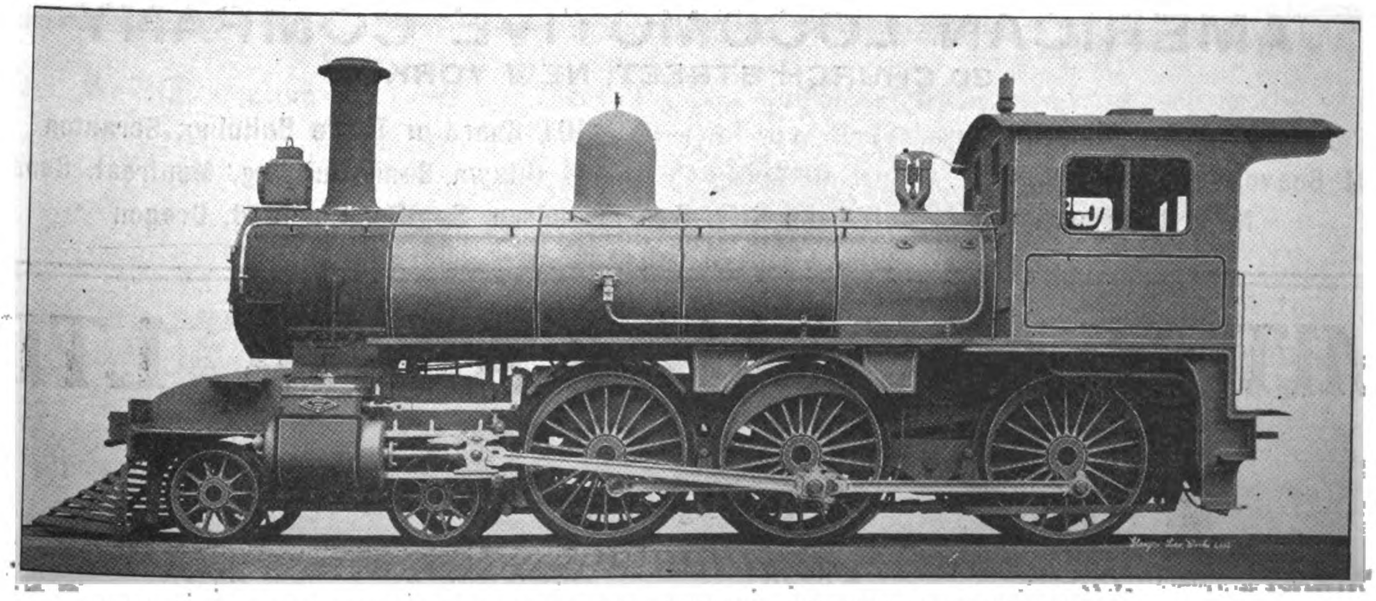

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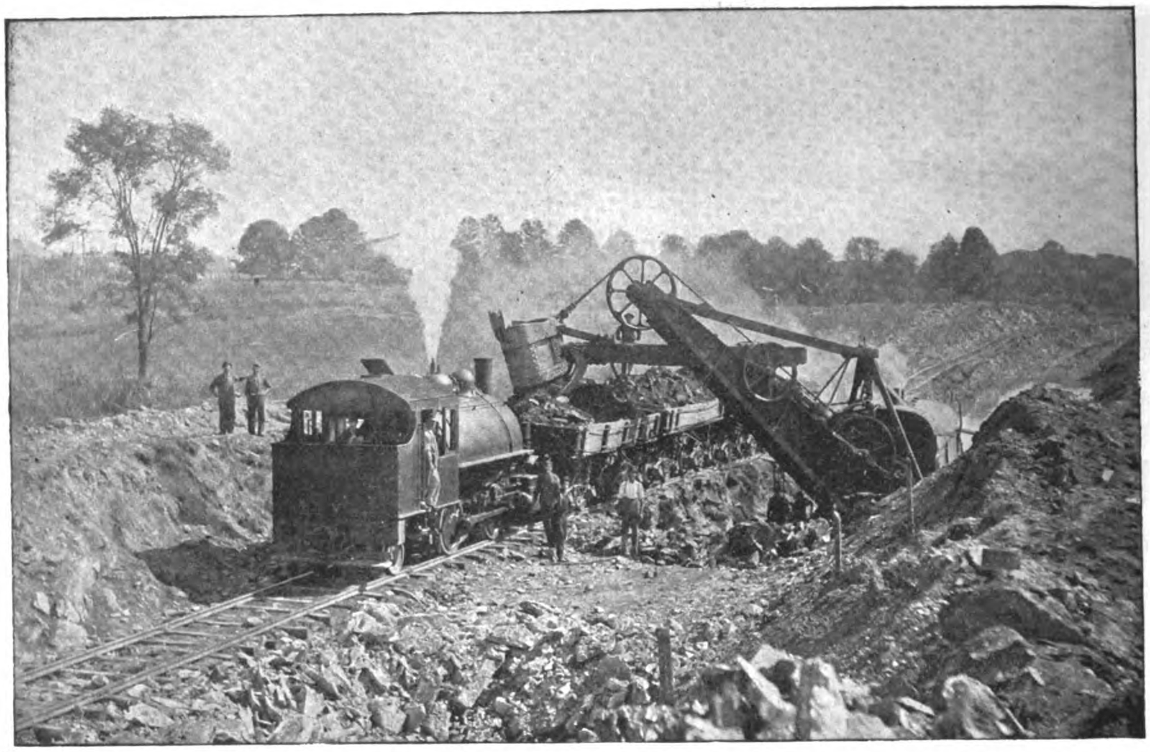

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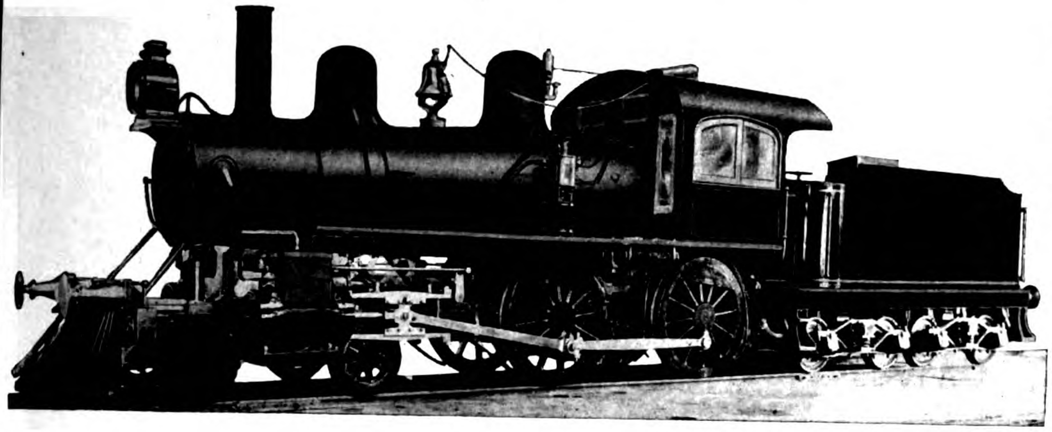

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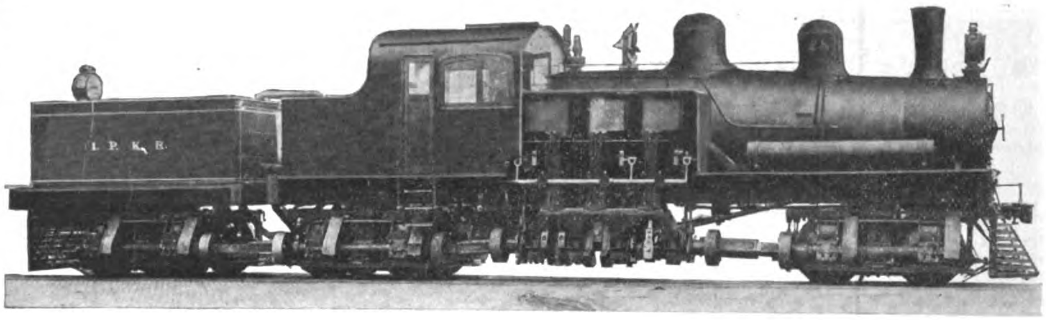

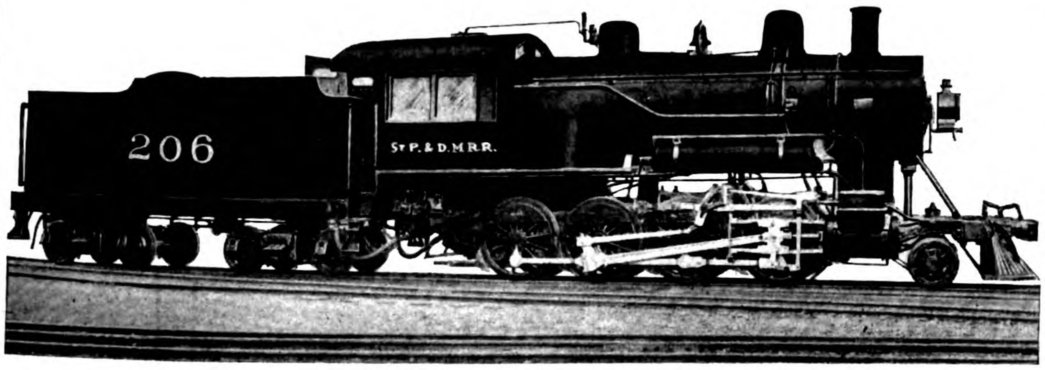

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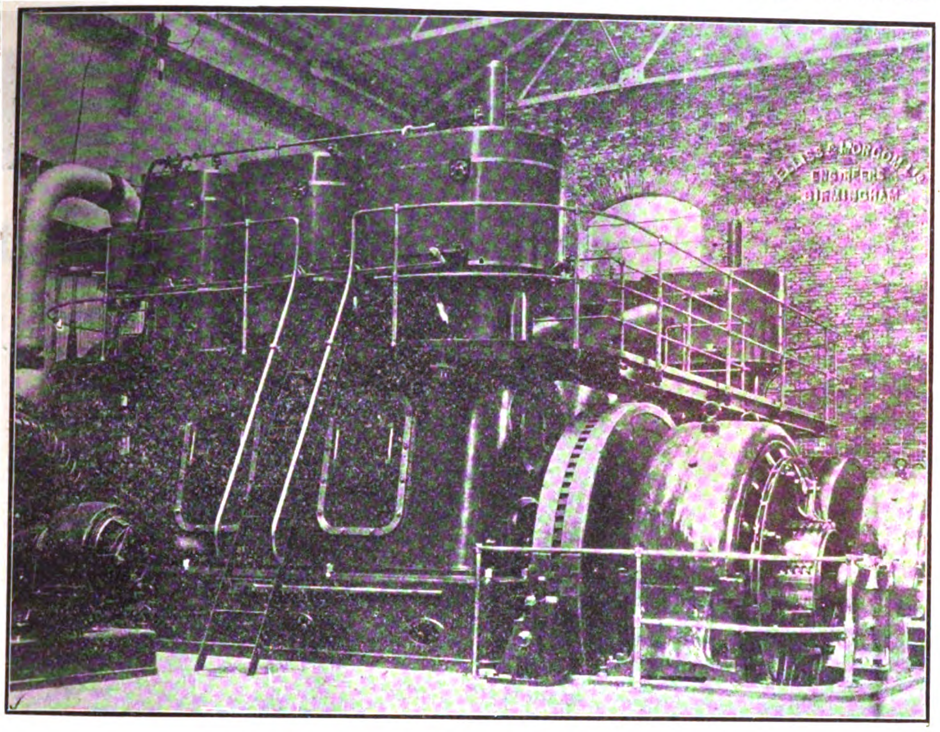

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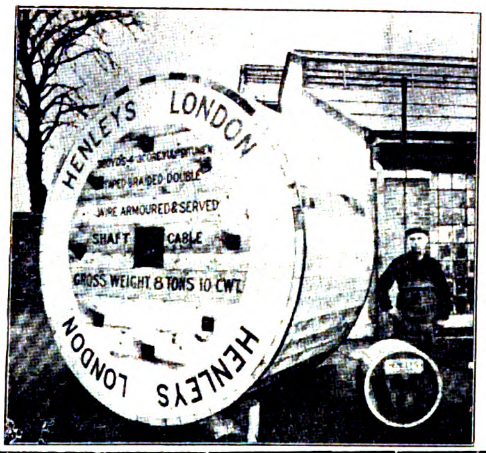

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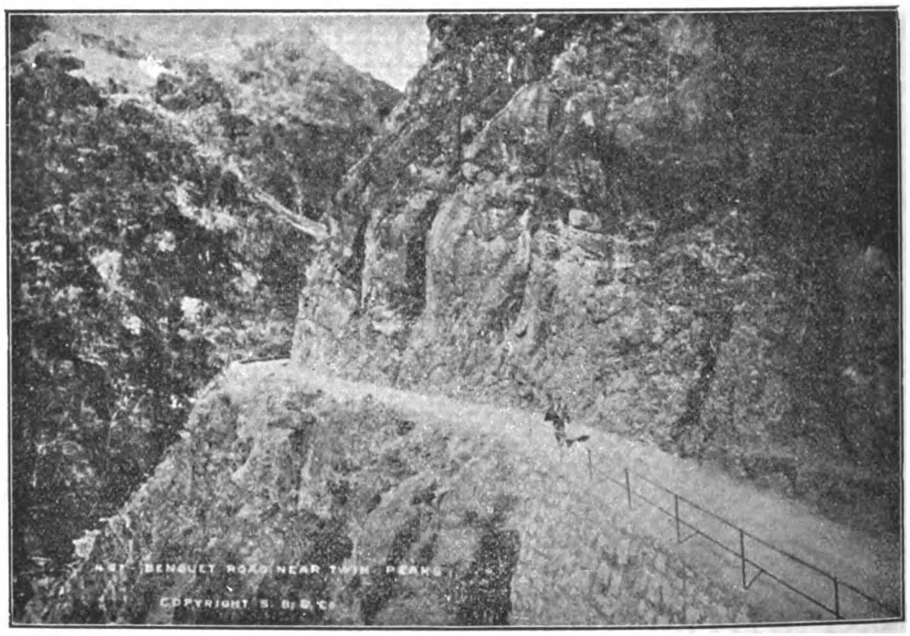

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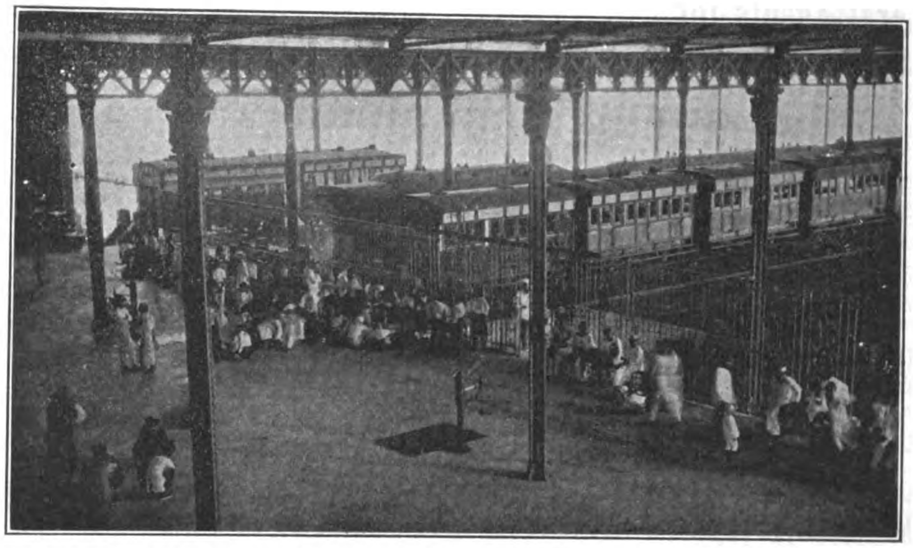
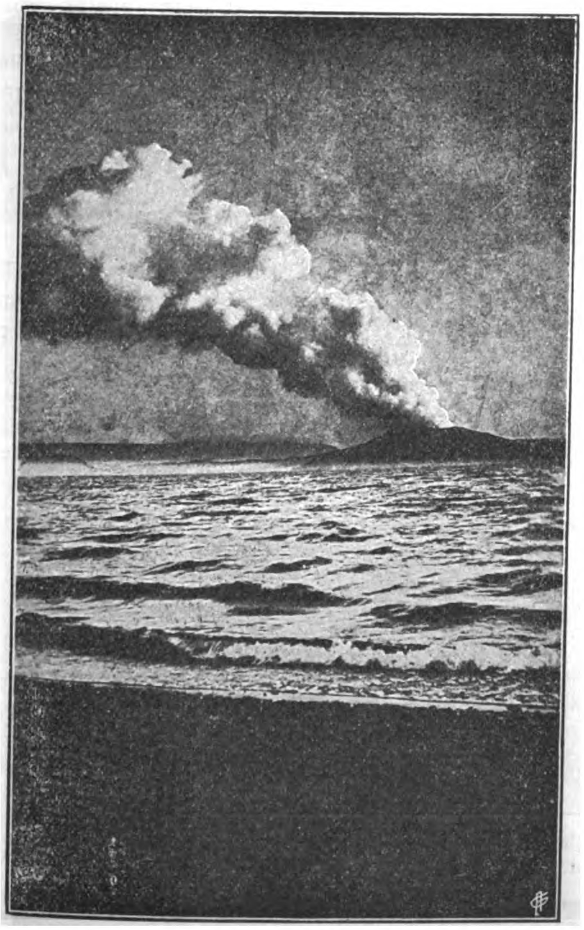


VIEW OF PASSENGER DEPOT AT MANILA, TERMINAL OF MAIN LINE MANILA RAILROAD CO



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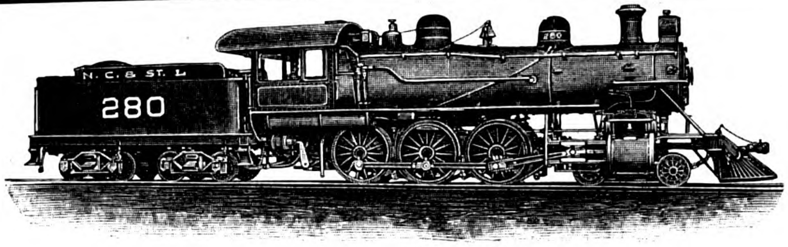
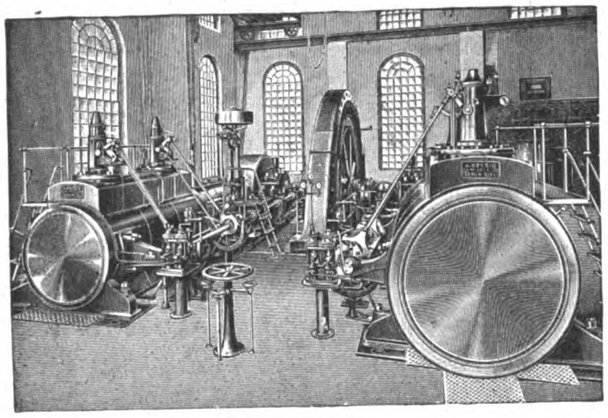
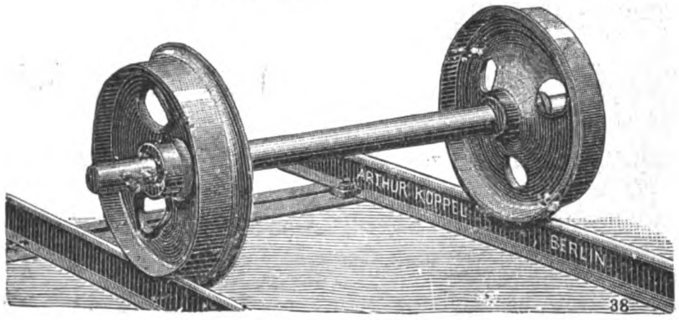


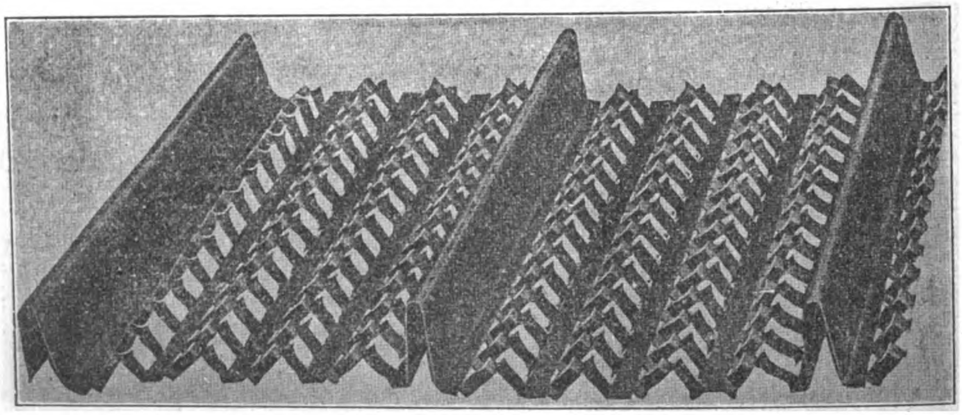
BALDWIN LOCOMOTIVE



A. E. G. ELECTRICAL PLANT



RAILWAY WHEELS AND AXLE



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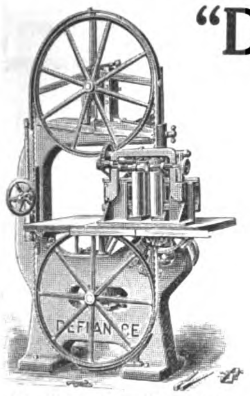

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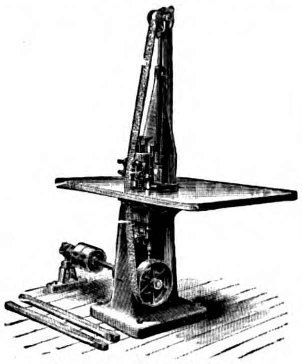
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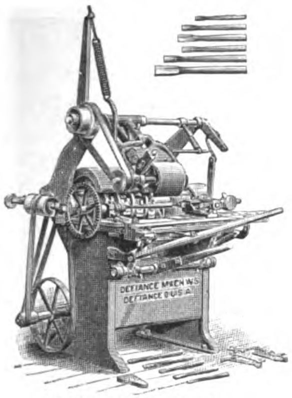
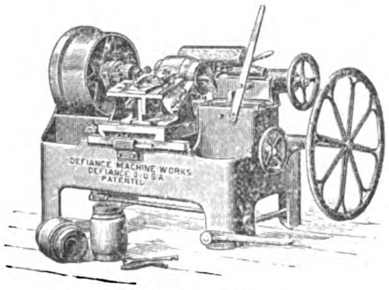
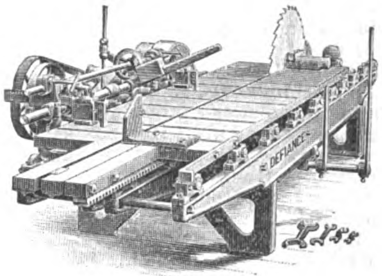
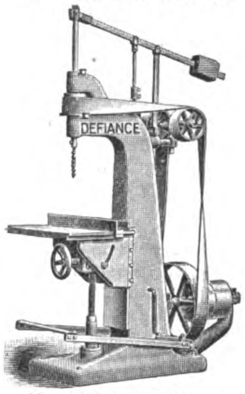

24" Handle Lathe


No. 1 Hub Lathe


No. 6 Bolting Saw



No. 6 Vertical Borer

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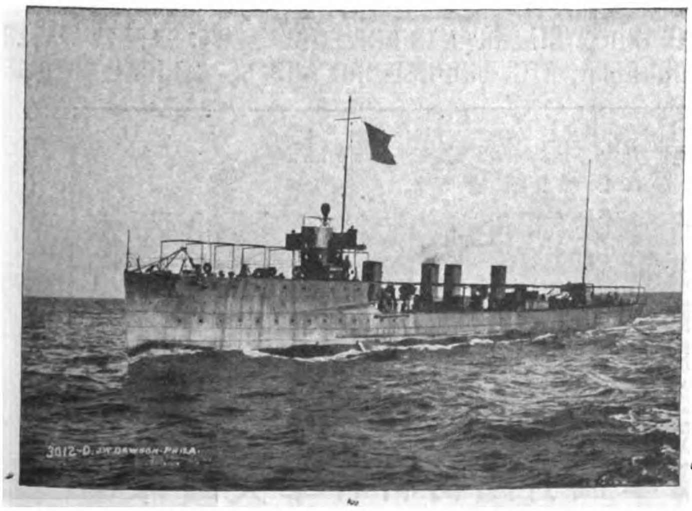
U. S. TORPEDO BOAT DESTROYER "LAMSON."
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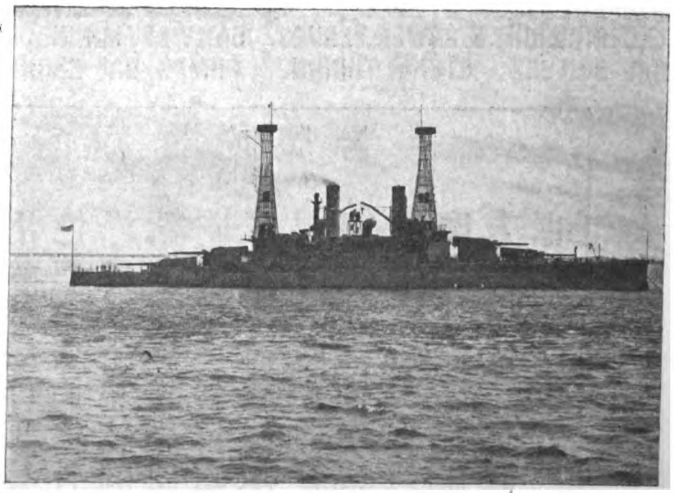
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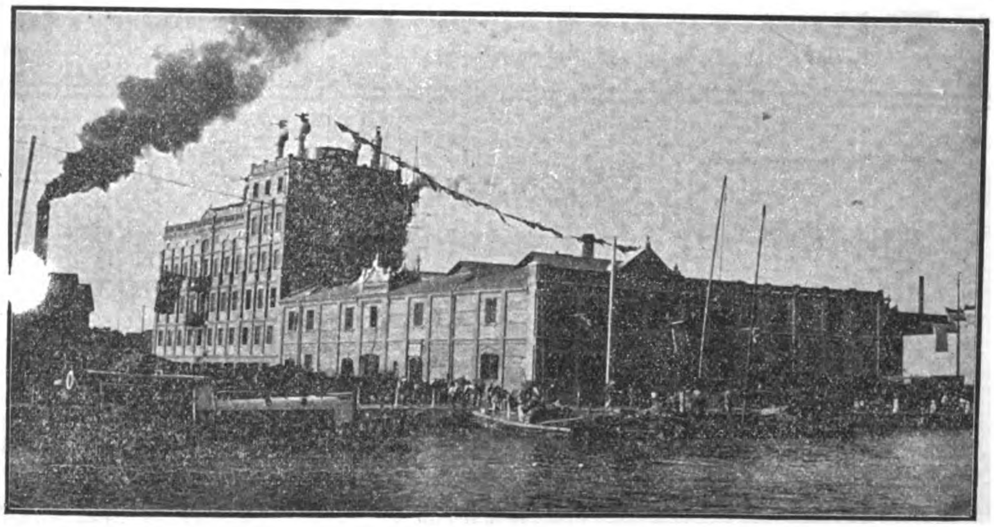

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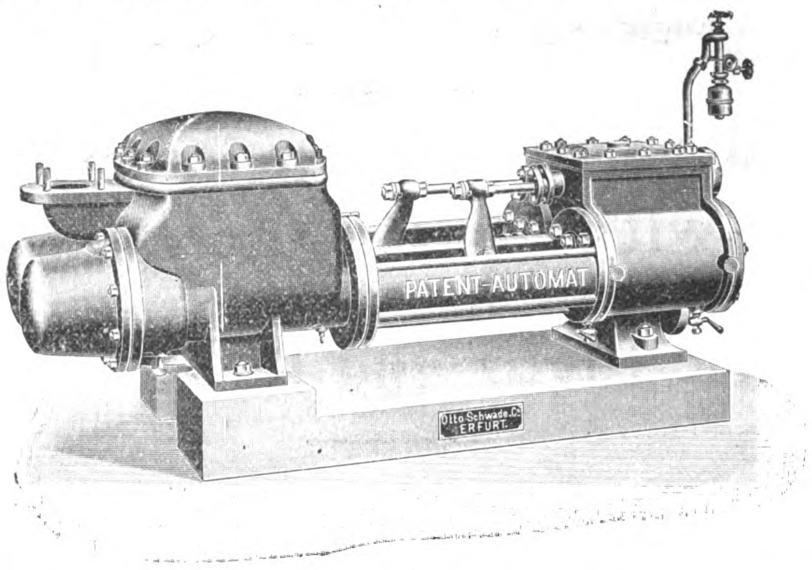

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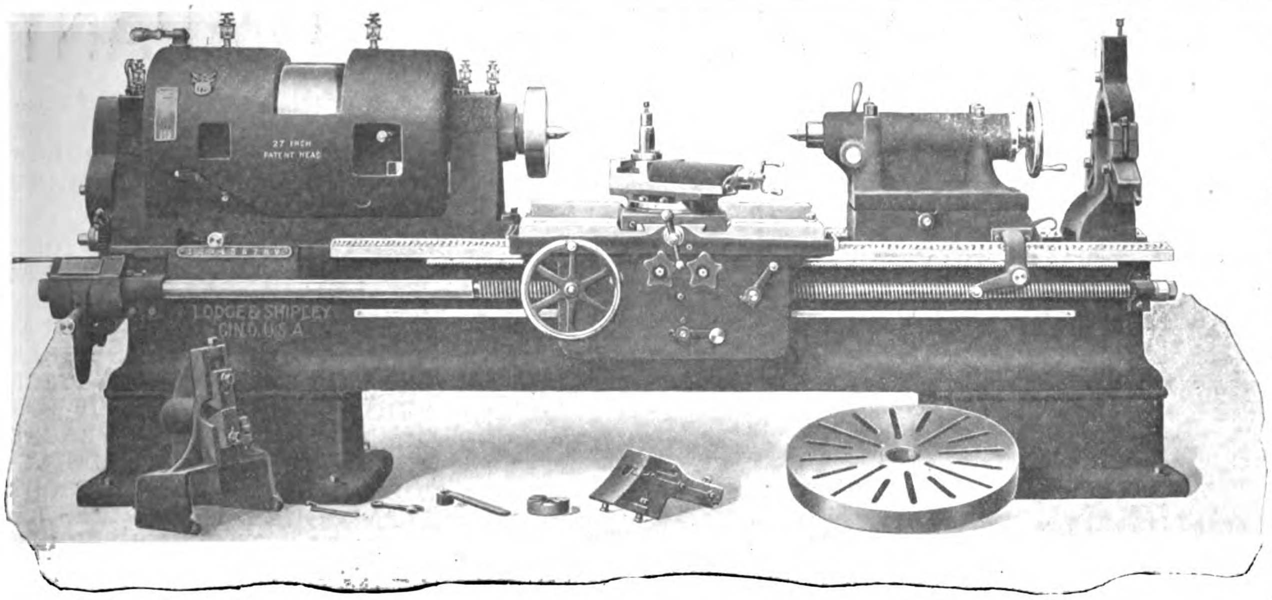

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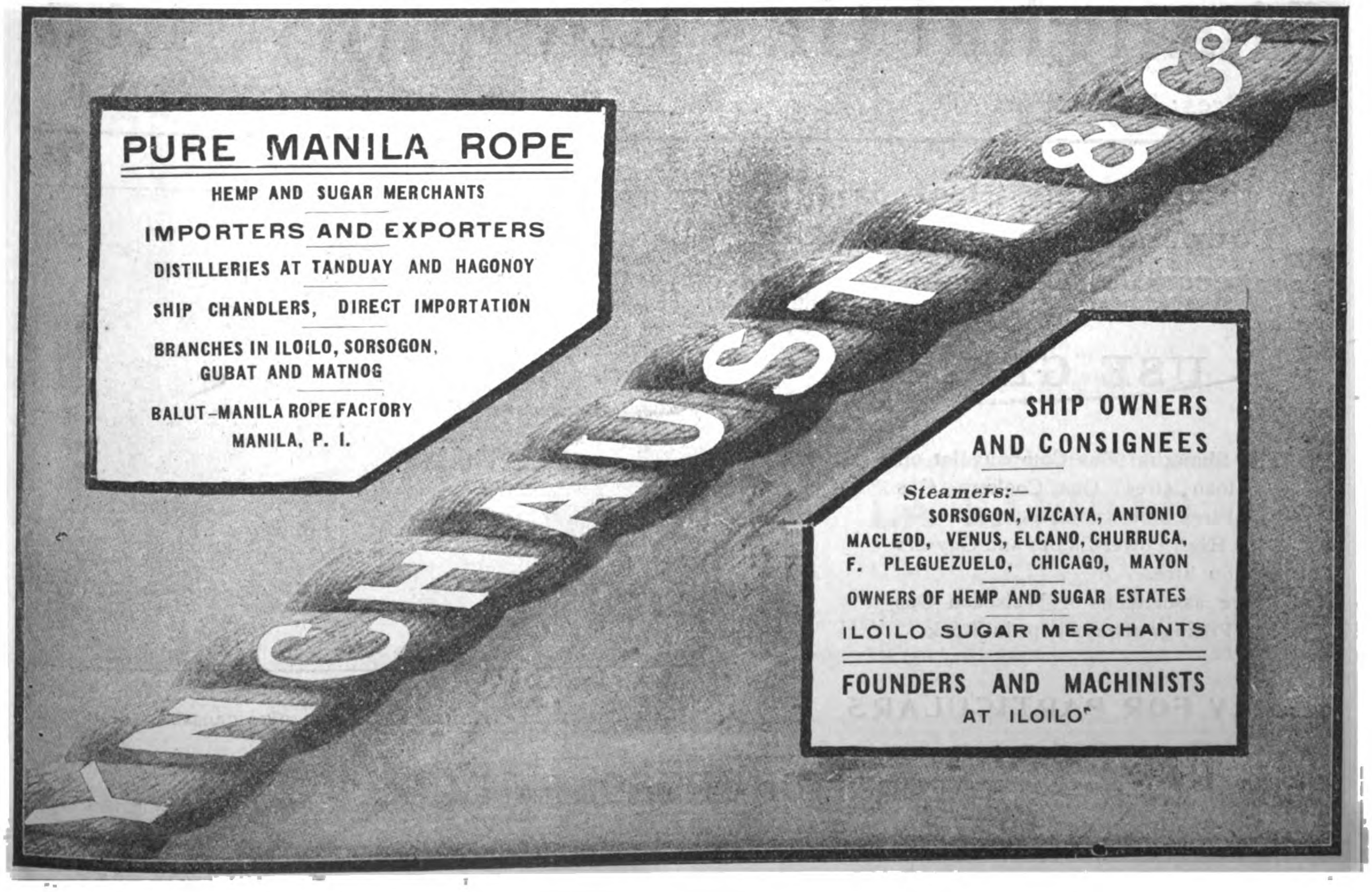

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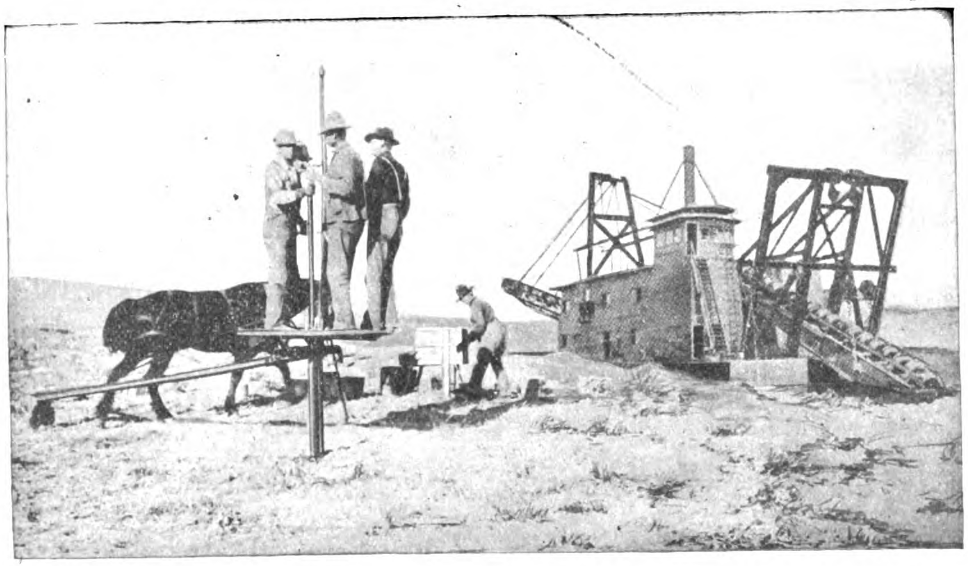

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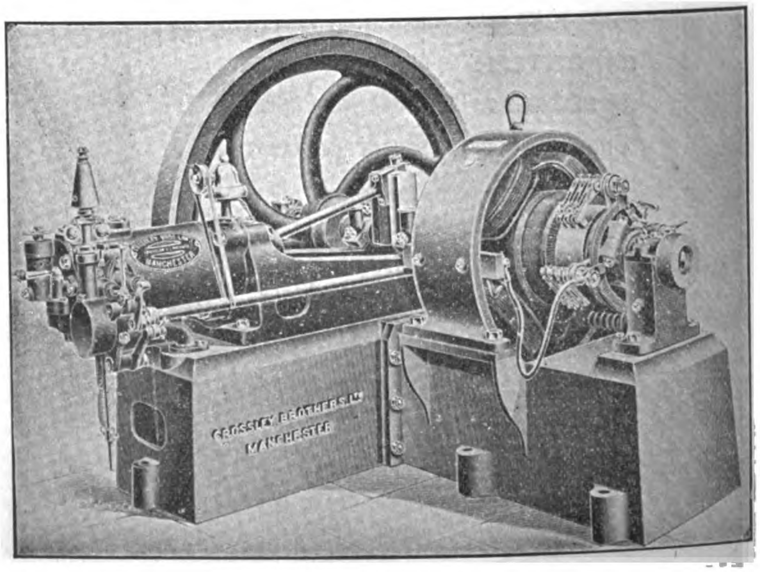

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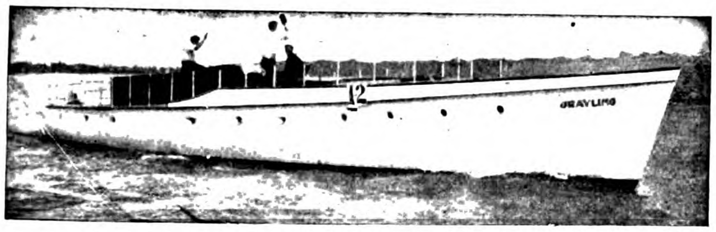

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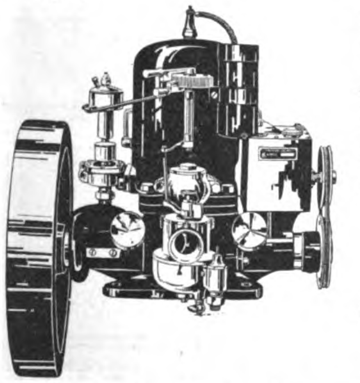

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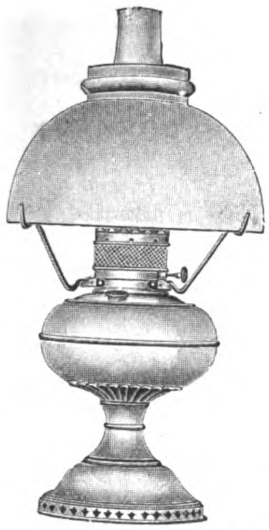

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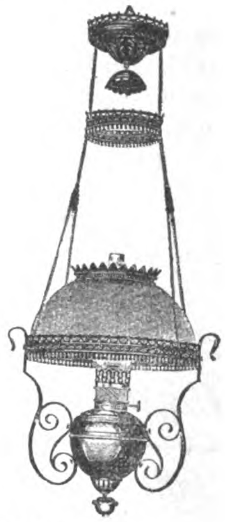

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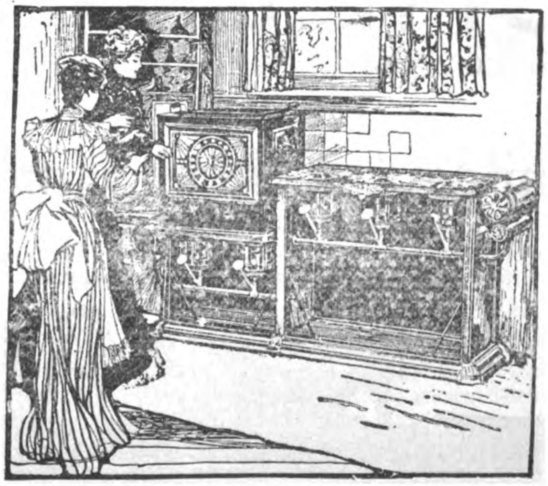

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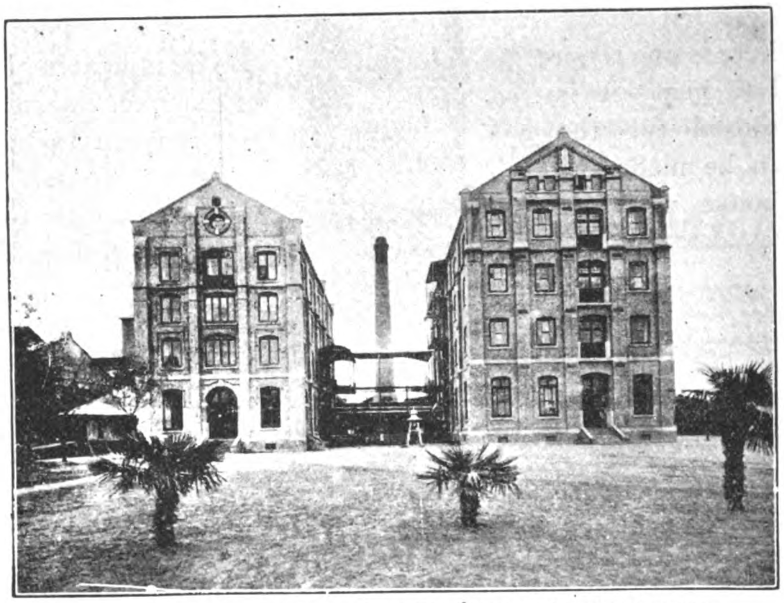

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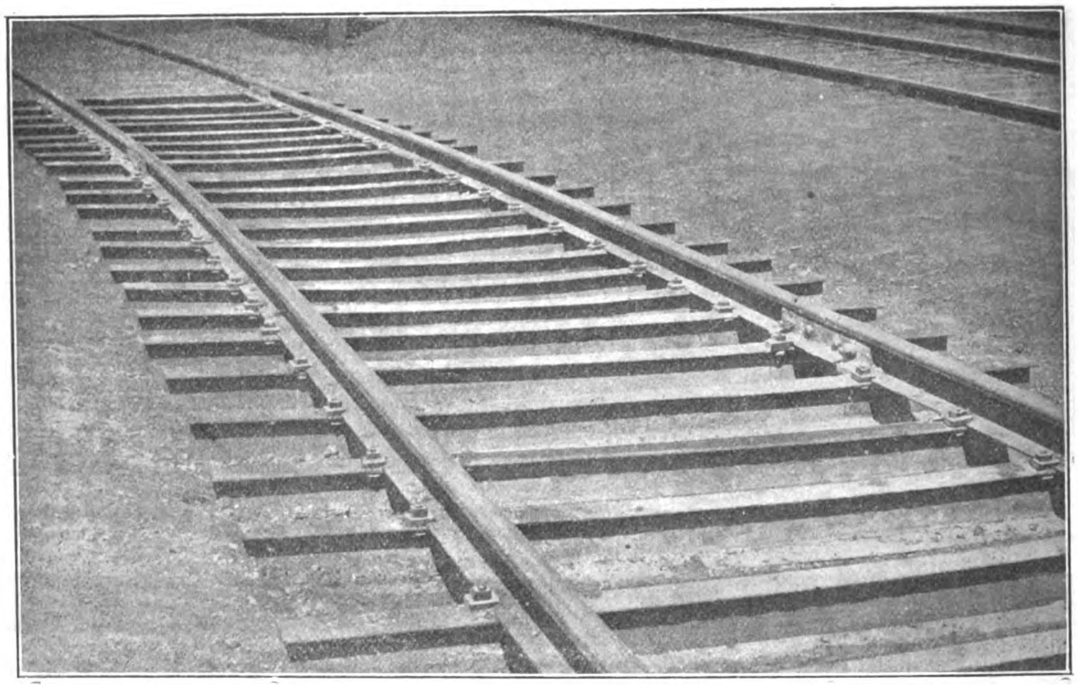

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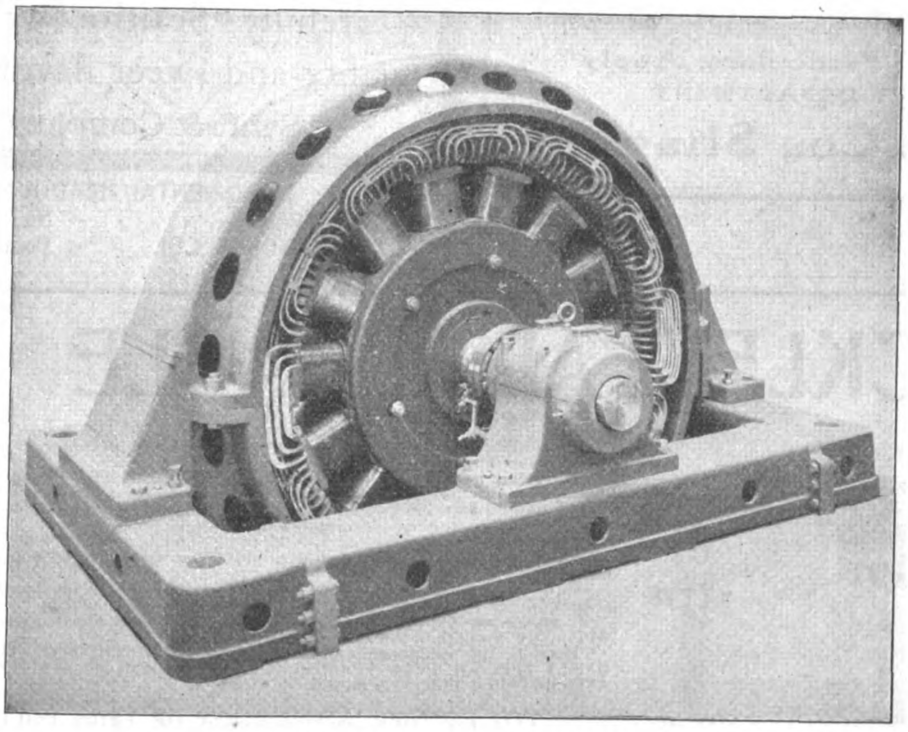

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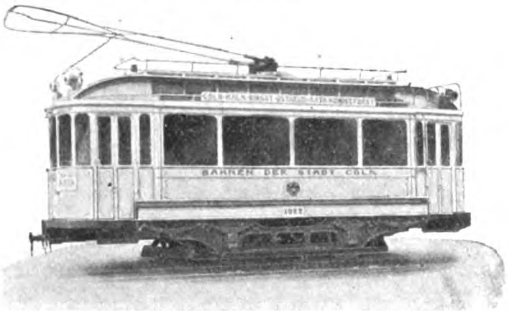

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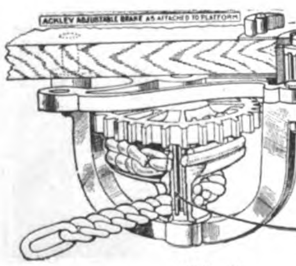

FIG. 1

FIG. 3

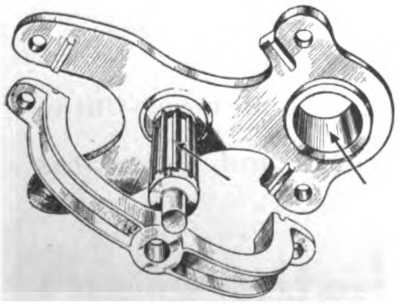

FIG. 2

FIG. 4

The ACKLEY ADJUSTABLE is the only gear brake that can be attached to the platform at any angle, owing to the adjustable yoke.

It requires no machine fitted bearings on the staff—(Fig. 2) simply square the staff in blacksmith shop for loose fit—reducing cost of labor to less than one-fourth required to fit any other geared brake staff.

All movable parts revolve on roller bearings (B, C, Figs. 1 and 3), eliminating friction, thereby giving ease of action in applying brake shoes and releasing.

Three different gear ratios, 12×36, 14×34 and 18×30, all interchangeable in same frame, can be obtained with different sized winding drums, as desired, to take up required amount of slack chain, according to type or weight of car.

It is the only gear brake which has no staff bearing in the frame. The journaling of the pinion (Fig. 4), in the frame (Fig. 3 at D), independently of the staff (Fig. 2), places the gears at a fixed position, preventing **BINDING,** which occurs to gear brakes having staff bearings in frame. (See THE OLD—Figs. 5 and 6, G and I.)

Here is the conclusion: It is EASY AND INEXPENSIVE TO INSTALL; POWERFUL, YET EASILY APPLIED; RELEASES QUICKLY; NO BINDING OF STAFF OR GEARS; ADAPTED TO ANY AND SUITABLE FOR ALL KINDS OF CARS.

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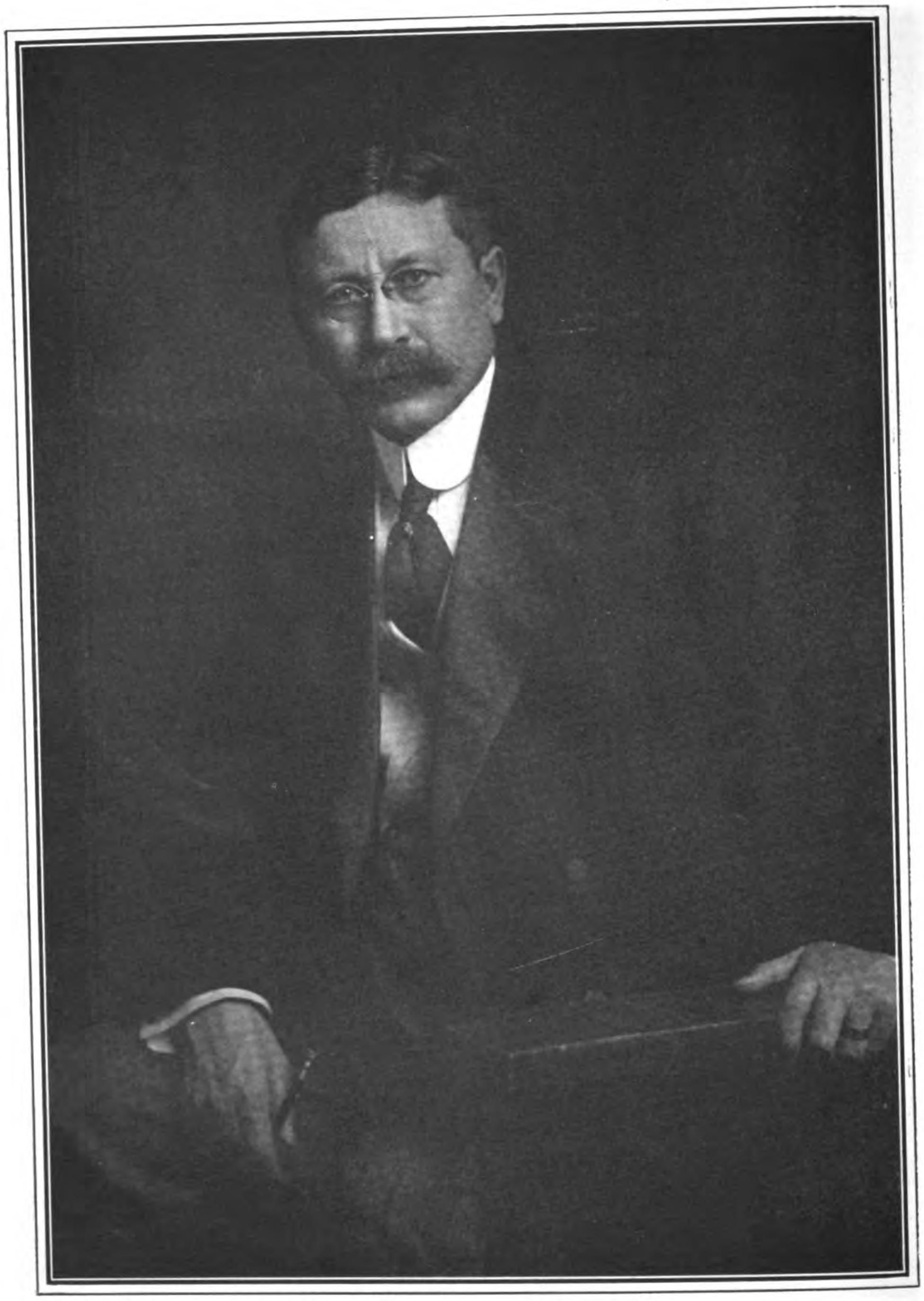
August, Nineteen Hundred and Eleven



The Hon. CHARLES B. ELLIOTT

Member of the Philippine Commission and Secretary of Commerce and Police in the Government of the Philippine Islands.

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COMMERCE • ENGINEERING • FINANCE

VOL. VIII. MANILA, P. I., SHANGHAI, AND YOKOHAMA, AUGUST, 1911 No. 3.

THE VIOLATION OF THE "OPEN DOOR" BY CHINA

The Reason Why it is Impossible for American Manufacturers of Railway Materials to Secure Fair Play in the Awarding of Tenders Under Present Conditions

By GEO. BRONSON REA

FOREWORD:—

Prior to the Russo-Japanese War, American trade in cotton goods predominated in Manchuria, American flour found a good market and other American staples figured largely in the trade of China. Conditions have since altered, and American piece goods have given place to the produce of Japanese looms, American flour has disappeared before the competition of the native milled wheat, and a general decline in all lines has been experienced. For some time, it was urged that the Japanese resorted to discrimination and other unfair practices to secure control of the trade, but calm investigation has disproved this idea, and exonerated them from the charge of willfully violating the spirit of the Open Door doctrine. America lost the Manchurian cotton goods trade to Japan because the latter was in a more advantageous position to control the market, and for nearly every dollar of trade in American piece goods so displaced the Japanese purchased railway material and steel products from America which nearly balanced the loss.

And now to the complaint of the American cotton goods manufacturers are added those of the machinery, steel and railway material manufacturers, who find it almost impossible to gain a foothold in the Chinese market. The writer has received many letters from American firms desirous of entering the field, but who are deterred by the experiences of others who have spent considerable time and money in trying to develop a market without results. They assert that there is no hope of a square deal in the awarding of railway tenders in China, for invariably their bids are rejected on the grounds of inferiority, even when lowest in price and equal in quality to the successful bidder.

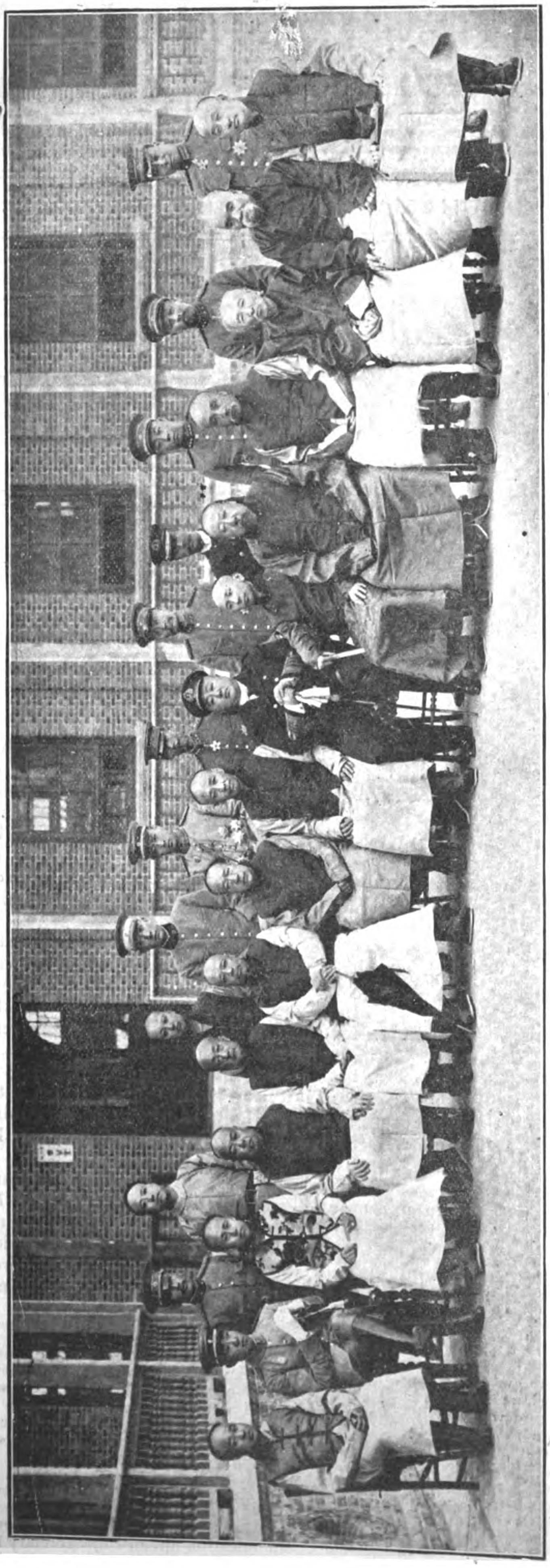
I have been requested many times to explain why such conditions exist but have refrained from so doing for fear that the explanation would be construed as an attack on British or German interests, and inspired by bitter national bias. Conditions have arisen however since the signing of the Hukwang Railway Loan Agreement, demanding that American manufacturers be acquainted with the reasons why their materials have been rejected and why it has been impossible for them to secure a fair share of China's market.

The Hukwang Agreement gives a fair field to the materials of America, Great Britain, France and Germany, and American manufacturers are looking forward with keen interest to the purchase of materials, hoping that at last there will be a semblance of a square deal which will warrant active participation on their part in China's development.

"Take warning by the cart ahead," to quote an old Chinese proverb, has been taken to heart by the American manufacturers, and with the following exposition of the real causes before him, he can determine whether it will profit him to turn out of the rut, and seek a new road towards the goal of commercial participation, or turnback and leave the race to those who are in the lead.

The "Open Door" doctrine had its inception in 1898 through the desire of Great Britain to counteract the forces making for the disintegration of the Chinese Empire, a situation menacing her trade supremacy and political advantages arising out of the occupation of Hongkong. America, at that time occupied with the questions leading up to the war with Spain, manifested little interest in the Far Eastern situation and although her statesmen readily indorsed the doctrine advanced by Great Britain, it was not until the termination of the war and the acquisition of the Philippines which made her an Oriental power, that America really awoke to the momentous trend of events on the mainland of Asia. In the short space of a year or so, while her attention was diverted by the Spanish war, the Open Door doctrine, originally advocated by Great Britain, had been superseded throughout Europe by that of the "Sphere of Influence" policy with partition as the probable fate in store for the ancient Empire. The various agreements entered into at that time between the powers had for their foundation the recognition of preponderating rights of the contracting parties within their respective spheres of influence. The partition of China was openly discussed and many maps delineating the areas or provinces apportioned to the various powers were published throughout the world.

The menace to the trade expansion of America involved in the acceptance of the sphere of influence doctrine, with the specter of dismemberment alwa s in the background, led the American Secretary of State to revive the Open Door policy, and advocate its acceptance by the chancelleries of Europe. The Communication directed by Secretary Hay to Count von Bulow, the German Minister for Foreign Affairs, on September 6th, 1899,



THE HIGH OFFICIALS OF CHINA

Rear Row Standing.—From Left to Right: Prince PA; .... ; Son of Prince NA; Duke LIN of the Imperial Guards; Prince TSAI-FU of the Imperial Guards; H. E. YIN CHANG, Minister of War; H. E. SHOU HSUN, Vice Minister of War; Admiral TAN, Vice Minister of the Navy; Prince TSAI JUI, President of the War College; .... ; ....
Front Row Seated.—Prince KALA CHIN; Prince TSAI TAO; .... ; .... ; Prince YULANG; Prince NA; Prince SU; Duke TSAI-TZE, Minister of Finance; Prince TSAI HSUN; .... ; H. E. NATUNG, 2nd V. P. of the Cabinet; H. E. HSU SHIH CHANG, 1st V. P. of the Cabinet; H. E. THE KUNG-PAO SHENG, Minister of Posts and Communications; H. E. TSOU CHIA-LAI, Acting Minister of Foreign Affairs; ....

was followed by the exchange of similar communications with the other Powers, and by March of 1900, the doctrine of the Open Door had been firmly established, giving equal facilities to the trade of all nations to participate in the development of China. While American industries ten years ago could hardly cope with the enormous development of the domestic market, far sighted statesmen could foresee the time when the limit of home development would be reached, and foreign markets would have to be cultivated. So it was from no altruistic motive that America stood forth at the critical stage in China's history, championed the Open Door, and induced the other powers to adhere to its principles. The adherence of the powers to the principles involved in the doctrine, although a distinct triumph to American diplomacy, at the same time solved the most critical situation in the history of China. The recognition of the doctrine by the great powers saved the Empire from partition, and guaranteed its integrity and neutrality. China was the real beneficiary, and her position among the nations of the world, for many years to come, will rest on the faithful adherence of the powers to the doctrine originally advanced by Great Britain and established by John Hay. If the law of Equal Opportunity be violated, China's end as a political entity would soon follow. The strictest compliance with its principles is imperative for the advance of the Empire under native rule, and the high Chinese authorities, if possessed of the slightest spark of patriotism, should bend every energy in enforcing its provisions. America, who made the Open Door possible, and so guaranteed the neutrality and integrity of the Empire, does not look for gratitude in return, but American manufacturers do ask for and have the right to expect that China will accord them fair play or a "fair field and no favor" in the awarding of tenders and contracts for materials.

If the American policy towards China is founded on trade and receives the support of the country because of that feature, then it is clear that if trade results are not forthcoming, and American products are repeatedly discriminated against by corrupt or indifferent Chinese officials, the manufacturers will retire disgusted from the field, and the policy of the Government fail for lack of support. American sentiment and sympathy has been largely instrumental in guiding China through her difficulties of the past few years, and public opinion has indorsed the Administration because of hopes that tangible commercial results would follow. The American manufacturer, however, has become somewhat sceptical of securing these results, as time after time he has experienced rejection of his tenders, which although lowest in price, on an even specification, have been refused on the ground of inferiority by some Chinese official acting under the advice of prejudiced counsellors. Time after time has he witnessed the flouting of the Open Door doctrine, and the cynical violation of the various railway loan agreements by the Chinese officials, so it is but natural that he has become hardened and indifferent to the promises of fair play. And with good cause and reason, for there is not a railway loan agreement entered into by China with other nations that has not been grossly disregarded and the provisions of fair play ignored.

In the absence of any specific railway laws, franchises, or charters for the various loan-built roads of China, the Loan Agreement becomes th fundamental law of the line, during the life of the loan. The provisions of these agreements are such that the principle of equal opportunity for all nations in supplying materials has been recognized, but have been deliberately disregarded in favor of special interests allied with the financial concerns furnishing the loan. The argument may be advanced that nations furnishing the funds should receive the preference in supplying materials, but, if so, then it should have been speci-

fically stated in the loan agreement, and no grounds for complaint or censure could then arise from other interests. I propose to prove conclusively by a résumé of the various agreements that the spirit of fair play, or the principles underlying the Open Door doctrine, incorporated in foreign railway loan agreements, has been contemptuously ignored and rejected by the country whose political independence hinges on its faithful application.

Peking-Newchwang Loan Agreement.—We will first take up and study the provisions of the Peking-Newchwang Loan Agreement, which for forty-five years is the law governing the operation of the Imperial Railways of North China.

A careful perusal of this document fails to reveal any provision for the purchase of materials, leaving it to be presumed that they will be furnished by the parties advancing the funds, or purchased in the open market. This oversight was, however, subsequently corrected in the Additional Agreement of April 29, 1902, when the line was turned over to the Chinese Government by the British military authorities after the Boxer troubles.

Clause 2 of this document reads:—

"ALL ROLLING STOCK, MATERIALS, ETC., OBTAINED FROM FOREIGN COUNTRIES FOR THE USE OF THE RAILWAYS SHALL AS FAR AS POSSIBLE BE PURCHASED BY MEANS OF PUBLIC TENDERS."

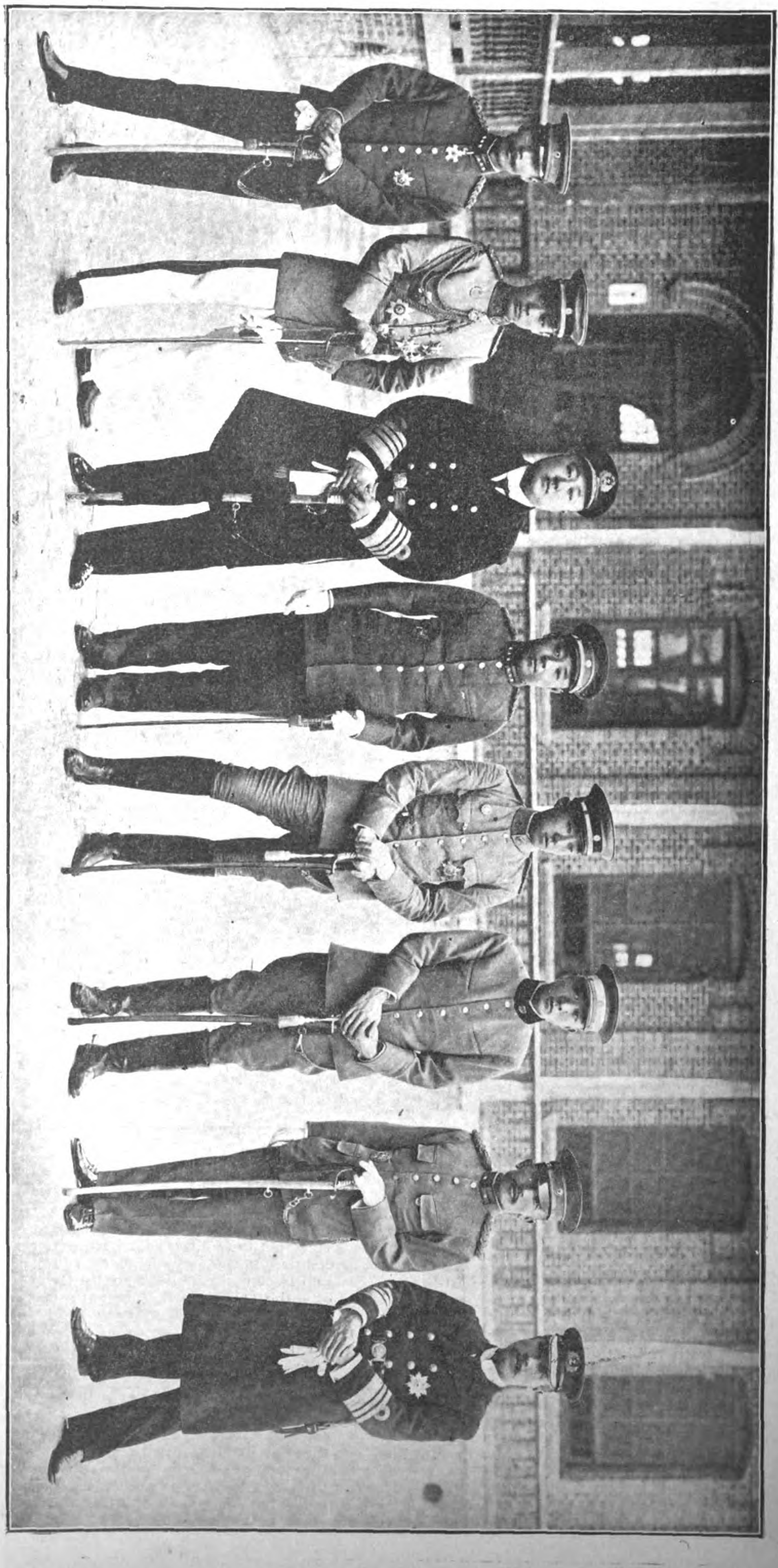
This is specific, and admits of no misinterpretation. It does not give preference to the materials of any one nation, but clearly implies that they shall be obtained from *foreign countries*.

If faithfully adhered to, tenders for materials would be publicly invited in Tientsin, or Shan hai, and the materials of all countries given an equal opportunity. But we find that this clause was ignored immediately after the signing of the agreement, and to prevent that free competition which would have allowed independent British, American or Continental manufacturers to tender, an arrangement was entered into whereby all materials were ordered through a firm in London acting as purchasing agents. This firm received for a long time a purchasing commission of 5%, and the British Chief Engineer of the railway drew up a list of makers approved by himself from whom materials could be purchased. The feature of this approved list, as far as car parts were concerned, was the absence of American makers. This purchasing arrangement, we understand, is still in force in a modified form.

For a more thorough understanding of the situation in the north, it is necessary to revert to the time when Mr. C. Kinder, the retired Chief Engineer, initiated the policy of building railway cars at the Tongshan Shops. In the absence of any definite standards his first step was to design those which could be most profitably and economically applied to the I. R. N. C., and to this end car plans for every variety of service were designed. As was quite natural, the British engineer at the outset adopted the British standards as regards diameter of wheels and other features at variance with American practice, which made it impossible for American car manufacturers to compete. And then by naming a selected list of British makers approved by himself, and placing all orders through the London purchasing agent, the door of equal opportunity opened by Clause 2 of the Additional Agreement was slammed to in the face of America.

Even this violation could be readily overlooked and the right conceded to China to give preference to British materials, as long as the purchases are for the maintenance of the lines controlled by the Loan Agreement. But it appears that a non-technical Chinese Railway Board in Peking, approved of and adopted the I. R. N. C. standards for use on all the roads in China, and the ruling is still in force.

From the manufacture of cars at the Tongshan Works for the use of the I. R. N. C. it was only a short step to the manufacture of cars for other railways in China, and the Chinese officials eagerly approved of this radical step. To the credit of Mr. Kinder I have been informed that he fully realized the violation of the spirit of fair play involved in this step and endeavored to dissuade the Chinese authorities from the scheme, but was over-ruled. And so under the provisions



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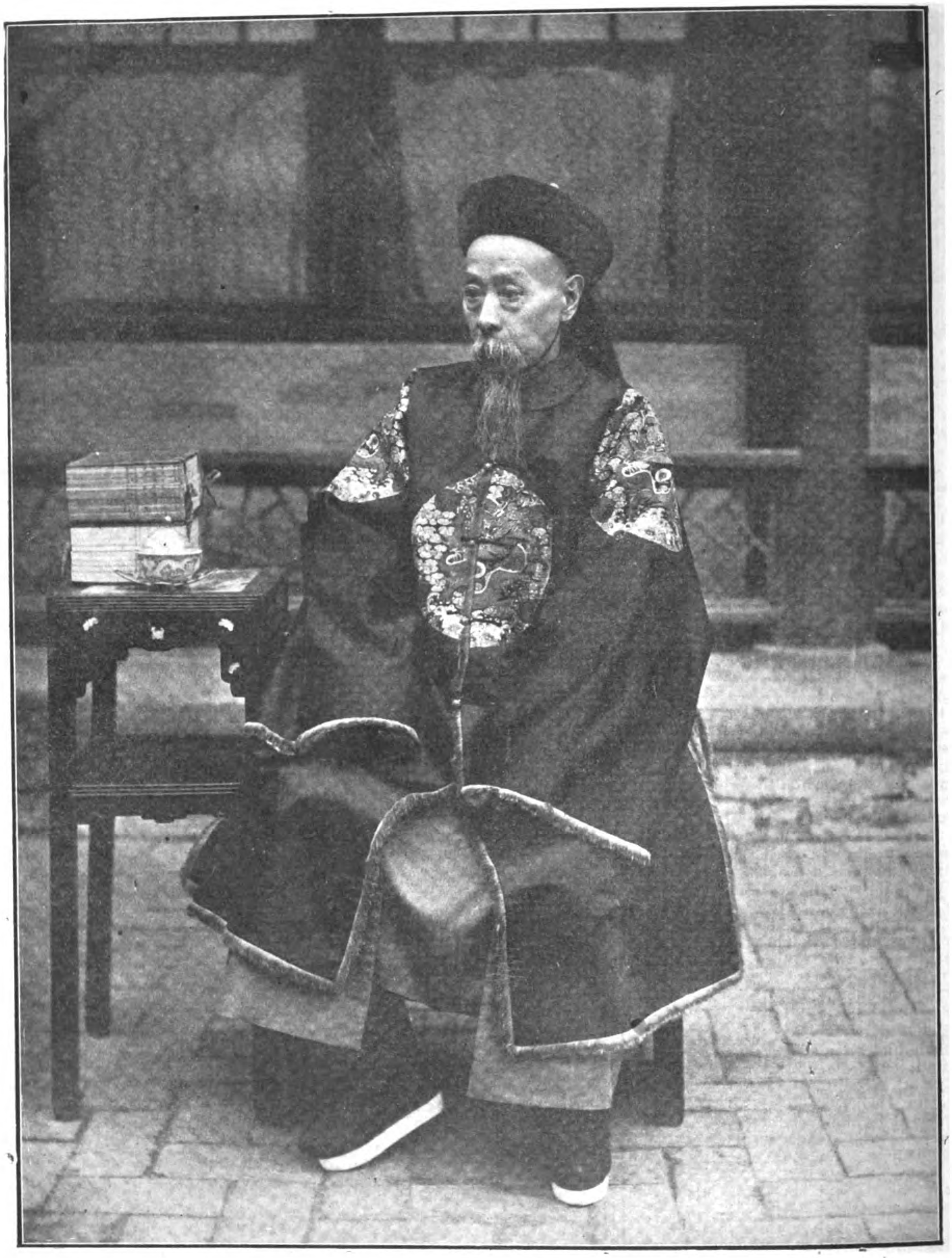


From His Latest Photograph

H. I. H. THE PRINCE OF CHING, PREMIER OF CHINA

of a Loan Agreement, which gives a British Corporation a lien on the line for 45 years, with a British Chief Engineer in charge, but with a specific clause for fair play, Chinese officials in their desire for profits entered into a program that, if permitted full scope for development, would end in the monopolization of the Chinese car market for a restricted list of approved British makers under cover of an official Chinese undertaking.

Under this arrangement a large number of cars for other lines in China have been built at the Tongshan Works, and this feature is receiving the careful attention of the Chinese officials at the present time. The point may be advanced that it is only a small matter as the Tongshan Works with its present plant cannot supply all the cars for other roads in China and therefore the menace to foreign manufacturers is more imaginary than real. But this is only begging the question. It is not the number of cars now made that counts, but the establishment of the principle in direct contravention to the basic features of the Open Door doctrine. The principle once admitted the way is open for the expansion of the shops to a point where car building for the Chinese Railways would soon become a monopoly and under the present system of purchases, this means a monopoly for a restricted list of approved British makers from whom all materials are ordered. If Tongshan standards are to prevail, the independent British maker together with American and Continental firms may fold up their tents, return home, and leave the field to the favored firms for thirty-four years to come.

If the principle underlying the operation of the Tongshan Works is permitted to stand without protest, their extension to meet the growing demands of the Empire will follow as a natural sequence, and instead of a few hundred cars built for other roads in China in the last few years, the number will be doubled in a very short time. It is safe to assume that the volume of car business undertaken for outside railways during the last few years reached $1,000,000 the materials for which were purchased without any regard for Clause 2 of the agreement. This amount of business, placed direct with the approved maker through the London purchasing agent, has been lost to firms in China. Aside from the evasion of the Open Door doctrine, the system is contrary to all recognized canons controlling

TWO OF THE CHINESE PRINCES, WHO LINE FOR THE THRONE, SET ASIDE FOR THE SON OF PRINCE CHUN

H. I. H. THE PRINCE OF KUNG
Grandson of the Great Chinese Statesman of the same name.

H. I. H. PRINCE PU-HUN
Minister of Agriculture, Industry and Commerce.

the placing of Government orders. The first duty of a government is to patronize the firms in its own country whose taxes are contributed to its maintenance. Every other country recognizes this principle and government orders are placed through firms whose duties and other taxes help to swell the national treasury receipts. Notwithstanding that all leading European and American manufacturers are represented in China by firms contributing to the support of the Chinese Government, they are ignored and passed over, in favor of a purchasing agent in London who has no direct interest in the country. When it is considered that as a general rule all agency agreements between manufacturer and representative give the latter a commission on all purchases for his territory whether placed through him or otherwise, the practice of going over their heads in the hope of receiving better prices is unsound. The purchasing agent in London or elsewhere cannot hope to secure a better price than the manufacturer's direct representative on the ground, so the result is that the Chinese Government in many cases really pays two commissions, one to the purchasing agent, and one to the China representative of the manufacturer. Patronizing the firms who contribute their taxes, duties, likin, and other extortionate demands of Chinese officials, is only legitimate reciprocity, and aside from the spirit of fair play and equity involved, it would save an extra commission to the Chinese treasury.

The operation of the Tongshan Works as a part of the Imperial Railways of North China, under the provisions of the British Loan Agreement, has created a very subtle commercial situation. The works are run as a Chinese official enterprise, and under cover of this, the agents of the restricted list of approved makers, who furnish the materials for construction of cars and locomotives, are enabled to push the sale of their specialties with Chinese private railways. Car building in China is a misnomer and is really only the assembling of parts ordered from abroad. Under any condition the car body would be constructed in China. It is true that at Tongshan the underframes and trucks are also made at the works, but wheels and axles, air-brakes, couplers, and other accessories are ordered from abroad.

H. E. Tuan Fang
Director-General of the Imperial Hukuang Railways.

When the agent of the approved maker solicits business direct from the Chinese private railway director and is unable to secure the order, as a last resort, he recommends the purchase of cars from the Tongshan Works, knowing that he will secure the same profit in a round about way.

I have before me the report and estimate submitted to the Director-General of a private Chinese railway company by a leading British Consulting Engineer. In his summary of costs, he refers the Chinese Director to the Shanhaikwan Works of the I. R. N. C. for bridges, and to the Tongshan Shops for cars and locomotives, where he urges they can be purchased cheaper than they can be imported, and at the same time built under Mr. Kinder's standards and specifications in conformity with the ruling of the Railway Board. As only the materials of approved British makers enter into the manufacture of bridges, cars and engines at the above works, the Engineer could safely recommend a prospective Chinese customer to Tongshan knowing that his friends would secure the profits from the order. And under cover of patronizing a Chinese Government undertaking, he made a strong bid for the business.

And we find that owing to the keen competition for freight and passenger cars on the southern section of the Tientsin-Pukow Railway, resulting in the placing of many orders to Continental and independent British makers, at prices lower than the favored makers could furnish them, some 100 cars were ordered from the Tongshan Works. In addition nearly all the Kalgan rolling stock—over two hundred cars—were built at the Tongshan Works. This is a purely Chinese railway, though it may come under the terms of Peking-Newchwang Loan Agreement as a branch or extension of the I. R. N. C. if the point is raised.

American and Continental car manufacturers were excluded from any participation in the supply of cars for this line, owing to the state of affairs which threw all the orders for materials through a London purchasing agent, in direct contravention of Clause 2 of the Additional Agreement. Here the Chinese officials exercised full control over the placing of orders and many American locomotives and other materials were purchased.

The situation herein revealed points to one inevitable conclusion. If Chinese official continue to manufacture cars at Tongshan, for all the railways in the Empire, and confine their purchases to an approved list through a purchasing agent in London, American car manufacturers can retire from the field.

If China desires to expand the Tongshan Works and enter into the manufacture of cars for roads outside the Pekin-Newchwang Loan Agreement, then it is only fair that the Works be separated from the administration of the I. R. N. C. and operated as an independent national enterprise, and the door of equal opportunity opened to the manufacturers of all nations, as provided for in Clause 2 of the Additional Agreement. Otherwise the railway car market in China will be slowly closed to all but the restricted list of British makers.

THE TIENTSIN-PUKOW RAILWAY.

German Section.—Clause 18, of the Tientsin-Pukow Railway Loan Agreement, reads:—

"For all important purchases of railway materials tenders shall be called for by the Managing Director; and the Banks and Syndicate as Agents shall purchase the materials required on the terms most advantageous to the Railway, and shall charge the original cost of same with a commission of five per cent. It is understood that no orders for materials shall be executed or any expenditure incurred without due authorization by the Managing Director.

"The Railway Administration shall have the right to reject on arrival in China materials which do not come up to specifications. At equal rates and qualities goods of German and British manufacture shall be given preference over other goods of foreign origin for the northern and southern sections respectively. The Railway Administration reserves the right, while paying the above stipulated commission to the said Agents in respect of all purchases of foreign materials, to avail itself of the services of other Agents in China or abroad should it see fit to do so.

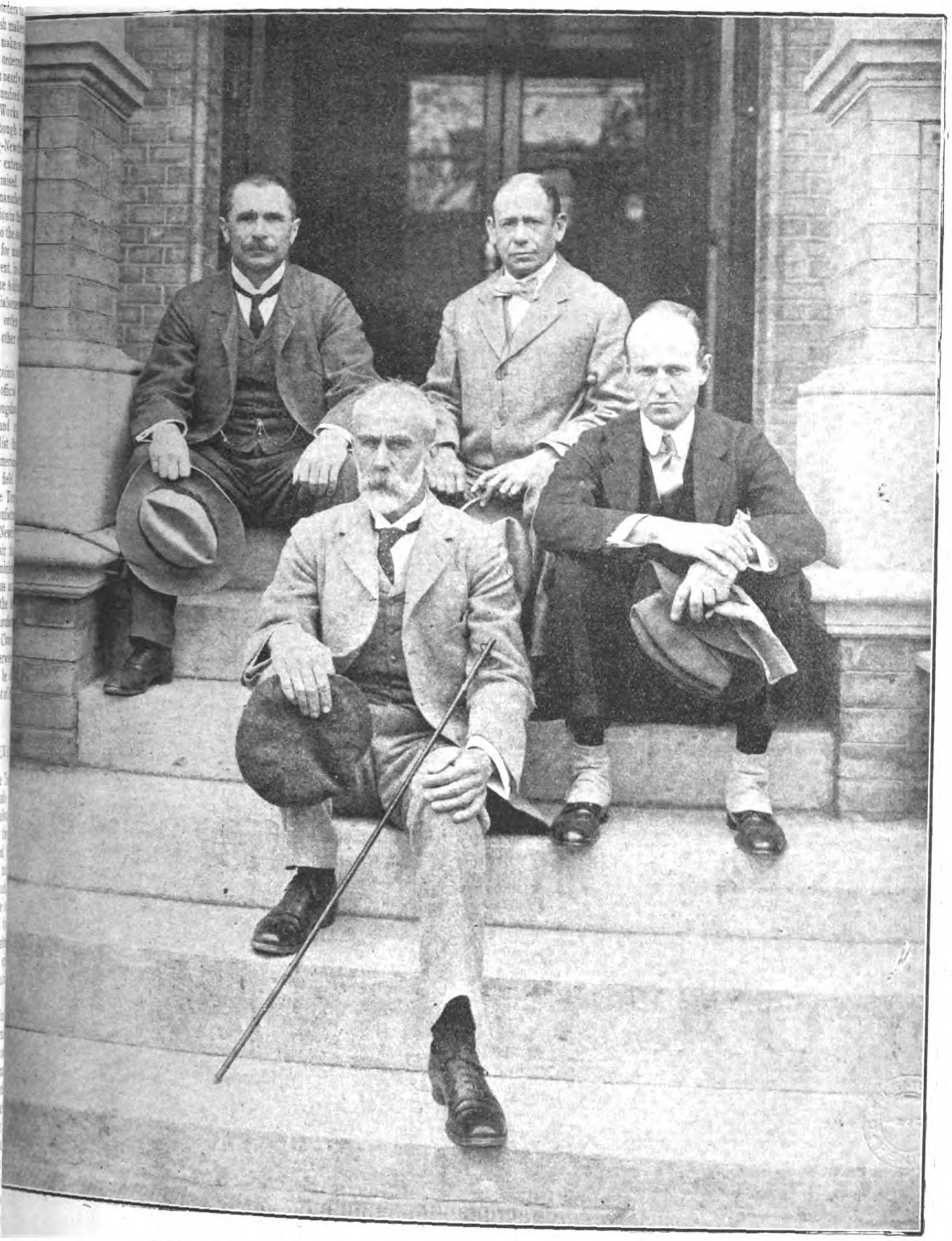
"No commission shall be paid to the Agents except as above provided; but it is understood that the Railway Administration shall provide out of Railway funds for the remuneration of Consulting Engineers whenever their services are engaged.

"With a view to the encouragement of Chinese industries, preference will be given, at equal prices and qualities, over British, German or other foreign goods to Chinese materials, and goods manufactured in China. No commission will be paid on purchases of such materials and goods.

"AT EQUAL RATES AND QUALITIES GOODS OF GERMAN AND BRITISH MANUFACTURE SHALL BE GIVEN PREFERENCE OVER OTHER GOODS OF FOREIGN ORIGIN FOR THE NORTHERN AND SOUTHERN SECTIONS RESPECTIVELY."

This Clause implies that for all important purchases tenders shall be invited open to the manufacturers of all countries, and if American or other goods are equal in quality, i. e., according to specification, and lower in price, provision is made for their acceptance. Otherwise,

Taotai Wan Bing Chun (B. C. Ward)
Secretary to H. E. Tuan Fang, Educated in America



THE PEKING REPRESENTATIVES OF THE FOUR FINANCIAL GROUPS

H. CORDES (Deutsch-Asiatische Bank.) E. G. HILLIER (Hongkong & Shanghai Bank.) M. CASENAVE (Banque de l'Indo-Chine) W. D. STRAIGHT (American Group.)

German and British manufacturers could raise their prices without fear of competition. Nothing could be more to the point. While British and German interests are fully protected, the Clause opens the door of equal opportunity to all and reflects a spirit of fair play, which if honestly and faithfully applied by the Chinese authorities would result in a fair share of orders for materials being placed in America at terms advantageous to China.

On the German section, it appears that the Clause was interpreted to mean that German goods should have the preference regardless of price or quality, and all orders for materials went automatically through the purchasing agents to their friends in Germany. The implied spirit of the Open Door underlying the clause was ignored and foreign manufacturers other than German had no opportunity to tender or compete. Had equal opportunity been granted to all, the cost of materials undoubtedly would have been greatly lowered.

The natural impulse is to lay the blame for this violation of the Agreement to the door of the Germans, as they were the sole beneficiaries, but a close study of the loan agreement and the contract of the Engineer reveals that the real transgressor is the Chinese Director-General and his subordinates in charge of the two sections. The Managing Director had full control over purchases and no expenditure could be incurred without his authorization. The Chief Engineer was entirely under his orders, and had no responsibility except in the technical supervision of construction.

By no stretch of the imagination can the Chinese hide behind the Germans and lay the blame on the German Chief Engineer.

Clause 5 of the contract of the latter with the Chinese government stipulates that "he shall obey the orders of the Director General or other superiors, and pay proper respect to them as their several positions demand."

"The Director-General has the power to cause this Agreement to become null and void at any time."

And the contract furthermore stipulates that on the day of the resignation or dismissal of the Engineer-in-Chief his salary ceases and he shall be paid the number of days he actually worked, if he has not rendered a full month's service.

In other words the Chinese Director General or the Managing Directors have full and absolute control over the Engineer-in-Chief, even to the point of dismissal without notice. And yet with this power in their hand, they permitted all orders for the Northern Section to be placed in Germany without any regard to the provisions of the Loan Agreement conceding fair play to all. The Germans cannot be criticized for their share in influencing and abiding by a practice which benefited them exclusively, as before the world they are absolved by the terms of the agreement and engineers' contract which fixes the sole responsibility on the high Chinese officials.

TIENTSIN-PUKOW RAILWAY.

British Section.—The same Loan Agreement, quoted above, applies to the Southern or British section of this road, and the contract between the Chinese Government and the British Engineer-in-Chief is identical with the one signed by the German Engineer.

During the first year of construction the Chinese Managing Director of the Southern Section (Taotai K. S. Low) interpreted the Loan Agreement as giving a fair field to the materials of all nations, and many awards were made to Continental and American manufacturers against the advice of the British Chief Engineer. Taotai Low's attitude in the advertising and awarding of tenders was the nearest approach to a "square deal" recorded in the history of Chinese loan-built railways, but even with his acknowledged general record for fairness there were many instances where he was influenced by the Chief Engineer to ignore the provisions of the Loan Agreement and award the orders for materials to British firms when American tenders were lower on the same specification.

Tenders for eight locomotives duly advertised in advance were opened on the 29th of June, 1909, and although the American tenders were lowest the contract for six was awarded to a British manufacturer, and only two ordered from the lowest bidder. As this transaction is typical of the practice and spirit of awarding tenders on-loan built roads, regardless of the clause which gives equal opportunity to all, a copy of the official letter of the British Chief Engineer to his Chinese superior is herewith reproduced, with the names of the makers omitted.

Chief Engineer's Office,
Nanking, 29th June, 1909.

No. 1761.
The Managing Director
Tientsin-Pukow Railway, Southern Section.
DEAR SIR:—

Tenders for Indent No. 51.

These tenders were opened this morning, and the results are very favorable for the Railway, the prices quoted by first class firm being much lower than I expected.

The lowest tenders are from America and Continental makers, for their patterns and specifications. There is, however, very little difference between the lowest tenders and those of really first class makers.

I should not under any circumstances recommend the acceptance of tenders from Belgium or German makers. Mr. Sandberg writes me most strongly about the poor quality of materials used for rolling stock in both countries. In the present case, the difference in price between the Continental makers, and the best British and American Locomotives is so small, that there is no temptation to accept the inferior article.

Of the British makers, the lowest tender for first class maker, is that for whom ....have tendered. The price delivered at Pukow, according to the terms of our advertisement *being* £3-143 0s. 0d. Payment 15 days after delivery

Of American manufactured locomotives, two firms have submitted tenders which agree with our specification: Messrs.............................tender for locomotives which are apparently according to our specification, though no detailed specification is given. Their price is £3,127 0s. 0d.

Messrs. ....tender for their price is £3,138 0s. 0d.

Between the prices quoted in these three tenders, there is only a total difference of £16 0s. 0d. and I have no hesitation in stating that the British Locomotives are much the cheapest at the price.

Most of the Locomotives of the Imperial Railways of North China, have been built by the British Company, and they have given every satisfaction The

Imperial Railways of North China have also had considerable experience with locomotives built by an American Company, and the experience has been greatly in favour of the British Locomotives.

The American locomotives spending a great deal of time in the shops under repairs, and costing much more for running expenses than the British ones. I have asked Mr. Alston to give me a report on this matter, which I shall annex.

As a rule there is a very considerable difference in price between British and American Locomotives, American Locomotives generally being much cheaper. Where the prices are approximately equal, as in this instance, there can I think be no question that the British are the best bargain, *and that even apart from the provision of the Loan Agreement, it would pay us best to accept them.*

Yours truly,
(Sgd.) T. W. T. Tuckey.

The above communication reveals the following facts:—

First, that the American manufactured locomotives agreed with the railway specification and the price quoted was £16.0.0 lower than the British engine. Consequently all things being equal, the American manufacturer under the terms of the Loan Agreement, should have been awarded the contract. Particular attention is invited to the closing words of the above letter, "*Even apart from the provision of the Loan Agreement it would pay us best to accept them.*" This corroborates what I have always contended and indicates that Chinese officials and foreign engineers recognize the true meaning of the clause which concedes to other countries the right to expect the acceptance of their tenders at equal quality and lower price, and which only gives the nation furnishing the loan preference when all things are equal. If materials from the country furnishing the loan were to be exclusively employed, the banks could readily sacrifice their commission in floating the loan and advance the funds to China at par, with the assurance that their industrial allies would split the excessive profits with them from the monopoly in selling the materials.

The above communication also reveals the methods employed in discrediting American goods, in favor of other national interests. It demonstrates the fact that the British Chief Engineer was cognizant of the infraction of the Loan Agreement, and the American makers lost the order on the Engineer's report that their locomotives were inferior.

Further evidence in support of my argument is herewith presented by the following extracts from an official communication of the same Engineer-in-Chief to his Managing Director concerning the tenders for 250 freight cars, dated July 1st, 1909.

No. 1772.

Chief Engineer's Office,
Nanking, 1st July, 1909.

The Managing Director,
Tientsin-Pukow Railway, Southern Section,
Nanking.

Dear Sir:—

Indent No. 50.

I have gone carefully through the tenders for rolling stock under the above Indent. Owing to the great number of tenderers, and the variety of offers, the difficulty of classification has been considerable. I am now able to enclose lists giving the offers in each case, in order of price, commencing with the lowest.****

My own experience of Belgian made rolling stock is limited to the cars of the Peking Hankow Railway, which are certainly very rough, and which gave much trouble, when running over the Northern Railway lines. Mr. Sandberg, who has a world wide experience, has, however repeatedly warned me against Belgian and German rolling stock. In Mr. Sandberg's letter dated the 20th April last, he wrote as follows:

"I am receiving no end of applications from all over Europe and America, so the competition will be too great, and you will no doubt receive tenders with very low prices and very poor quality. I quite see that you must be forced by your Directors to act in this way. They will all suffer and we too, if the tenders are not judiciously selected. *Take for instance the rolling stock in Belgium and Germany, the former particularly, and even in America,* it is as poor as possible, and while all the buying there is going on by advertisement like yours, and their own careful inspection, which clearly shows that it cannot be done, *and Mr. Kinder's system for the I. R. N. C.* of inviting only the *best makers approved by himself* was no doubt the best way."

You will note that Mr. Sandberg's opinion as to the quality of Belgium rolling stock is very strong indeed, and after such an opinion, I cannot possibly recommend it.*****

The prices are very favourable indeed, and far lower than I anticipated, for first quality cars.

Yours truly,
(Sgd.) T. W. T. Tuckey.

The above letter is highly interesting and not only corroborates my statements in regard to the unfair awarding of tenders on the Tientsin-Pukow line, but also the conditions underlying the purchasing arrangement for the Imperial Railways of North China. Particular attention is invited to the advice of Mr. Sandberg, the London Consulting Engineer, about purchasing Belgium and German rolling stock and even American material, and his remarks concerning Mr. Kinder's system of inviting only the best makers *approved by himself* is elucidating and convincing.

No comment is necessary in the face of such conclusive evidence.

In April of last year, after the removal of Taotai Low from the post of Managing Director of the Southern Section of the Tientsin-Pukow Railway, tenders were invited for the supply of 12 locomotives. Under Taotai Low's administration there was no difficulty for a reputable firm to secure the necessary specifications and tenders, but under his successor all kinds of difficulties have beset the path of those who desire to compete.

As an instance we can cite the experience of one Anglo-American firm, representing a well known American locomotive manufacturer. They applied for the specifications immediately after the appearance of the advertisement, and sent in the necessary fee ($25.00). In return they were furnished a blue print of an engine. They sent again for the specification to the authorized representative of the railway in Shanghai, and the reply came back that they had not yet arrived from Nanking. They sent again in due course and were then informed that there was no specification, the blue print being the only thing issued. Realizing that they were being discriminated against, the manager of the firm went in person and de-

H. I. H. Prince Su, Minister of the Interior. One of the Eight Princely Families.

H. E. NA TUNG, 2nd Vice President of the Cabinet.

manded the proper specification, as a result of which a solitary copy was unearthed and he was permitted to copy it. The tenders were duly submitted and opened and the representative of the American manufacturer was far the lowest in price.

The American manufacturer bid strictly to specification, the engines to be built under the supervision of the Inspecting Engineer in America, yet although they were nearly £300 lower in price on each engine, the contract was awarded to the British makers. In the face of this great variance in prices in favor of the American locomotives the Managing Director refused to take the responsibility in awarding the tender and referred it to his superiors in Peking, who decided in favor of the British maker. The explanation given at the time was to the effect that the American manufacturer did not have a technical representative on the ground to explain the tender. The fact was overlooked that an engineer of the American Company was at Peking at that very time superintending the erection of locomotives supplied by his firm to the Peking Kalgan line, and who could have readily answered all necessary questions. *The lame explanation offered by the Chinese to justify their violation of the spirit of fair play, did not extend to the British makers, who were in the same boat as the American makers, as they did not have a technical representative in China.*

This discrimination cost the Chinese Government just $18,000.00 gold, but the damage to its prestige cannot be reckoned in dollars and cents. And for the last year there has been hardly a tender awarded on this line not open to criticism and the charge of unfairness, and many reputable firms now refuse to tender on materials for this line, knowing full well that they cannot expect equitable treatment.

The Shanghai Nanking Railway.—The Loan Agreement controlling the construction and operation of this line is typical of the spirit of fair play and adherence to the principles of the Open Door doctrine, by the British Government in conceding its support to the financial corporation advancing the funds, and at the same time the evasion of this agreement stands forth as a shining example of the spirit characterizing those who interpreted it according to their own interests, and in which they received the tacit approval of the high Chinese authorities.

Article 9 of the Shanghai-Nanking Loan Agreement, signed at Shanghai the 9th of July 1903, reads:-

"9.—As remuneration for superintendence and services the Corporation shall receive 5 per cent. on the entire cost of all materials purchased for the railway.

"It is agreed that all materials required for the railway shall be purchased in the open market at the lowest price obtainable, but it is understood that all such materials shall be of good and satisfactory quality. Invoice and inspector's certificates are to be submitted to the Chinese Administration.

"With a view to encouraging Chinese industries Chinese materials are to be preferred, as also the products of the Hanyang Iron Works, provided price and quality are suitable.

"No commission will be allowed to the Corporation on the purchase of materials except as herein provided. All trade discounts or rebates, if any, are to go to the construction account."

This is all. It is specific, and admits of no misunderstanding. It is a clean cut provision for fair play and the open door for materials of all nations, for no where in the other clauses of the agreement is preference to British materials specified.

It will be readily conceded by American and Continental manufacturers in a friendly spirit that although British materials were not given preference in the agreement, the fact that a British Corporation furnished the funds and controlled the drawing of plans and specifications and superintended the purchases, entitled the products of Great Britain to greater consideration. This, however, does not alter the ethics of the case. The Loan Agreement is the fundamental law of the line during the life of the loan, and should be adhered to. If it were intended that British material should be exclusively employed, it should have been so stated in the bond, and other interests would have nothing to complain of.

We find however that, notwithstanding the specific agreement that all materials should be purchased in the open market at the lowest price obtainable, the purchases were made exclusively in London, without reference to the lowest price or open tender.

The result of this method was to make the road more costly.

It is of course difficult to point to any concrete instances in proof of this, but the following evidence from the highest British authority in China, is sufficient to emphasize the point. At a meeting of the Hongkong Legislative Council, held May 14th 1909, Sir Frederick Lugard, Governor of Hongkong, in defending the high costs of the Kowloon-Canton Railway showed where the original estimates were too low and the reasons why the costs had ascended to the enormous figure of nearly $250,000 gold per mile. He also showed where over-estimates had been made and said:—

"I have dealt in considerable detail now with the items that involve excesses in the estimates. There remain those under which large savings are shown. Ballast and permanent way show an estimated saving of $51,700, *rolling stock $82,400.*"

"I may add, too, that the *carriages will cost something less than half what had been estimated, for the amount placed on the estimates had been calculated on the basis of carriages for the Shanghai Railway, and we find by adopting a less expensive model we can reduce the cost from about $2,000 per carriage to $1,000*".

This direct statement from the Governor of Hongkong is convincing. The same Consulting Engineers who directed the construction of the Shanghai-Nanking Railway which cost China $75 000 (Gold) per mile, were also retained to superintend the 22 mile British section of the Kowloon-Canton Railway which cost the Colony the enormous outlay of nearly $250,000 gold per mile and a member of the same firm has again been appointed by the Chinese Government as Chief Engineer of the British section of the Hukwang Lines.

This appointment is a complete vindication of Mr. Collinson's record in the construction of the Shanghai-Nanking Railway and must be accepted by the world as an apology on the part of the high Chinese authorities for all the abuse and criticisms heaped on him the last few years. By reinstating him in the important position of Engineer-in-Chief of the British Section of the Hukwang Railway, China admits to the world that the charges against Mr. Collinson were groundless; accepts all responsibility for the extravagance, and endorses the methods employed in awarding contracts for materials in violation of the Agreement. If the Chinese Officials acting with Mr. Collinson are to interpret the Hukwang loan in the same spirit as the Shanghai-Nanking Agreement, then American and other manufacturers may well "take warning from the cart ahead" and forego hope of equal participation in the supply of materials as provided for in the Loan and Parts Agreements.

Had open tenders been invited, and the cars and other material for the Shanghai-Nanking Railway purchased in the open market at the lowest price obtainable, on a fair specification, the saving to the Chinese Government would have been considerable. If $82,000 Mex. (say $40,000 gold) were saved in the rolling stock for a little 22 mile line, it is fair to assume that a proportionate saving would have been made on a 200 mile line.

Had all the materials for the Shanghai-Nanking Railway been purchased on the open market as provided for by the Loan Agreement, and the tenders advertised in Shanghai, and American and Continental firms permitted to compete, China would have had just as good a line at much less cost. Instead of operating at a loss, owing to the high capitalization, the line would now be paying its fixed charges or more. The failure of China to insist on her rights and demand compliance with the express terms of the agreement has cost her dear. She is still paying for it.

The Hukwang Railways.—And now we may consider the clauses of the Hukwang Railway Loan Agreement, the official text of which is printed in full in the supplement to this isssue of THE FAR EASTERN REVIEW. The history of the negotiations leading up to and surrounding the final acceptance of this loan, and the many bitter international jealousies engendered in consequence is still fresh in the minds of our readers and further agitation of the subject is to be deprecated. However, we desire to emphasize one point for the benefit of American manufacturers and their agents in China. The negotiations between the four financial groups had dragged along for several months owing to the refusal of the British and German groups to permit any change in the wording of Clause 18 of the original agree-

H. I. H. Prince YU LANG, Chief of the General Staff.

H. H. The Prince of SHUN CHENG, High Commissioner for Opium Suppression.

ment, which named the British and Chinese Corporation and the Deutsch-Asiatische Bank as purchasing agents for the lines.

The representative of the American Group, having full knowledge of the bitter national prejudice actuating E ropean engineers in influencing the awarding of tenders, and with the record of the British & Chinese Corporation and the Deutsch-Asiatische Bank in placing orders for materials regardless of the provisions of the Loan Agreements, endeavored to secure American participation in the appointment of a purchasing agent to provide a square deal for American manufacturers. This point was stubbornly contested for months, the British and German Groups refusing to admit American participation or relinquish their advantage. To terminate a trying situation, the American representative finally waived the right to appoint an American purchasing agent, on the condition that the British and German purchasing agents write an official letter obligating themselves to an impartial awarding of tenders. In other words the American representative placed the British & Chinese Corporation and the Deutsch-Asiatische Bank on their honor to discharge their duties impartially.

For a fuller understanding of this question, Article XVIII of the Hukwang Loan Agreement follows:—

For the Hupei Hunan section of the Canton-Hankow railway line, and the Hupei section of the Szechuan-Hankow railway line respectively (a) The British & Chinese Corporation, Limited and (b) the Deutsch-Asiatische Bank will act as Agents of the Railway Administration during construction for the purchase of all materials, plant and goods required to be imported from abroad. From this category rails and their accessories are excepted; for the purchase of which the Ministry of Posts and Communications has memorialized the Throne recommending that they should be manufactured and supplied by the Hanyang Iron Works. Their price will be settled by the Ministry of Posts and Communications with the Hanyang Iron Works, after comparison with the current quotations for rails purchased by other lines from Europe or America. No delay will be allowed, and it is understood that if the Hanyang Iron Works are unable to supply the requirements of the lines in question in such manner as to insure uninterrupted construction, the Purchasing Agents will be instructed to procure from abroad the additional supplies required. For all important purchases of materials tenders shall be called for by the Director General or the Managing Director concerned; in the case of all tenders, indents and orders for the importation of goods and materials from abroad, the said Agents shall purchase the materials required on the terms most advantageous to the railways, and shall charge the original net cost of the same, plus a commission of five per cent (5%). It is understood that no orders for materials shall be executed or any expenditure incurred without due authorization by the Managing Director concerned.

In return for payment of commission as above stated the British & Chinese Corporation, Limited, and the Deustch-Asiatische Bank as Agents for the respective railway lines, shall be prepared to superintend the purchase of all foreign materials required for their construction and equipment, which shall be purchased in the open market at the lowest rate obtainable, it being understood that all such materials shall be of good and satisfactory quality and that the aforesaid Agents will avail themselves of the services of engineering experts to be selected by the Ministry of Posts and Communications for the inspection of such materials. The fees of these Inspectors shall be borne in equal shares by the Ministry of Posts and Communications and the Purchasing Agents. At equal rates and qualities goods of British, French, German and American manufacture shall be given impartial preference over other goods of foreign origin. The Railway Administration of the Ministry of Posts and Communications reserves the right, while paying the above stipulated commission to the said Agents in respect of all purchases of foreign materials, to avail itself of the services of other Agents in China, or abroad, should it see fit to do so.

The most favorable shipping and insurance rates are to be secured and statements thereof together with original invoices and Inspectors' certificates are to be submitted to the Director General and the Managing Director concerned: all return commissions and rebates of every description shall be credited to the railways and all purchases made by the Agents on behalf of the railways shall be supported by manufacturers' original invoices and Inspectors' certificates No commission shall be paid to the Agents except as above provided; but it is understood that the Railway administration shall provide out of railway funds for the remuneration of Consulting Engineers whenever their services are engaged.

With a view to the encouragement of Chinese industries, preference will be given, at equal prices and qualities, over British, French, German, American or other foreign goods to Chinese materials and goods manufactured in China, such cases being left to the decision, in consultation with the Engineers-in-Chief, of an Inspector appointed by the Ministry of Posts and Communications. No commission will be paid on purchases of such Chinese materials and goods.

It is understood and agreed that, after the construction of the lines is completed, the British & Chinese Corporation, Limited, and the Deutsch-Asiatische Bank will be given the preference for Agency business for the respective lines during the currency of the Loan, for the supply of foreign materials which the Railway Administration may require, on terms to be hereafter mutually agreed upon.

It will be seen that this concedes to the British and Chinese Corporation and the Deutsch-Asiatische Bank the exclusive purchasing rights for the entire system including the American section, on which they are allowed a purchasing commission of five per cent.

At the meeting held in Paris on May 23, 1910, between the representatives of the four groups, it was agreed:

"That the existing arrangements of Article 18 of the original Loan Agreement be allowed to stand provided that the two Purchasing Agents give to the French and American Groups a letter in the following terms, and **provided moreover that said purchasing agents shall be bound to report as far as possible to any group requesting such information regarding the purchase of materials under the construction of the Director General** in accordance with the provisions of the original Loan Agreement with accompanying despatch and the supplemental Loan Agreement."

"We beg to inform you that we have been appointed purchasing agents for the Hankow-Canton, Hankow-Szechuen railways in accordance with article 18 of the Hukwang Loan Agreement initiated on June 6th, 1909."

"In view of the terms of the said Loan Agreement with accompanying dispatch and the agreement supplementary thereto providing for the admission to participation of the American Group and securing equal consideration for British, German, French and American materials and equal facilities for the receipt of tenders in the markets of the four countries, we beg to state that we will take all steps necessary to assure the above mentioned consideration for French, American materials *and make all proper provision for the receipt of or an absolute basis of equality of tenders from British, German, French and American manufacturers*".

Signed:

F. URBIG.
G. JAMIESON.
M. CASENAVE.
W. D. STRAIGHT.

At the same meeting it was furthermore agreed that all four groups should participate equally in the purchasing commission, the Deutsch-Asiatische Bank and the British & Chinese Corporation receiving one per cent as compensation for the actual services rendered, and the other four per cent to be equally divided between the four groups.

So apart from the provision of the Loan Agreement, there is a gentleman's compact that fair play will be observed.

The wording of the Loan Agreement, however, is somewhat ambiguous, and fails to define the precise methods to be followed. According to the agreement the British and Chinese Corporation and the Deutsch-Asiatische Bank are to act as agents for the purchase of *all* materials, plant and goods required to be

H. H. THE PRINCE OF CHUANG, One of the Eight Princely Families

imported from abroad, rails excepted, but for all important purchases of materials tenders shall be called for by the Director-General or the Managing Director concerned, and the said agents shall purchase the materials required on the terms most advantageous to the railways, charging the original net cost plus a commission of five per cent. However it is understood that no orders shall be executed or any expenditure incurred without due authorization by the Managing Director concerned.

What does this mean? If the Managing Director is to call for tenders on all important purchases, the tenderers will submit their prices, c. i. f. at Hankow, and the award will be made on the basis of this price, without reference to the purchasing agent. If this is the meaning of the Clause, then the duties of the purchasing agent are superfluous and the designation is wrong, for they cannot intervene to secure more advantageous terms after the tenders have once been opened and awarded. If the payments are to be made through the British and Chinese Corporation and the Deutsch-Asiatische Bank, then their duties are those of a fiscal or disbursing agent, and the 5% purchasing commission is only another name for a bonus for handling the funds.

Although one paragraph expressly states that all tenders shall be called for by the Managing Director, and no orders shall be executed or expenditure incurred without his sanction, yet we find that the purchasing agents in return for the commission are to superintend the purchase of all foreign materials, which shall be purchased in the open market at the lowest rate obtainable, and that at *equal rates and qualities* goods of British, French, German and American manufacture shall be given impartial preference over other goods of foreign origin, and the purchasing agents are to secure the most favorable shipping and insurance rate and all return commission, rebates, &c., shall be credited to the railways.

The phraseology of the clause is very much involved, and the only clear explanation seems to be that only for *important* purchases are tenders to be called for by the Managing Director, and all other orders are to go through the purchasing agents after due authorization from the Director.

The question naturally arises, what constitutes an important purchase, so that public tenders shall be invited? Is this confined to cars, locomotives, and bridges only, and are all other material classed as unimportant?

The most important order can be mutilated and divided into small parcels and placed direct through the purchasing agents. The value of accessory supplies for the construction of 1200 miles of railway is enormous, and if ordered in sufficient quantities would constitute an important order worthy of calling for tenders. If, however, these materials are to be ordered in small quantities at the whim of the Engineer, it is plain that the Director General will not have to call for tenders, and the goods will be purchased through the agents.

In this case what is the duty of the Purchasing Agent? The Loan Agreement provides that they shall purchase the goods in the open market at the lowest rate obtainable, and equal preference given to British, German, French and American makers, and in the Agreement signed in Paris, the British and German purchasing agents obligate themselves to give equal facilities for the receipt of tenders in the markets of the four countries.

This implies that in order to faithfully carry out their duties the British and German agents must also publicly advertise tenders for the various orders sent to them for execution.

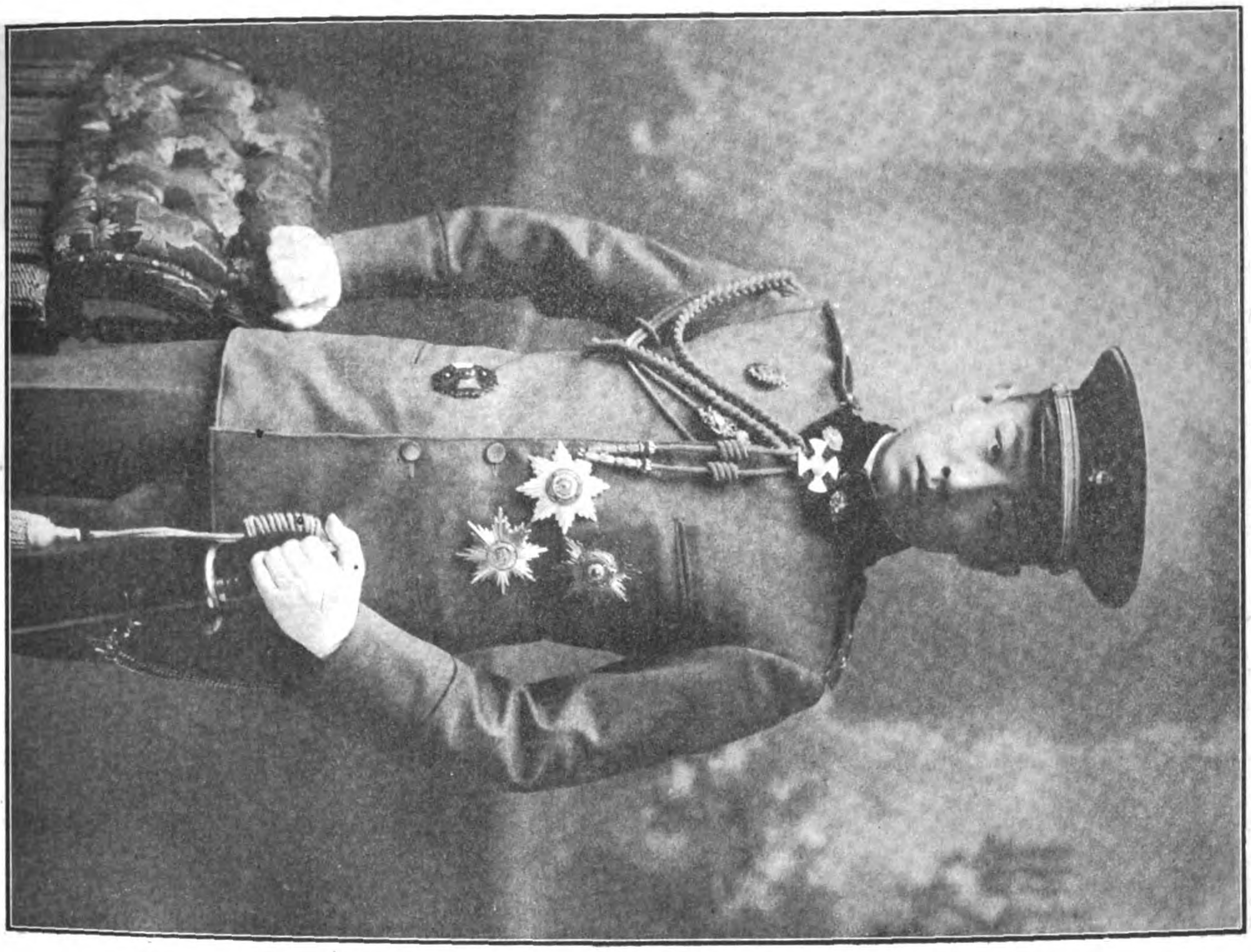
If these orders are to be placed privately or by private tender, how are the various manufacturers to know whether they are receiving equitable treatment? If the British or German purchasing agents place these orders with their friends direct, of what value is the Paris agreement which calls on them to explain after the deal is closed?

There is only one honorable method to follow, and that lies in the timely advertising of all tenders so that all parties to the agreement will receive a fair and even chance, otherwise the agreement is not worth the paper it is written on.

In this connection the question may be asked, what is a purchasing agen ? The commonly accepted definition is—one who purchases materials on a commission basis, and who is in honor obligated to give the best of his time, experience, knowledge of prices, etc., to the party engaging his services. He cannot in honor while acting as such at the same time act as a selling agent for any manufacturer and sell to his client, thus receiving a commission both ways. In America or Great Britain the duty of a purchasing agent is clearly defined and governed by a rigorous code of ethics, any deviation from which destroys confidence in his methods and ends his usefulnes. A purchasing agent who has an intimate knowledge of prices, freights, exchange and other conditions, can purchase materials lower than his client and justify his five per cent commission. In America a 2½ per cent commission is considered adequate for such services. The purchasing agent has no entangling alliances with manufacturers, but serves his client by securing the lowest prices on an even specification by open competition.

The question of the duties of a purchasing agent in connection with Chinese railways has never been clearly defined, and each agent has apparently placed his own construction on its meaning. In the early days

THE SONS OF PRINCE CHING



H. I. H. Prince TSAI FU. General of the Imperial Guards.

H. I. H. Prince TSAI-CHEN, Ambassador of China to the Coronation of H. M. King George.
It is reported he will be appointed to a high post in the near future.

of the America-China Development Co., who held the original concession for the construction of the Canton-Hankow Railway, the firm of Wonham, Sanger & Bates of New York (then Wonham & Magor) was appointed purchasing agents for the line. The business code of morals under which they operated, compelled them to cancel all agency contracts with manufacturers they had represented for years, and to enter their new duties with a clean slate, and with no entangling commercial alliances to provoke suspicion and criticism. This is the correct and only attitude.

In nearly all the railway loan agreements entered into between the British and Chinese Corporation and Chinese Government, the Corporation has received the customary five per cent for superintending purchases, or in other words for acting as purchasing agents. Invariably however the Corporation has delegated its powers as purchasing agent to a leading British mercantile firm who have superintended the purchasing of materials in China and elsewhere. This action has created a very delicate situation, for this firm actively represents many of the leading manufacturers of railway material.

Under the terms of previous Loan Agreements, the question had no special interest to American manufacturers, but under the terms of the Hukwang Loan Agreement, which admits American material on an equal footing with the other nations, and the fact that the purchasing agent is obligated to give a square deal to all, the duties of a purchasing agent should be clearly defined, especially as we are informed that the British and Chinese Corporation has again delegated its powers to the same firm. If this is the case, then we contend that the latter firm is debarred from acting as agents for the sale of materials to the lines embraced in the Hukwang Loan, and must confine its duties solely to the impartial awarding of orders to other firms. The Deustch-Asiatische Bank also acting as purchasing agent has apparently no organization in China for the discharge of these duties, and all orders would be automatically placed with their friends in Germany. The situation demands some radical departure from the prevailing practice to avoid criticisms and misunderstandings.

Nearly all American and European manufacturers of railway supplies are represented in China by reputable firms, and we believe that the only solution to insure fair play to all interests is for the British and Chinese Corporation and the Deutsch-Asiatische Bank to employ a competent party with assistants to act for them, establish headquarters in Shanghai, and publicly invite tenders for the various orders for materials as they are required. Such a step would meet with the hearty approval and indorsement of all fair-minded merchants, and pave the way towards a better understanding and the establishment of mutual confidence.

With the duties of the foreign purchasing agents clearly defined, and the way paved for an impartial rendering of their services, there yet remains a difficult situation to improve before a square deal can be secured. Of what avail is the impartiality of the purchasing agent, or the Chinese Managing Director, if each Engineer is to draw up his own specifications for materials, according to his ideas of what is best and proper? The natural tendency of the engineer of a loan-built railway is to devise a specification on which only his particular friends can hope to tender with success. If American standards for bridges, and rails, are specified by the American Engineer-in-Chief, British or Continental materials cannot hope to compete, or if British sections for bridges and rails are specified, American and Continental makers are disbarred. If the engineer specifies a locomotive following purely British practice, the other makers are frozen out, and so with cars and other materials. It is so easy to devise specification and insert some innocent looking clause, which closes the door to all but

H. I. H. PRINCE TSAI HSUN, MINISTER OF THE NAVY.
Brother of the Regent, and Uncle of the Emperor.

some favored maker. The failure of the Chinese Railway Administration to adopt a set of standards for the roads under its control is almost criminal and opens the way to all manner of graft, corruption or favoritism, which in the end means a needless drain on the treasury.

The engineer of each loan-built railway has in the past been a law unto himself, and set his own standards and drew up his own specifications, and then when competition was permitted at all, it was restricted to a list of makers approved by himself.

The Chinese Government has placidly refrained from interfering in such practices, and the consequence is, that to-day after an expenditure of over $120,000,000 Gold, there is no co-relation between the systems, interchange of cars or through traffic is almost impossible, and sooner or later the enormous outlay for her ill assorted collection of rolling stock will be wasted, and the lines equipped anew.

The time has arrived when China must face the situation and assert her authority. The Minister of Posts and Communications by further delay in authorizing a set of national standards, is piling up future trouble for his country, and holding open the door for further corruption and discrimination.

It is the only solution to a fair deal that will relieve China from the charge of evading the Open Door doctrine. If a committee of broad-minded foreign engineers, one Continental, one British and one American, together with a Chinese of the standing of Jeme Tien Yu, were appointed to devise a set of standards for Chinese railways, it would solve the question. Then when future railways are to be constructed, all manufacturers will know exactly what will be required.

At present half the time of the Engineer-in Chief is devoted to drawing up plans and estimates for materials, instead of superintending the real construction work. With official standards already created, it would relieve him of much mental worry, and make impossible any improper practices or discrimination.

With a fair clean specification for locomotives, cars, bridges and other material, giving the manufacturers of all nations an equal opportunity to tender, real competition will result to the immense advantage of the Chinese Government.

If the present system is permitted to continue, then we may look forward to a repetition on the Hukwang Lines of the practices characterizing the building of other roads, and China will again "pay the piper". With a set of standards making for a clean cut specification once established, there remains yet another important feature for the insurance of fair play to all. This consists in timely advertising the tenders in the daily or other papers at Shanghai, so that every firm will be on the same footing.

There is plenty of time to spare in the construction of the Hukwang Lines, so that tenders for the purchase of all important materials can be duly advertised in advance allowing sufficient time to elapse before their opening. This enables the firms on the ground to mail the specifications home and receive their replies by mail. This feature is imperative for fair play. There have been instances on other railways, where the specifications have been in the hands of favored firms long previous to the advertising for tenders, which was only done to "save face". The advertisement called for the opening of tenders in three weeks time, or sufficient to enable the Continental and British agents to mail the Specification home, receive their price by cable, and the tenders opened and the contract awarded before the mail could reach America. So to insure fair play to the American manufacturer, the time should be lengthened. Aside from the spirit of fair play involved, the practice of short time advertisements for tenders is a gross imposition on the business community of Shanghai, who are compelled to use the cable if they wish to compete. It is safe to say that the disregard for this feature by the management of the Tientsin-Pukow Railway cost the firms of Shanghai, in the aggregate, more than the entire profits realized on the sale of materials to the line. One locomotive tender in which 40 firms participated the cable tolls must have reached $20,000 gold. Any system which will relieve the merchants from this unnecessary drain would meet with hearty applause.

H. H. Prince NA (Nayentu), Grand Chamberlain of the Court.

Dsazzak of the Khelka Mongols. Son-in-law of Prince Ching

I have pointed out a condition and suggested the remedy. If the Chinese authorities desire to be impartial and retain the good will of foreign manufacturers, and uphold their end of the Open Door doctrine, they will take action to alter present practices. Procrastination will not avail, as the situation must be faced now squarely and fairly. China's credit and prestige is at stake. If former discrimination and extravagance mark the construction of the Hukwang Lines, China's credit will be irretrievably lost. The loan of $50,000,000 to construct 1200 miles of railway, is only $40 000 per mile.

The American section of 200 miles through a mountainous country may well cost $100.000 per mile or $20,000,000. If the British Kowloon-Canton Railway cost over $200,000 per mile, and the French narrow gauge line in Yunnan over $60 000, no undue criticism could be directed against a cost of $100,000 for the American section. This leaves $30,000,000 to build 1000 miles of railway. Under purely Chinese management a suitable line might be constructed for this cots, but experience has taught us that loan roads built under foreign supervision are more costly. With all charges, it is fair to estimate the cost of the line at $50,000 gold per mile or a total of $70,000,000 for the entire system. And only by the most careful economy and strictest honesty can the lines be built with in this figure. With every resource of the Empire already hypothecated, it is difficult to conjecture where China will find the neces sary guarantees for future loans, if the presen policy of borrowing is continued. With a constantly increasing deficit in the Imperia and Provincial treasuries, and all possibll revenues mortgaged, the end will come, unless corruption ceases.

The world will watch with great interest the progress of the Hukwang Lines, as it is China's last opportunity to prove her good faith.

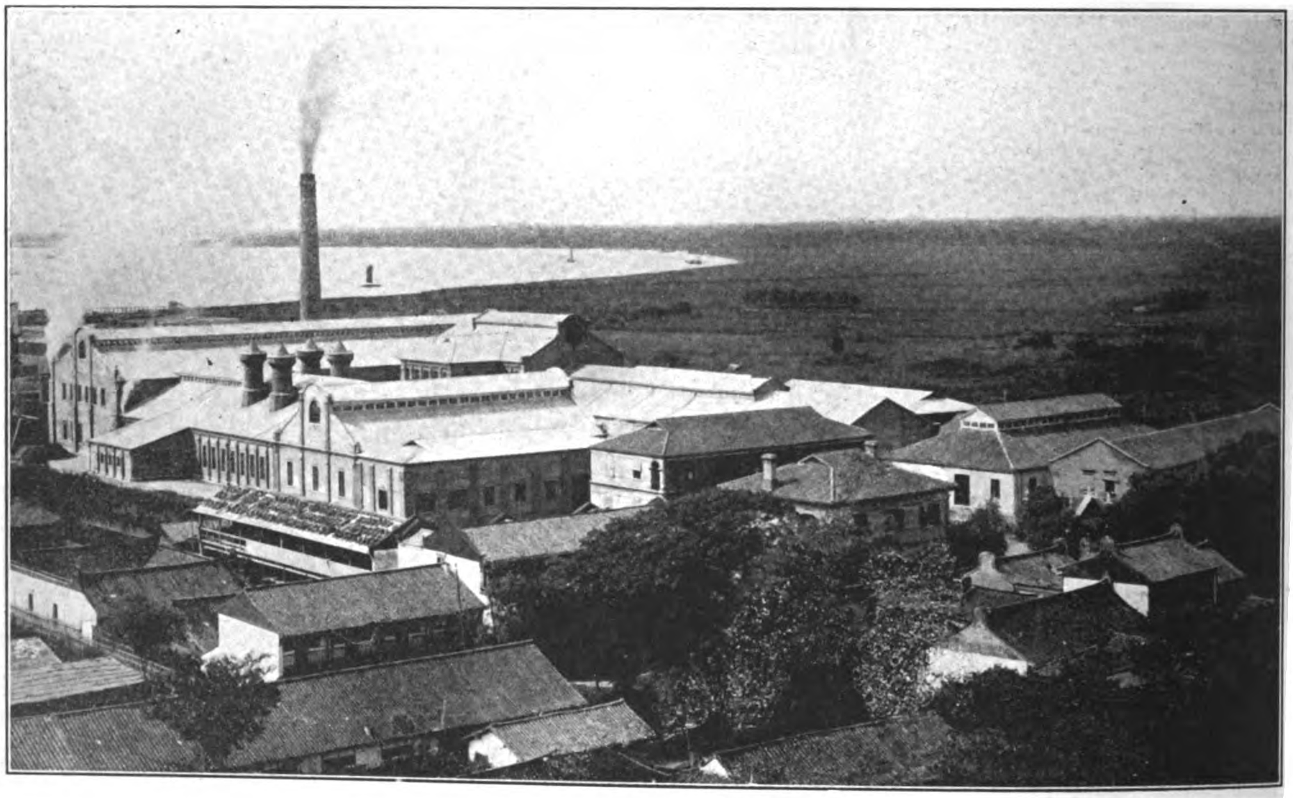
THE IMPERIAL CHINESE PAPER MILL, SHANGHAI

Among the leading modern manufacturing plants in China the Imperial Chinese Paper Mill, located about four miles from Shanghai on the Whangpoo River above the Arsenal, takes a foremost place. The plant is owned and operated by the Imperial Chinese Government with Pong Lai Zung, a metropolitan official of the Fourth Rank, in charge as Managing Director.

The contract for the installation of the plant was awarded the American Trading Company after keen competition in June, 1905. The specifications called for an American paper mill having all the latest modern machinery and equipment, with a capacity of 22,400 pounds of fine, and about 26,800 pounds of ordinary paper. The construction of the plant was supervised by the American Trading Company's engineer, the work being in direct charge of the Japanese engineers employed by the mill company, and within eighteen months after the contract was signed the installation was completed.

The Power Plant.—This consists of four 7 ft.×30 ft. Lancashire Galloway boilers in battery with Green's fuel economizer. Feed water is supplied to these boilers by powerful Worthington plunger and ring pattern pumps. The pressure carried is 160 lbs. per square inch. The main engine is a 650 I. H. P. Lane & Bodley triple expansion four cylinder horizontal side by side engine with twin cylinder worm and screw actuating barring engine. A Worthington jet condenser is located in the pit at the right and aft of the engine. Power is taken from a fly wheel grooved for 18⅓ ropes.

An electric lighting set is installed comprising one General Electric Co.'s vertical direct connected trunk pattern single cylinder engine with a 20 K. W. 360 R. P. M. generator.



THE IMPERIAL CHINESE PAPER MILL AT SHANGHAI

Rag Cutting and Dusting Room.—This department contains one Daniel's double blade iron frame rag cutter, one Wheat's improved rag duster, one cone fan duster, one exhaust fan for rag room, and one rag conveyer for carrying rags to the rag room above the rag boilers.

Chemical Room. — This room contains wrought iron caustic soda dissolving tanks, lime dissolving tanks, bleachers, and powder dissolving tanks with agitators, centrifugal pumps for caustic soda and lime, and bleaching pumps.

Rag and Straw Boiling Room.—This section contains 2 14 ft. McNeil's spherical rotary bleaching boilers, boiled rag conveyers, and straw and pump machines.

Sizing and Loading Room.—This division of the plant contains cast iron size boilers, wood dissolvers, and alum dissolvers.

Beating Room.—This space is occupied by two Jones 4 ft.×5 ft. stock elevators, six Jones 54" wood tub washing and bleaching Hollanders with two cylinder washers, six complete 54" wood tub beating engines with one cylinder washer, two complete standard Jones Jordan engines, two Jordan stuff pumps, and 2-12-ft. wood stuff tanks with agitators.

Paper Making Room.—Here are installed two Beloit Iron Works Co.'s improved 100" wire tissue Fourdinier paper machines with gear train. Each of these machines is driven by a 100 H. P. Shephard automatic engine. The paper machines are complete from stuff chests to revolving cutters, and Jones vertical stuff pumps are provided to deliver to the Fourdini r machines from stuff tanks.

Finishing Room.—This department contains one 50" Guillotine paper cutter, one baling press with suitable hydraulic pump operated by vertical team engine with shafting, etc., adapted to meet requirements.

(Continued to Page 92.)

THE FAR EASTERN REVIEW

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SUCCESS OF THE FILIPINO LABORER ON SUGAR PLANTATIONS IN HAWAII

The experience of the Hawaiian Planters' Association has demonstrated the fact that in the sugar industry of Hawaii the Filipino may be developed into a satisfactory and efficient laborer. This result involves, however, considerable time, much patience, painstaking and careful supervision.

Comparatively few of the Filipinos going to Hawaii have ever been accustomed to continued or systematic work and it can hardly be claimed that the Association has been taking labor from the Philippines, but rather that they have been taking a possibility of labor and that the results of proper feeding and housing, of fair treatment and intelligent supervision have developed it.

Going as many of them do, ill-fed, anaemic, and with little in the way of clothing, it is not surprising that the first few months are frequently months of desultory work and that the wages earned are spent for fancy groceries and luxuries in the way of clothing rather than for necessities. When the Filipino comes to the realization of the fact that he is to be paid cash at the end of each month for the work done, and that he can supply all his wants and actually save money, a feeling of responsibility and ambition is aroused, his attitude changes and his work becomes of real value.

If the amounts of money sent home to the Philippines by the laborers were accurately known they would be astonishingly large. A single mail recently brought to one post office on a southern island, from which about one hundred people had gone to Hawaii, money orders to the amount of over two hundred and fifty pesos. Many of the Filipinos after a few years stay evince a desire to return to the Philippines, and an instance is recalled of a young man and his wife, to whom two children were born on the plantation, who in three years entirely supported their growing family, saved sufficient money to bring them all back and had a considerable cash balance.

Something over a year ago statistics prepared showed that of the number of Filipinos who had emigrated to Hawaii 86 per cent were at work on the sugar plantations. More recent figures show that they are gradually advancing into better and more profitable classes of work. In March of the present year there were employed on the plantations in Hawaii

463 Filipino contractors
162 ,, planters

These had all advanced from the condition of unskilled laborers, who are those receiving a monthly wage based on twenty six (26) working days per month.

CONTRACTORS are those who either singly or in companies undertake the performance of labor needed for some specific operation, such as planting, cultivating, cutting, or loading and for which they receive so much per ton of cane, and who during the period of the contract are advanced sufficient sums to meet living expenses.

PLANTERS are those who either owning land, leasing it, or being allowed the use of it by the plantations, raise and sell sugar cane to the plantations on an agreed price per ton.

Both of these classes allow of more independence on the part of the laborer and bring in larger returns but can be undertaken only after experience in plantation work. That the Filipino is acquiring experience and ambition is shown by the above figures.

During the last session of the Territorial Legislature a resolution was adopted directing the Committee on Agriculture, Forestry, Promotion and Immigration to carefully investigate and report on the character of Filipino laborers and the conditions of their acquisition.

On the question of character, the Committee reported in part "The overwhelming weight of the evidence gathered warrants the finding that the Filipinos are people of average "character"—usually peaceable and orderly, in the main honest, tractable, industrious,—generally the equal of most of the immigrants."

The Committee sent letters to various plantation managers asking among other questions the following:

Question 4. General characteristics of the Filipinos as laborers, (b) as citizens of the plantation community?

Some of the replies were:

Manager, Ewa Plantation.

"Filipinos are not as good laborers as other nationalities; but my belief is that, with regular work and regular pay, they will in time become efficient. On this plantation there are a number of men who are steady workers. As citizens of the plantation community they seem to be fairly peaceable. There has been less trouble with them than the writer anticipated."

Manager, Oahu Sugar Company.

"They are good for light labor, and seem intelligent, are not quarrelsome, but are obedient, and in time should make good laborers. Are peaceable citizens of the plantation community, fond of sport, and are gradually taking more interest in improving their own condition. They are a better lot of labor than the Koreans or Puerto Ricans, and as a large percentage of them talk English, it is not difficult to instruct them in their work. We have had very little trouble with them, they keep the peace, and do not drink more than other nationalities, and as they learn how to provide comforts for themselves, in the way of living, they will improve."

Manager, Olaa Sugar Company.

"The Filipino compares favorably with the laborers of other nationalities as to their peacefulness, and law abiding qualities in the plantation community. We have found some exceptionally good men amongst the Filipinos, and taking all in all I consider they have done as good work as the Japanese when they were coming to the country in large numbers from 15 to 18 years ago."

Manager, Waialua Agricultural Company.

"As cultivation contractors, the Filipinos on Waialua are doing as good work as any of our oriental contractors. On day labor they are a little slower than Japanese. On heavy work, such as flume cane, most of them drop out; those that remain are first class.

"As citizens of the plantation community, they are quiet, keep their camps fairly clean, obedient and respectful, although they are probably our worst gamblers; very little drunkenness.

"There are many good men who compare favorably with any men we have; this class pick up the work quickly, are reliable and steady. The tougher element leave of their own accord after working two or three months. All Filipinos seem more fond of sports, music and dancing than any laborers we have; they are ambitious to learn English and American ways; most men wish to attend some night school."

Manager, Onomea Sugar Company.

"Some are very good laborers, other indifferent and restless, a characteristic usually obtaining among all classes of Asiatic labor when first introduced here".

ALL NATIONALITIES PLEDGED TO ADVANCE PHILIPPINE INTERESTS

The month of July was marked by a successful campaign on the part of Manila Merchants' Association to enlist all the different elements of the commercial community in a cooperative movement designed to advance the interests of the Philippines. The result was an increase of over 100 in membership of the association among whom were representative businessmen of every nationality.

Manila is one of the most cosmopolitan cities of the world. Every active commercial nation is represented and foreign commerce is greatly in excess of American participation. It is only natural then that each nationality represented

should have its own chamber of commerce to advance the interests of that special group. The Merchants' Association was organized originally to discuss local problems, to carry on a campaign of publicity, and to make such recommendations to the local authorities touching legislative needs. The growth of the Association has been steady, but it seemed impossible to secure active interest on the part of the members of the foreign commercial bodies. The agitation for reciprocity between the islands and the United States endorsed by the Association which was controlled by American sentiment did not meet generally with the approval of the foreign interests who believed they would suffer from the legislation giving America a preferential market. As a result there was but a limited interest taken by the foreign communities in the work of the Association.

Reciprocity with the United States, however, did not prove so disastrous to foreign trade as was anticipated. The increased purchases of Philippine products by America enhanced the purchasing power of the islands, with the result that foreign trade increased by over 10% the first year and conditions generally were greatly improved. Instead of injuring foreign interests, free trade proved a material benefit.

All trade interests whether foreign or American participated in the increased prosperity of the islands, and there has developed a sentiment favorable to a greater measure of cooperation along lines designed to widen trade relations, encourage investment in industrial development and to give wide publicity to the Philippines.

The year 1911 has been especially marked by the advanced position taken by the Association. President Milton E. Springer recognized that the time was ripe for broadening out effectually and, with the support of an active executive committee, success crowned his efforts. The active co-operation of the Philippines Government was pledged and the foreign membership increased by leaps and bounds.

The new birth of the Association was celebrated in an unusual and striking manner at its annual banquet on July 27 when over 300 covers were laid and the enthusiasm prevailing emphasized the purpose of the merchants of Manila without regard to nationality to work together for the good of the community.

A few days previous to the banquet Governor General Forbes made an address before the members of the Association at their rooms on the pressing commercial needs of the Philippines in which he pledged the Government's co-operation in the working out of local problems. He prefaced his address by the following characteristic remarks:

"The Government cannot make prosperity, the Government cannot create wealth, it can only assist. It is the Government's business to so administer the Islands that the people may have the least possible obstruction to legitimate enterprise; that the individual may reap his greatest share in the fruits of his labors, and that the conditions under which agriculture, industry and commerce are conducted are as free and unrestricted as possible. To use a figure of speech, the surface of the field is to be kept smooth by the Government, it is the merchants who play ball.

"There is a vast amount of potential labor of excellent quality, and, without going into a discussion of Philippine labor at length, I will say that in the long run you will get what you pay for and if you pay well you will get good service. The Filipino is no fool and he must be well treated and also well paid or he will not play the game, because Nature is lavish and prodigal and will compete in the matter of kindly treatment to a degree upon which all employers of Filipino labor will have to calculate.

"In the matter of the willingness of the labor to work I am not very hopeful of very early results; the old system of inadequate incentive has been of too long duration and the growth of a demand for a higher grade of living and of the supply necessary to fill this demand will be a slow matter. The majority of the people of the Philippine Islands, even if money were given them today would not know how to spend it advantageously. In this respect they do not differ very greatly from the people of all other countries in the world, who usually make a poor use of the first money which they get, spending it on things which they think they want but which they probably find are bad for them. You give a large sum of money to a hundred people in America and see what portion of them will be benefited by it. Most people have to have time and experience before they will make good use of money and some never do learn. Thus we cannot criticise the Filipino because he is like every other human being and makes a bad use of his first free money. Thus will the cockpits flourish until the Filipino learns the value of doctors and medicines, hospitals, good stores, better food, better clothes, more durable houses and until the means of supplying the desire for these things is at hand. We are now lying in the doldrums between the two incentives; the old incentive of fear by which men were practically forced to work is giving way to the new incentive of desire by which intelligent self-interest will make men work. That there is no possible question as to the result and the success of the new incentive when it gets in fun force is proven abundantly by the experience of our laborers in Manila where good wages are paid and where the individuals can get a good living; and having learned to want the good things they can get by working, they do now work satisfactorily. Also in Hawaii, the experience with Filipinos has proven them to be as good laborers as Porto Ricans, Coreans and Japanese."

He declared his purpose to assist the Association in preventing adulteration of Philippine products. He said:

"I have recently directed the Attorney-General to prepare a law designed to penalize frauds in the matter of classifying and putting up staple articles of Philippine production. I don't know whether the real evil can be reached and remedied by law, but there is no doubt that it can be reached by a combination of law, and regulations put into effect by associations formed by the interested parties, and by the development of enlightened public opinion condemning such practices. One of the advantages of the association would be that where each concern has put in a deposit of good faith the best markets would soon be reserved for goods guaranteed by the association, and any member found guilty of adulterating or fraud could be fined or fired from membership and lose whatever privileges attach thereto.

"Last and not least of all these things is the proper advertisement of Philippine goods. The Legislature has shown its appreciation of the importance of this by the passage of Act 2058 appropriating ₱50,000 for the advertisement of Philippine goods in the United States. The Government stands ready to co-operate with the merchants to the fullest extent of its resources in this very important particular.

"It is the business of all of us,—of you and of me,—to see that at no point in the passage of the river of trade, to return to my first simile, is the obstruction such as to choke the flow. And this has been the principal menace to the successful conduct of business in the Islands; namely, that it has always been the practice of too many to try to make too much out of their transactions, and in this way tend to kill industry. Producers who cannot operate without loss will abandon the trade, and thus the goose that lays the golden egg is killed. So it is up to the owner of land who leases it to the "aparsero," to the man who loans him money, to the launch owner, or cart owner, or automobile owner who carries it to the point of shipment, to the man who owns the bodega at point of shipment where the product is housed until the train or steamer arrives, to the railroad company or steamship line, to the stevedore and transportation companies in the major ports, to the warehouse people and to those people who loan money on produce until the time of sale, to make absolutely sure to take no more than the business will stand. They must not crowd business back to the point of production, thus ruining trade or forcing the little man out and the larger man to provide himself with his own facilities which in time may prove to be a competitor. In other words, they must be careful to measure the flow and where the flow checks take less and reduce their own prices and if necessary their own profits in order to make sure that the volume of business does not decrease and thus give the whole country a set back, in which they themselves will be included.

"To accomplish the complete regeneration of the economic Philippines and bring about the reforms I have outlined there are two things that are necessary: co-operation and capital.

"The Government can do a part; the merchants can do a part, but the two together are vastly stronger than either alone. Let us get together and stay together. The recent activity of the Merchants' Association is as earnest of the new era which holds brilliant promise for future understanding and co-operation.

"Once we are all pulling together and co-operating and presenting a solid front we can expect others to have confidence and come to invest capital. For the introduction of economical methods and modern improvements means money. We have got to have money. Without it we cannot compete in the markets of the world with other countries that have capital already invested."

The well defined attitude outlined in the Governor General's address was received with enthusiasm and the whole community woke up to its responsibilities in this campaign. The attendance at the annual banquet which followed a few days later and the interest displayed might well be taken as evidence of renewal of purpose.

The speakers at the banquet represented every section of the commercial community. Governor General Forbes enlarged on the subject of advertising. The government was prepared to put up a dollar for every dollar subscribed by the merchants for that purpose and there were ₱50,000 in the Insular Treasury now available. He even announced his own subscription of ₱1,000 to head such a list. He urged the establishment of agencies in China, Japan and the United States for the purpose of attracting tourists here and expected to establish a government bureau to spread Philippine gospel and to refute calumnies heaped upon the islands by the unscrupulous.

The Governor General was followed by Alcalde Roxas and Bishop Chas. H. Brent. H. I. Japanese Consul General, Mr. Sugumura, made a speech in which he stated that he expected to see the trade between the islands and Japan doubled in the next five years.

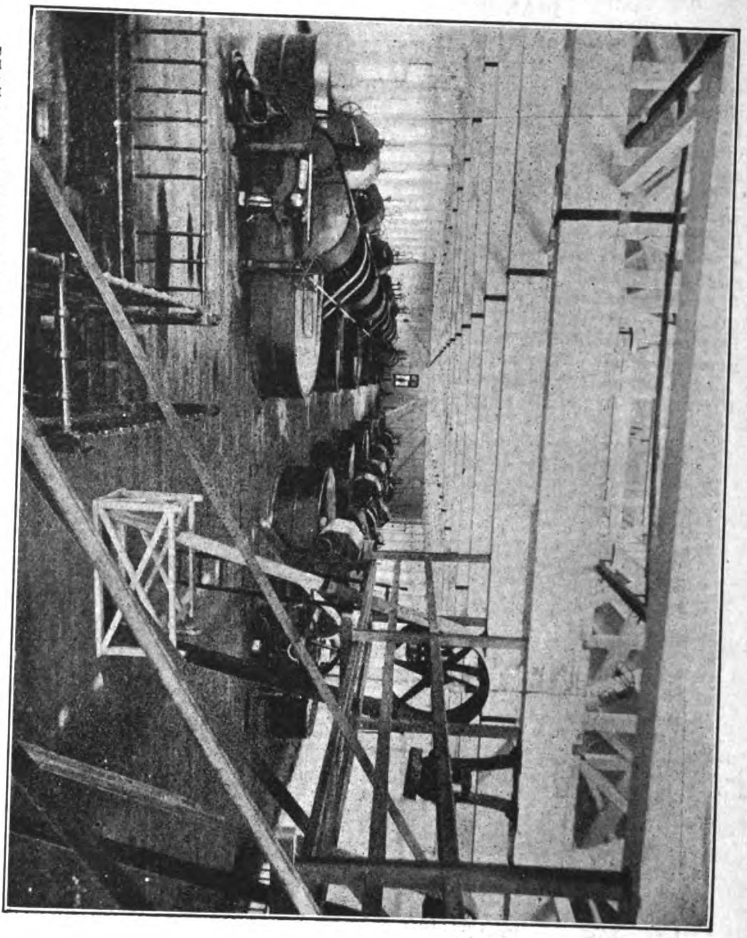
Hon. Charles B. Elliott, Secretary of Commerce and Police, followed and advocated greater co-operation between the commercial interests and the Government, but pointed out that the Government was for the benefit of all the people and not any particular body or interest, and that it should keep the field clear in order that while the commercial interests are encouraged legitimately it must be along lines consistent with the general prosperity of the country.

Mr. William S. Macleod, head of the well-known British firm of Messrs. Macleod & Co., favored the occasion with an excellent address in which he dwelt upon the benefits of the Payne Bill and made a strong plea for co-operation in improving the quality of Philippine exports and maintaining the highest possible standards. He expressed his faith in the future of the islands as a producer of rubber, coffee, spices, cocoa, etc.

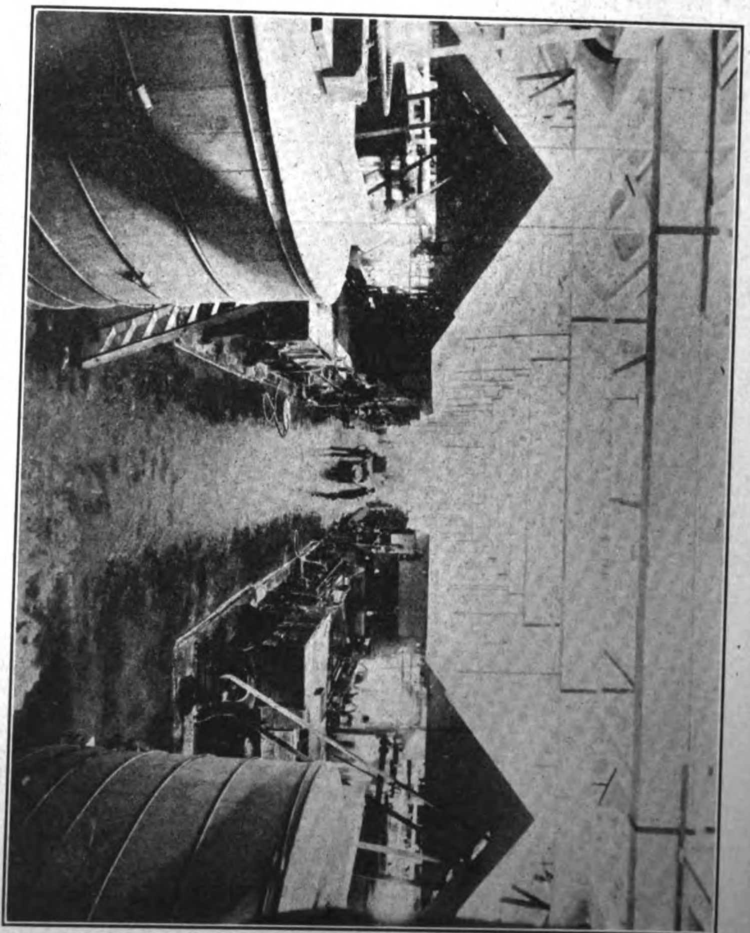
Señor Eduardo Soriano, President of the Spanish Chamber of Commerce, gave a comprehensive review of the commercial history of the islands and entered heartily into the spirit of the occasion by urging every interest to co-operate for the general good.

Mr. E. Zuellig, a prominent German importer, reviewed the commercial situation with special reference to the adjustment of certain lines to meet the changed conditions under the Payne Bill. He was enthusiastic over the Association program and expressed his belief that active co-operation would result in immeasurable advance of insular trade and industry.

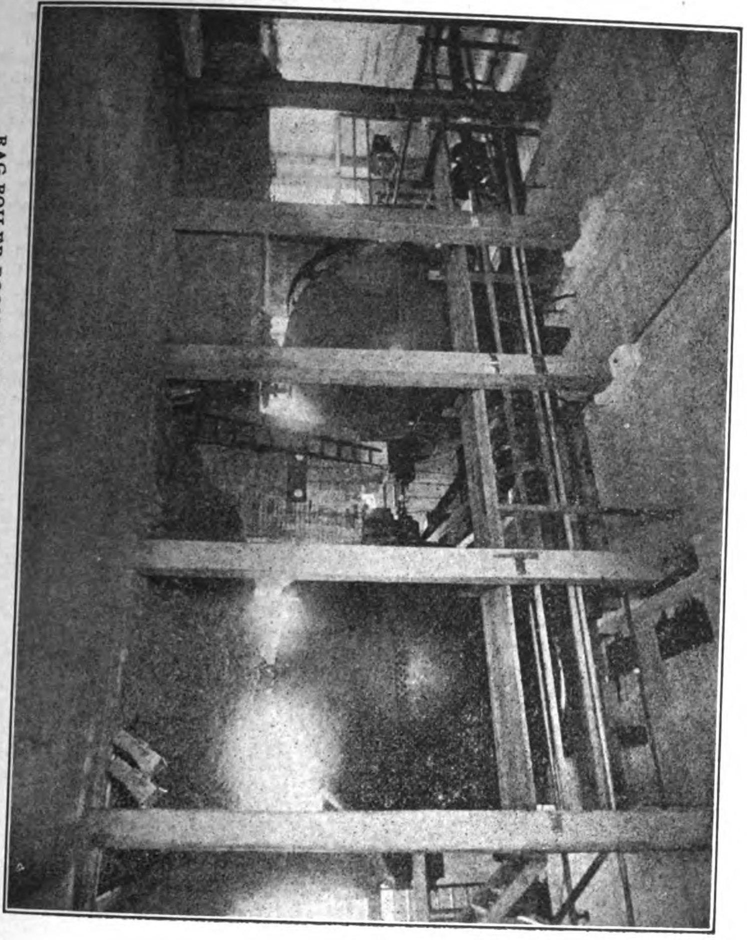
A speech by President Hord of the Banco Español Filipino, chairman in charge of the banquet arrangements, was the last address on this historical occasion. He has always been a promoter of greater co-operation among the merchants and expressed gratification at the display of sentiment indicating that Manila was well on the way to accomplishment.



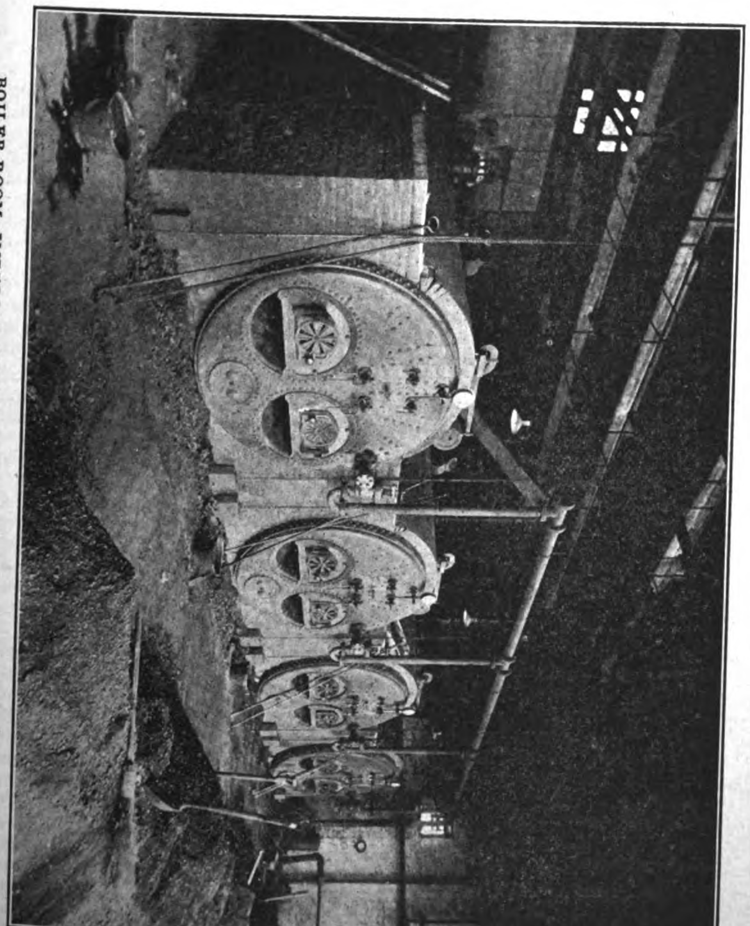
BEATER ENGINE ROOM—TWELVE E. D. JONES & CO.'S PATENT BEATERS AND TWO JONES JORDAN ENGINES



MACHINE ROOM FROM STUFF END—TWO BELOIT IRON WORKS MACHINES



RAG BOILER ROOM EQUIPPED WITH TWO 14-FOOT RAG BOILERS



BOILER ROOM, IMPERIAL CHINESE PAPER MILL, SHANGHAI, WITH GREEN'S ECONOMIZERS

THE IMPERIAL CHINESE PAPER MILL, SHANGHAI

(Continued from page 88.)

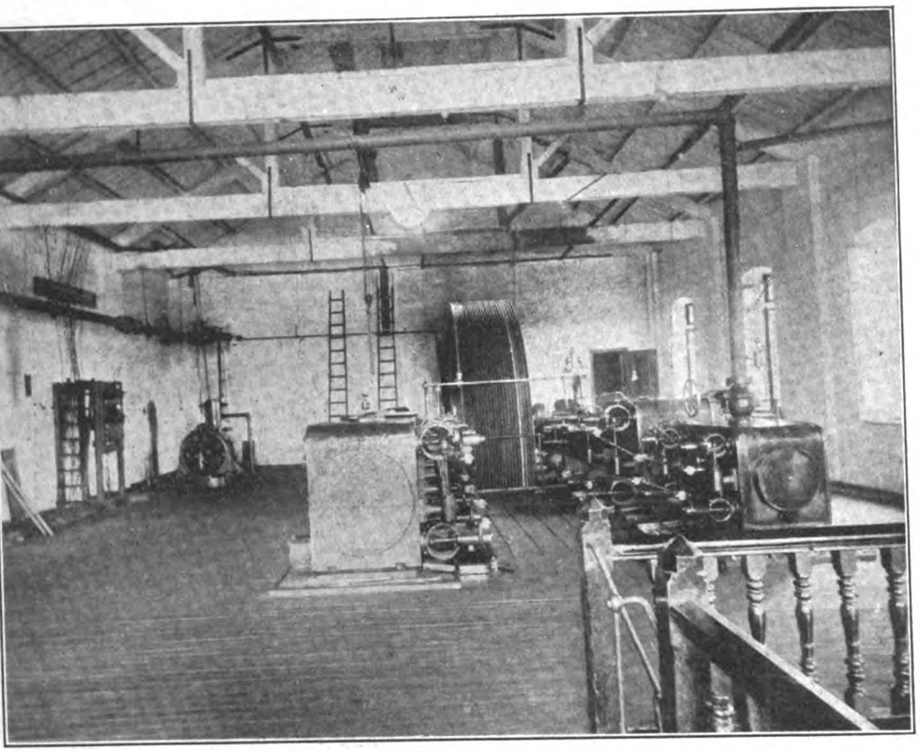
The Machine Shop.—This shop is equipped with one vertical steam engine with auxiliary boiler, one 42" Bickford radial drill, two lathes, 16"×24" one 36"×36"×8" Cincinnati planer, grinders, forges, etc., with suitable connections.

Carpenter Shop.—This division is supplied with circular saws, etc., and all necessary equipment to provide a modern shop.

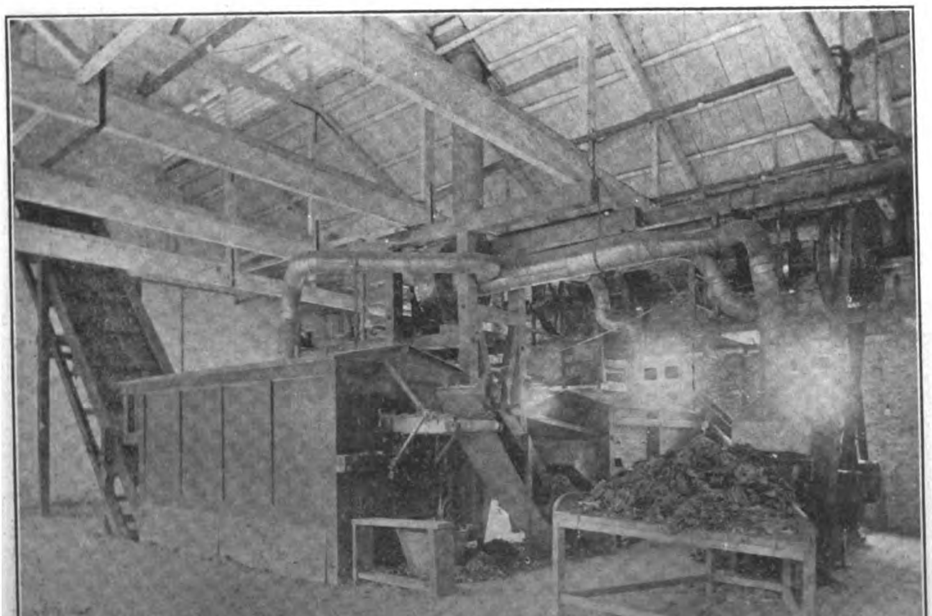
Water Purification and Supply Plant.—Here are installed one low lifting centrifugal pump for filters capable of lifting 200 cubic feet of water per minute, one double acting Duplex horizontal Worthington low pressure general service pump 14"×14×10 eight 16 ft.×12 ft. wood tub filters, 2 main water tanks 16 ft.×12 ft, and one 18 ft.×16 ft. also one elevated iron supported maintank for general water supply.

The plant is a credit to the Chinese Imperial Government and to the contractors and manufacturers. The American Trading Company exhausted every possible effort in making the installation typical in every way of the best American practice and the manufacturers supplying the machinery co-operated most satisfactorily by expeditious delivery of machinery. Among the manufacturers referred to were Messrs. E. D. Jones & Co. of Pittsfield, Mass., the Beloit Iron Works Co. of Beloit, Wisconsin, the General Electric Company of Schenectady, N. Y., and the International Steam Pump Co. of New York.

The quality of paper turned out is equal to the best American or European manufacture.



MAIN ENGINE 650 H. P. TRIPLE EXPANSION



RAG ROOM SHOWING RAG DUSTERS AND CUTTERS

A STAFFLESS HAND BRAKE

In order to meet the requirements of modern ideas of car platform construction, says the *Electric Railway Journal*, the tendency of which is to reduce the space occupied by the controlling devices thus increasing the facilities of handling passengers as evidenced by the popularity of the prepayment plan of platforms with transit operating officials, a new hand brake has been designed and patented by G. S. Ackley, the well known inventor of the "Ackley Adjustable Brake". This new brake, as shown by the accompanying illustrations, combines in an ingenious manner the space saving features of the vertical wheel with the advantages of the spur geared eccentric winding drum. It has been named the "Ackley No-Staff Brake" as it will be noticed the customary brake staff with its heretofore necessary evils is eliminated. The "Ackley No-Staff Brake" has also been designed for steam cars both passenger and freight service, and can also be used in place of the old slow acting screw brakes.

FIG. I

Fig. I shows a full front view of the new brake as it appears on a car platform. The pedestal and gear housing is a one piece casting with doors on both sides for assembly and inspection purposes. Care has been exercised in its design so that it presents a symmetrically appearance and does not mar but rather adds to the attractiveness of the car equipment.

A side view is shown in Fig. 2 with the doors removed and the pedestal broken open disclosing the interior mechanism. The brake chain is attached to the eccentric or cam of the drum,

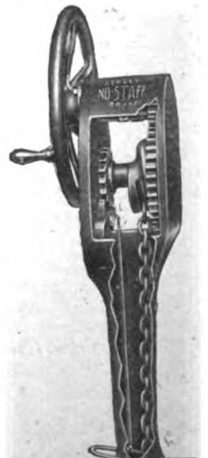


FIG. 2

and by means of the spur gear cast to this drum and the pinion actuated by the hand wheel, is wound along the smooth spiral course on to the drum's smallest diameter. This drum revolves on a roller bearing, and with its axis being in a horizontal position there is no difficulty in the release, as the tension and weight of the unwound portion of the chain serves toward this purpose. In this illustration the chain is shown as "out" or fully unwound and as used with the sheave wheel under the platform floor, being connected with the brake levers in the usual manner. A new arrangement is used in holding the brakes when applied; a pawl ratchet is mounted on the end of the drum and a pawl or dog mounted on the housing by a stud bolt directly under. The pawl is weighted on the spur end so that it is kept normally free of the ratchet. A vertical rod connects the pawl with the foot lever the exposed part of which is normally raised. When the brakes are set and the motorman desires to hold the car he locks the gears by the weight of his foot upon the foot lever which throws the pawl into engagement with the drum ratchet. A slight turn of the hand wheel in the winding direction allows the weighted spur end of the pawl to drop free of the ratchet permitting the brake to release,—but only when the motorman is prepared for or desires it at which time he has hold of the hand wheel. This feature eliminates the dangers of the old staff floor ratchet and pawl where it is possible for the pawl to be inadvertently kicked loose allowing the brake handle to revolve under the releasing tension with

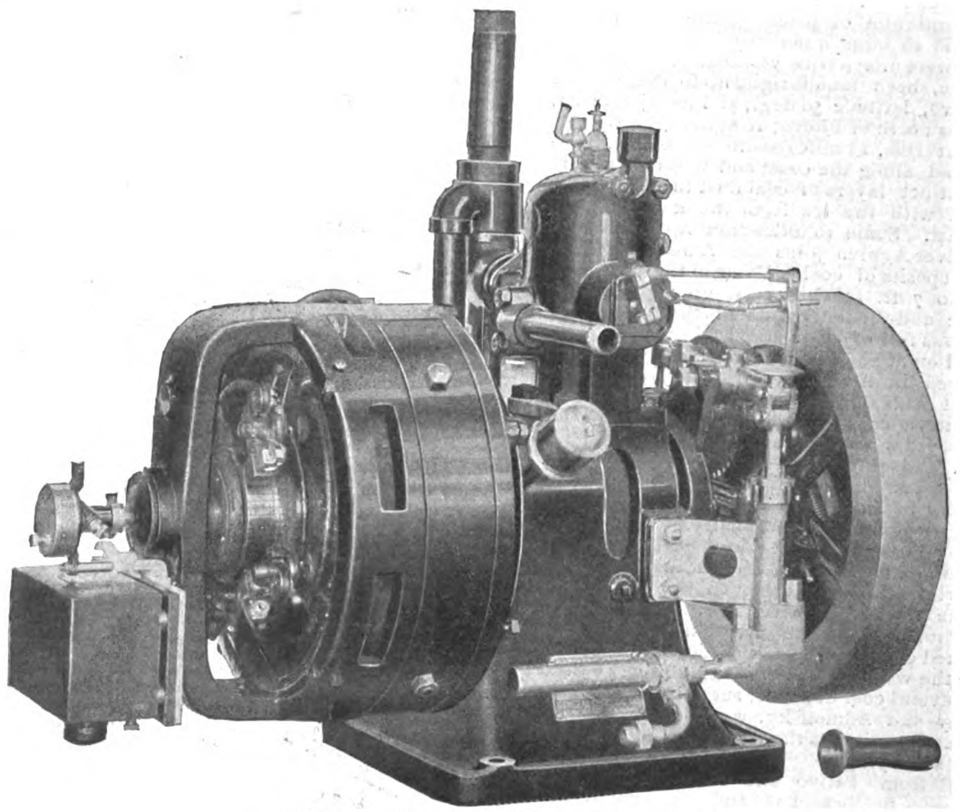
FIG. 3

great force and rapidity, a danger many car men have experienced, some with serious and even fatal results. Fig. 3 gives a side view showing the chain wound "in" and the ratchet pawl holding the brake from releasing. This view shows the brake as used with the "goose neck" lever connection between the brake chain and the brake levers; this "goose-neck" connection provides for additional or variable leverages as a series of holes permits the draw rod to be attached at different distances from the fulcrum. Different combinations of gear ratios are provided for, but those of 14:34 and 12:36 (the gears are 4 pitch) have been found to give the most satisfactory results; these combinations are interchangeable in the same housing. The "Ackley No-Staff Brake" is fully covered by patents issued or pending in all important countries of the world and is the result of a universal knowledge of brake conditions and requirements gleaned by Mr. Ackley from personal observation and study in twenty six different countries. This new brake will be handled for export by the Ackley Brake Co., New York City, and by the British Ackley Brake Co., London, the Deutsche Ackley Bremsen Co. m. b. H., Berlin, and the Compagnie Francaise des Freins Ackley, Paris.

NEW ONE KW. GAS ELECTRIC GENERATING SET

The advantages of electricity for illumination and power make it indispensable to this enlightened age, yet many people who would like to use it are not within the zone of distribution of an electrical system, and so to enjoy the advantages of electricity must install their own plants.

The General Electric Company, who manufacture gasolene-electric generating sets of capacities 3, 5, 10 and 25 kw. have added to this line a 1 kw. set which is designed for furnishing electricity for power and lighting in private residences, small hotels, rural railroad stations, etc., not now served by central stations, and on board boats. This set comprises a single cylinder, vertical, 2-cycle water cooled gasolene engine direct connected to a 1 kw. D. C. generator. The regulation and steadiness of the voltage of this set is so good that it is possible to supply current direct from the generator, thus avoiding the expense of installing and maintaining a large battery and the loss of power and troubles incidental to the operation of the latter.



ONE KW. GAS ELECTRIC GENERATING SET

The engine is provided with a suction gasolene pump for lifting fuel from a tank placed under ground and located at some distance from the engine, thus fulfilling the requirements of the National Board of Fire Underwriters.

The cooling is by thermo siphon, thus doing away with the necessity of a pump to provide forced circulation of the cooling water.

The governor is located in the engine fly wheel and operates a throttle valve, giving very close regulation and satisfactory operation at all loads.

The dimensions of this 1 kw. set are: Length, 2′ 6-5/8″; height, 2′ 2″; width 17-5/8″, and the total weight is 350 lbs.

Recognizing the fact that it is frequently desirable to install a small storage battery to provide a few lights on occasions when the generating set is not running, the General Electric Company manufactures for use with these sets a suitable board for controlling both the generating set and such a battery, as well as two types of switchboard for controlling the set alone.

The combination generator and battery switchboard is so arranged that the battery can be charged at the same time that the generating set furnishes power for lights or motors, without affecting the operation of these appliances, while when the battery is fully charged it can be connected with the system so that the generating set can be shut down without interrupting the service.

GOULDS MANUFACTURING CO.'S EXPANSION

The Goulds Manufacturing Company of Seneca Falls, N. Y., are about to build four large additions to the No. 2 Plant, in which will be housed the part of the works known as the No. 1 Plant, part of which must be torn down to make way for the new barge canal. The new buildings will be parallel with the foundry buildings. A one story storage buildings for rough castings is completed. This building is 240 by 60 feet and of mill construction.

Two machine shops, 300 by 100 feet, will parallel the storage building. They will be of steel frame and brick construction and about 70 per cent of the wall surfaces will be glass. South of the two machine shops a four-story warehouse 240 by 60 feet will be built. These will be reinforced concrete and on the south side there will be a loading platform. The New York Central will build two additional switches along the warehouse. All the new buildings will be lighted with tungsten clusters and will be heated and ventilated by the hot blast system. All the equipment of the machine shops will be motor driven. By Nov. 1 the buildings will be ready for use.

THE WEALTH OF SAGHALIEN

According to recent researches by a Danish engineer, embodied in a report by the Danish Consul-General at Shanghai, the island of Saghalien appears to be rich in several minerals, among them coal, perhaps, more especially. Coal is found all over the island, although it is as yet impossible to accurately measure the volume of deposits. Innumerable veins on the west coast can be traced right into the sea and along all rivers and heights. The engineer in question travelled over considerable portions of Saghalien, and had the opportunity of questioning a number of natives and criminal prisoners, who, better than others, know the interior of the country. They told him of places where coal was to be found in large quantities, and these statements were afterwards verified. Coal has, for instance, been found right up to the surface at Pilevo, latitude 50 deg.; at Pjeverjaretzaka, 10 miles north of Pilevo; at Agnivo, latitude 51 deg.; at Due, 15 miles south of Alexandrowsky; and along the coast and the rivers there are distinct layers of coal dust that has been carried with the ice from the mountains to the coast. Some 10 miles from Agnivo, where the River Agnivo joins the Amber, he found rich deposits of coal. Veins of the pure coal, 5 ft. to 7 ft. in thickness, go right to the surface and the natives stated that the mountain was full of coal. Coal-mining has been carried on at Saghalien ever since the Russians appeared in the island, but only on a very modest scale, and in a very primitive way. At Due a coal-mine has been worked for thirty years without any other plant than a winch and primitive engine, that obtained steam from an old ship's boiler. This mine has now been sold to a company, which is going to exploit it rationally.

The old Government mines are located halfway between Due and Alexandrowsky, where the criminals were employed up to the time of the Russo Japanese War. It was from these mines that the Russian Pacific fleet obtained coal, but the mines have been worked since the war. North of Alexandrowsky there are several coal deposits, such as the Wladimirsky and Admoffsky, where Russian Government engineers the last year or two have been surveying.

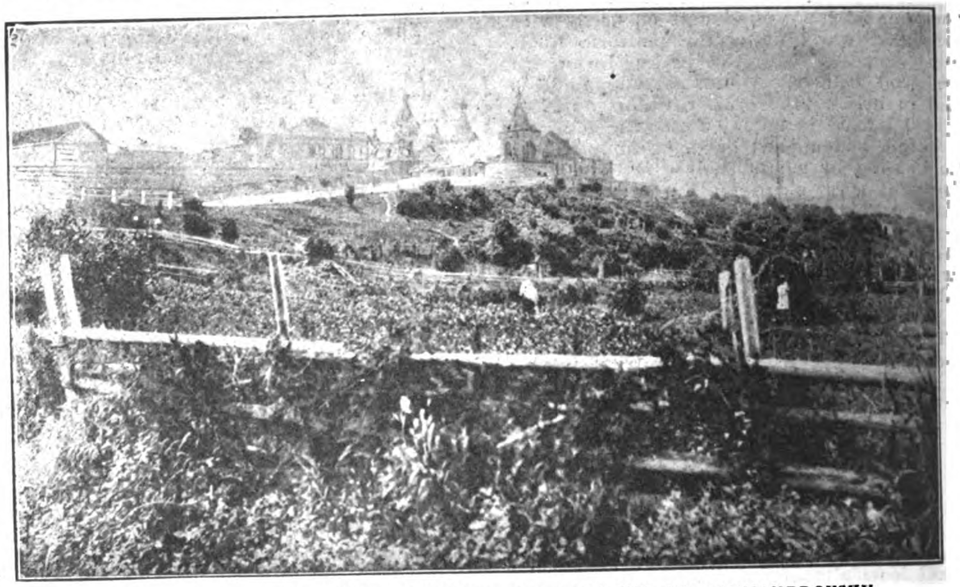
Coal from Pelivo and Agnivo has been analysed in Shanghai and Hongkong, and found to be superior to best Welsh coal and leaving only 3 per cent. ashes. Its superior quality is known to captains and ships' engineers in the East, and the Norwegian boats trading over Kamshatka and Alaska never coal in Japan, but wait till they get to Saghalien and then go into Due. All are unanimous that the Saghalien coals are as good as any other kind of coal in the East Asiatic market.

Some thirty years ago an American syndicate secured a concession for coal mining and export, but the syndicate operated only a couple of years, as the concession was cancelled, when it was found that the company allowed the convicts quartered on the island to escape by their steamers, since then Americans have not done anything at Saghalien, but it appears that they are again planning to exploit its natural wealth.

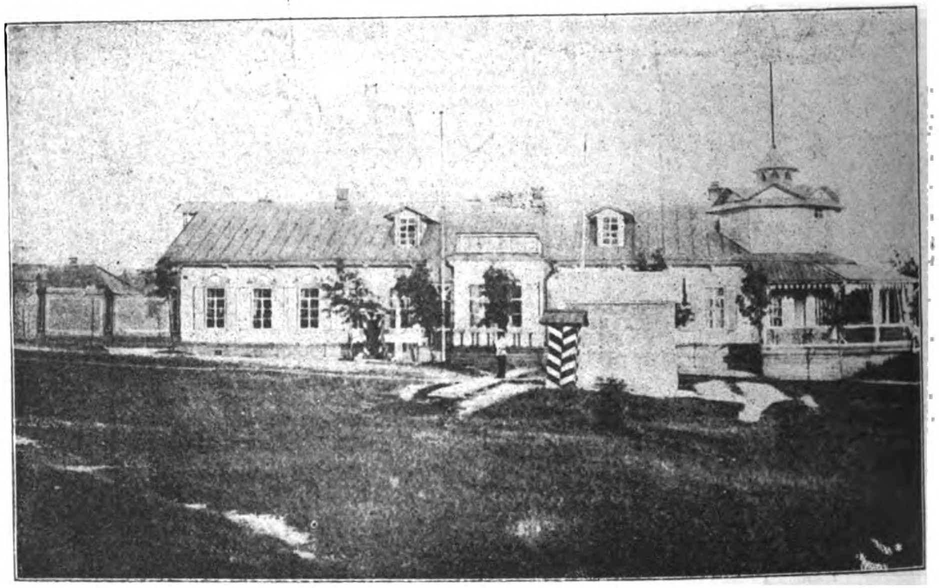
Russian Government engineers have lately been engaged in examining the coal deposits at Vladimirsky and Adamofisky, north of Alexandrovsky, and at Due a Russian named Makaffsky, from Vladivostock, who has been working a coal mine for the last thirty years, has transferred his property to a syndicate, which is going in for modern and more extensive working.

COAL MINING CONCESSION

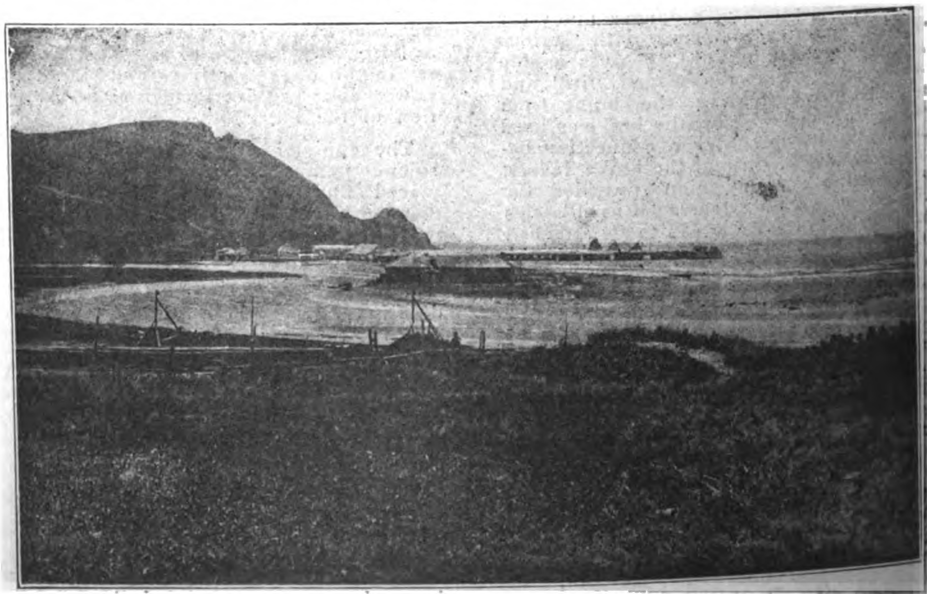
The Russian Minister of Trade and Industry recently submitted to the Council of Ministers a proposition on the leasing of the coal mine properties in the island of Saghalien by competition. Competitors must be able te deposit 5,000 roubles, and the period of tho concession is to be 36 years. The payment is to be in the form of so much per pood, with a minimum of half a copeck (half a farthing) per pood (36 lbs.). Only two and a half years are to be allowed for investigating the allotments and preparing work for the extraction of coal, during which period the concession will be franked of dues.



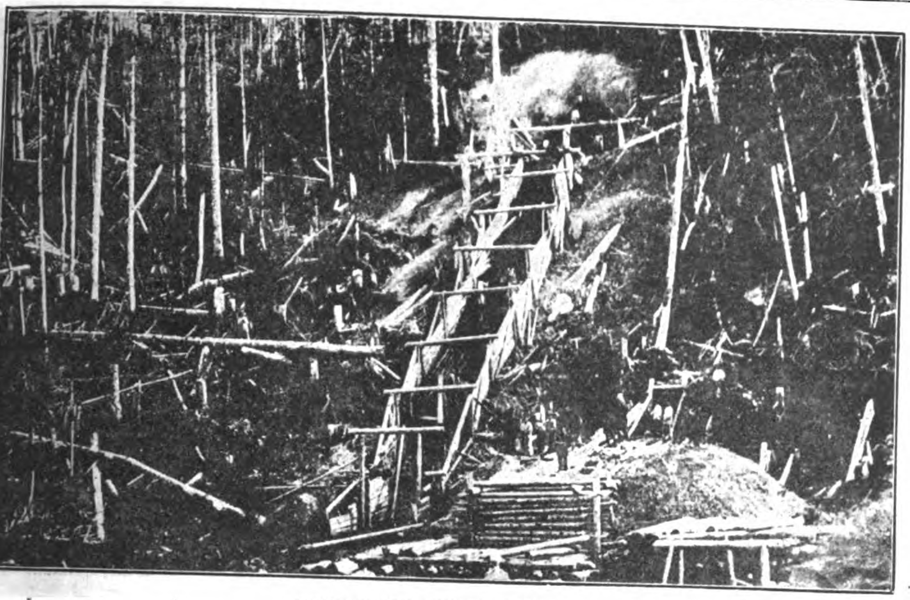
SAGHALIEN: ALEXANDER CHURCH AND MUSEUM AT ALEXANDROVSKY



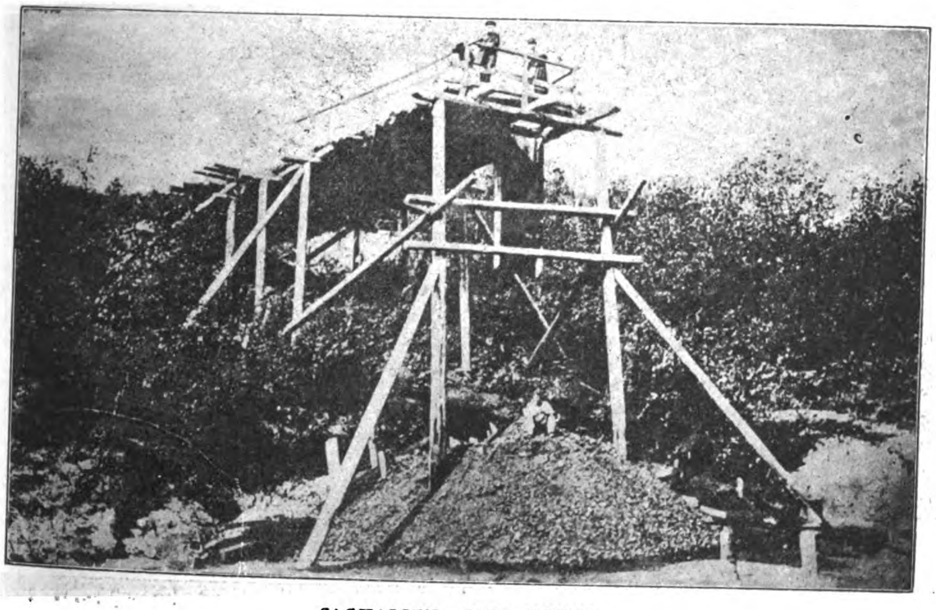
SAGHALIEN: THE GOVERNOR'S RESIDENCE AT ALEXANDROVSKY



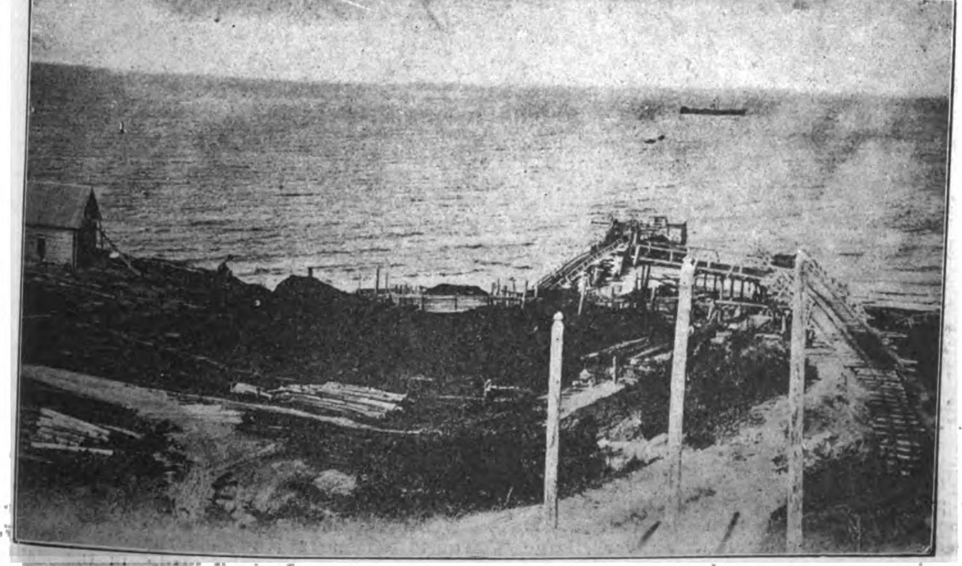
SAGHALIEN: THE PORTOF ALEXANDROVSKY



SAGHALIEN—COAL MINES



SAGHALIEN—COAL MINES



SAGHALIEN: THE SHIPPING WHARF OF THE MAGTSCHINKOVA COAL MINES

During the first three years of production the lessee must extract not less than 500,000 poods per year, and during the succeeding years until the close of the concession the extraction will be calculated at a minimum of 1,000,000 poods per annum; and it will be at the discretion of the Ministry of Trade and Industry to double this latter minimum when the trading port is completed on the western shore of the island of Saghalien. To exploit the surface a rent will have to be paid, subject to variation according to circumstances, and the workmen to be employed on the concessions must be Russians. The surface rent is a nominal one of one rouble (2s. 1½d.) per dessiatine (2.7 acres). This rent again may be increased every 10 years by 50 per cent. There is no mention in the advice of the terms on which concessions for other minerals may be had.

JAPANESE SAKHALIN

Writing on the mineral resources of Japanese Sakhalin Mr. W. M. Royds, H. B. M.'s Acting Vice Consul at Hakodate, states that the strata in Karafuto (Japanese Sakhalin) are mostly of tertiary formation and hold very rich veins of coal, which in some places reach a thickness of 50 ft. The coal is of good quality, and resembles the Yubari coal of the Hokkaido. There are three important coalfields, viz, the northern, the central, and the southern, besides others of less importance. The central and largest coalfield, stretching from the river Pusutaki, a tributary of the Susuya, to the river Tomaioro, is 60 miles in length and from 1 to 3 miles in breadth. This field is but little disturbed by faults, and the seams of coal are thick and regular. The northern coalfield lies along the eastern side of the axial mountain range of Karafuto, extending from near the mouth of the river Poronai to the Russian boundary at latitude 50°. The southern coalfield is situated in the central portion of the Notoro peninsula. This field is rich, but somewhat irregular, the inclination of the seams being in many places very sharp.

At Tomarioro, on the west coast, the Karafuto Administration have already started operations for working the large central coal-field. A coal-mining experiment station is established there, and coal is produced and supplied to the Government railway. Work was begun in October 1909. the output was 4,552 tons. of which 535 tons were sold to private individuals. The present workings are distant some 7½ miles from the coast, and a light railway of 2 ft. gauge has been laid to bring the coal to the sea for shipment. It is intended to reach an output of 100 tons per day at this experimental station. Concessions have been granted to private individuals to work other part of the coalfields, but operations have not yet begun.

PETROLEUM

The island also appears to be rich in petrolenm. The Russo-Chinese Bank financed an expedition to a place called Tchaiwo, on the bay of the same name. According to the report of this expedition the borings undertaken, although they were neither numerous nor deep, brought considerable quantities of petroleum to the surface, and subsequently a more scientific examination undertaken by Russian geologists confirmed this result, and it was the general impression of these scientists that vast subterranean petroleum reservoirs are to be fouud along the whole of the East Coast of Saghalien. As the petroleum in some places is only come upon at a depth of 400ft, the research entails considerable expense.

The Russo Chinese Bank has secured a concession for the petroleum springs at Tchaiwo, and from what so far has appeared the concern looks most promising; installations on a comprehensive scale have been made, and there is an excellent natural harbour. A Shanghai syndicate has also been formed for the purpose of exploiting exceedingly rich petroleum springs in another locality and com-

peting with the Standard Oil. Other discoveries of immensely rich petroleum springs have recently been reported.

H. M. Vice-Consul at Vladivostock (Mr. R. M. Hodgson) has furnished the following particulars relative to petroleum deposits in Russian Saghalien:—

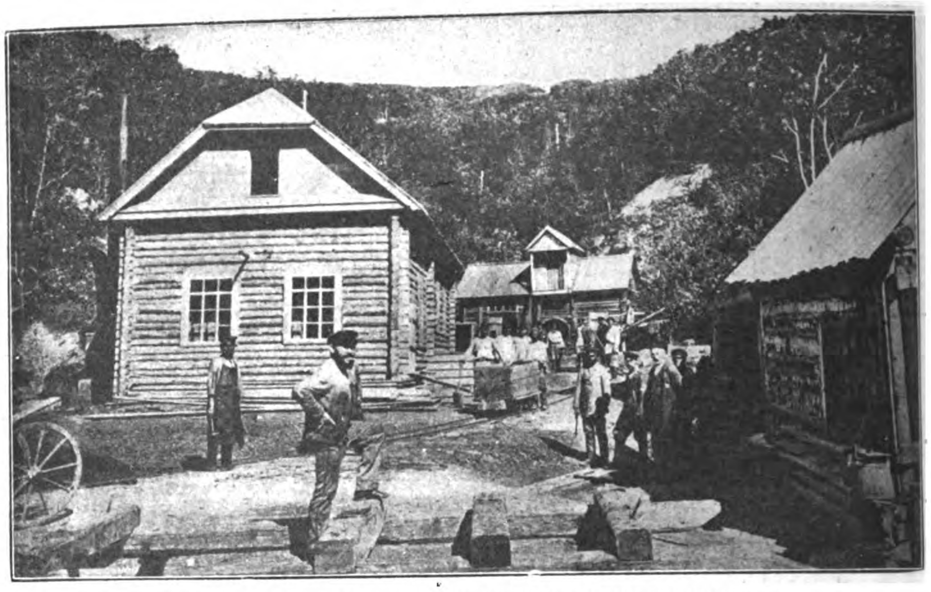
The three petroliferous areas so far known to exist in Russian Saghalien are all on the east coast, and may be distinguished as (1) the Okha River oil-field, (2) the Boatasin and Nutovo oil-fields, and (3) the Nabil Bay oil-field.

The first-named area appears to be one of considerable promise, being remarkable for the existence of a large "petroleum lake" covered with a thick coat of asphalt. The Boatasin and Nutovo River oil-fields area is the one to which, up till now, the most serious attention has been paid. In 1898 a German engineer found, some eight miles from the mouth of the Nutovo river, a number of petroleum outcrops resembling those in the Allas Valley, and also discovered five "petroleum lakes" of a similar nature to those on the Okha, the largest being 420 ft. by 1,400 ft. The "lakes" are, in reality, considerable areas covered with petroleum in a decomposed state, in parts liquid and in parts in the form of asphalt. In 1901, boring operations were commenced on the Boatasin; two petroliferous layers, both in sandstone, were discovered, the first at a depth of 150 ft. and the other at 237 ft. The holder of the mining rights for the Boatasin and Nutovo River oil fields has formed the China Oil Company, registered in HongKong, with head office in Tientsin, and a capital, German, British, and Chinese, of Tls. 420,000. Buildings are being erected, and systematic boring will commence on the arrival of new plant, consisting of a hand-boring plant for depths of 200 metres and a 600-metre steam-boring plant. The present intention is to build large containing tanks on the point at the mouth of what is known as Kleye Strait, and there to load the crude oil, which will be run in pipes from the Nutovo on to steamers. The company have already made arrangements in China and Japan which will ensure their obtaining a market for their output.

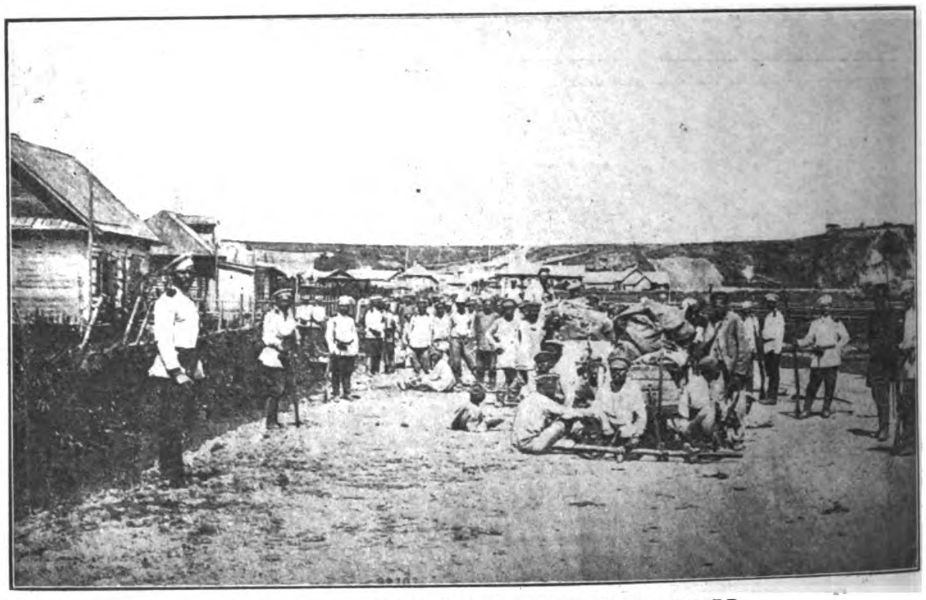
The Nabil Bay oil-field area consists of (*a*) deposits on the Noglik River, a tributary of the Imtchin, which runs into the Timi River close to its mouth, in the southern end of the Nisky Lagoon, and (*b*) deposits round the south-east corner of Nabil Bay. From a 26-ft. shaft sunk in the Noglik territory, 8 to 10 gallons of heavy dark green petroleum, full of carbonic acid gas, were obtained in 24 hours, the specific gravity being 0.9 at 17.5° C. Samples sent to St. Petersburg were pronounced to be suitable for kerosene.

A considerable number of persons have recently acquired mining rights in Saghalien. A Russian geologist who has recently been investigating the Nutovo area spoke highly of the prospects of the concessions granted to the first investigator of the Nutovo River deposits. From his study of the geographical structure of the island he formed the opinion that the level of the petroliferous strata was probably a deep one in comparison with that of the Japanese oil-fields, the first deposits being at not less than 600 ft. and the second layer at about 2,000 ft. He further believes the Saghalien petroleum to be rich in kerosene, containing probably 85 per cent. He thinks that the oil will probably not play in fountains, but will require pumping, as in Pennsylvania.

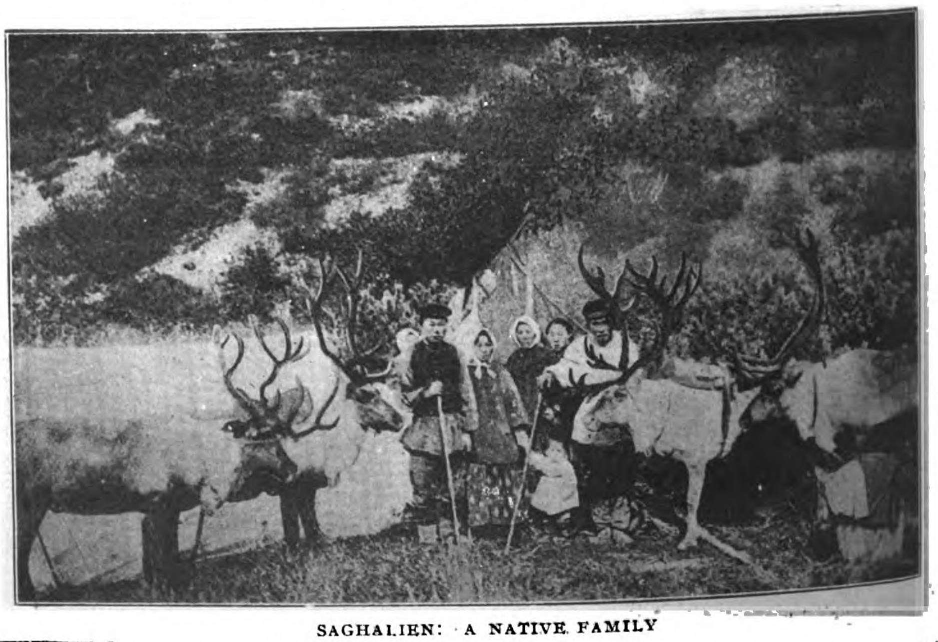
Taichusky Bay, or Kleye Skait on the East coast is the only harbor and on the West coast Baikal Bay is the only harbor.



SAGHALIEN: GOVERNMENT MINE WORKED BY CONVICTS



SAGHALIEN: CONVICTS AT WORK UNDER GUARD



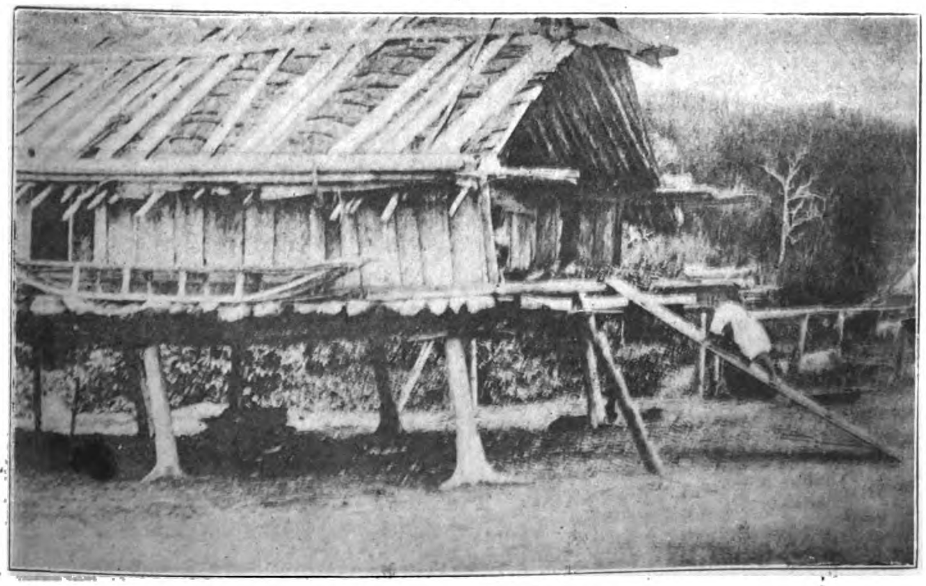
SAGHALIEN: A NATIVE FAMILY

TURPENTINE

With reference to the experiments in turpentine extraction in Karafuto (Saghalien), the British Acting Vice-Consul at Hakodate (Mr. W. M. Royds) reports that, preliminary experiments having proved very successful, the manufacture of turpentine by the Government is shortly to be begun. Machinery for the purpose to the value of 150,000 yen (about £15,300) has been ordered. It is hoped eventually to produce a very large amount of turpentine, as the sources of supply are almost inexhaustible and consequently more machinery will doubtless be required later. In connection with the manufacture of turpentine at the Government laboratory, experiments are to be made in the manufacture of gun-cotton. The Acting Vice-Consul

SAGHALIEN: A HERD OF REINDEER

SAGHALIEN: WINTER HUNTING



SAGHALIEN: A NATIVE HUT

has forwarded samples of raw turpentine, extracted from the tree. "Larix dahurica Turez," known in Karafuto as the "Raku-yosho," of refined turpentine oil produced at the Government experimental laboratory, and of the resin left after the extraction of the oil: these samples may be seen by British firms at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall-street, London, E. C.

OTHER MINERALS

Next to coal, alluvial gold and pyrites are the chief minerals found in Karafuto. Alluvial gold exists in the beds of the rivers which flow down from the Taraika, Susuya and Shiretoko mountain ranges, and also at Aniwa Bay. Several concessions have been granted for working these deposits. Iron pyrites are found in large quantities in the Notoro peninsula. Oil bearing lands have been discovered in the neighbourhood of Tokombo, Manka, and Arakoi, on the west coast.

SALT

Salt is plentiful in pure, crystallized deposits. A Russian official has already secured a concession for working a considerable area, and recent Government expeditions have discovered vast salt-fields in the northern portions of the islands. China is a splendid market for salt, and Siberia will be still more so, especially the region along the Amur River, where every year fresh fishery establishments are springing up.

The Russian concessionaire intends to cooperate with foreign financiers, and is understood to have already made some arrangements with an English firm at Yokohama and a Russian firm at Vladivostock.

FORESTS

There are also vast forests in Saghalien, of which the white fir, particularly adapted for paper manufacture, forms a large portion. If this timber went through the first stages of manufacture on the island, so that the raw materials could be exported as pulp, it could unquestionably easily compete with American pulp in the Chinese and the Japanese markets, considering the distance the American product has to be carried. The wood is also admirably suited for making tea caddies.

FURS AND FISHERIES

Costly furs, both brown and silver gray sables, can be obtained in considerable quantities in Saghalien, and a Japanese fur merchant in Alexandrovsky, who himself began as a hunter, is now a millionaire. Fox, bear and the deer are found in many places, and the sea-otter, whose skin is very costly, is found in the sea between Saghalien and Kamschatka.

The sea around Saghalien teems with herring, salmon, cod and flounder, but the only people who so far seem to have realized this wealth are the Japanese, who every year go in thousands on northward fishing expeditions. They arrive in the early spring and settle down on the coast of Saghalien to wait for the herring to arrive about the middle of May.

Constantine E. Pfaffius in the *Mining Magazine*, writing about the oilfields of Sakhalin, says:

"The enormous development recorded during the last 50 years in nearly every branch of industry has emphasized the problem of maintaining an adequate supply of fuel in manufacturing, mining, shipping, and naval spheres of activity. Among the better known combustibles, liquid fuel is steadily gaining in popularity and application, owing to the many advantages it possesses over coal and other solid fuels in the matter of ease of handling, cleanliness, and high calorific value. Last, but not least, crude oil, even under present antiquated methods of treatment, yields such a number of valuable by-products (lubricating oils, illuminating oils, and benzine, the demand for which is steadily increasing) that the prospector is always on the look-out for new sources of supply. The older oil-fields of South Russia and the United States, until recently the principal sources of the world's petroleum supply, have for some time been exhibiting signs of approaching exhaustion, although California is rapidly coming to the front and the Galician, Roumanian, Asiatic and other oilfields of minor importance are steadily advancing in output.

"The possibilities of Sakhalin, as a prolific and reliable source of oil, have recently attracted attention. Situated between 142° and 145° east longitude and, roughly, extending from

40° to 54° 20′ north latitude, the island has approximately a length of 600 miles and a width of from 100 miles at its widest to 10 miles at its narrowest part. The parallel of 50° north latitude practically bisects the island into two more or less equal parts, Russian and Japanese, respectively.

"The northeastern part of the Russian portion of the island is alleged to contain one of the most extensive and reliable oil-belts in existence. The surface exposures consist of tertiary sandstone, but it has been proved by borings that older rocks lie beneath. Surface evidence of the existence of an oil horizon at depth is provided along the Pacific coast, commencing at Nabil Bay and extending to the northern extremity of the island—a distance of nearly 200 miles—from 6 to 12 miles inland, by a succession of lakes, seepages, sand hillocks, and plains the ground of which is saturated with oil. The oil is to some extent drained seaward by the numerous creeks and lagoons, but most of it evaporates on exposure to atmospheric influences and when mixed with grains of sand forms what is known in Russia as keer, a product resembling semi-solid asphalt.

"The honour of having been the pioneers of the petroleum industry in Sakhalin is due to Messrs. Zotov and Kleye. However, they do not appear to have been particularly enterprising, nor to have had much financial backing. As yet they have not obtained any important results, although they have been drilling during a period of fully ten years. Claims have been staked by scores of other Russians, but these have done practically nothing in the sense of testing the ground, their sole aim being to hold their concessions until someone else succeeds in bringing in a gusher and then to dispose of their rights. The Russian government has stopped this indiscriminate claim-staking and now no one may be granted a concession to more than two plots of 100 acres each for prospecting purposes, and this right is subject to the locator sinking within the period of two years from the grant of the concession at least one well of a minimum depth of 600 ft., unless the oilbed be struck at a shallower depth on each claim. In the event of noncompliance with this stipulation the concessionaire forfeits his rights and the perimeter (claim) is confiscated.

"The establishment of a properly equipped petroleum industry on the island has been hindered by the prevalence during the greater part of the year of severe weather, such as a temperature of 20° to 40° F. below zero for 5 months, heavy snow-falls, and blizzards. These being the conditions, the capital outlay on buildings, workshops, material, tools, spares, provisions, and other equipment, practically excludes the small producer as a factor of any importance whatsoever in so far as the establishment of a petroleum enterprise in this part of the world is concerned. On the other hand, a financially sound enterprise would find here almost unlimited scope for extension."

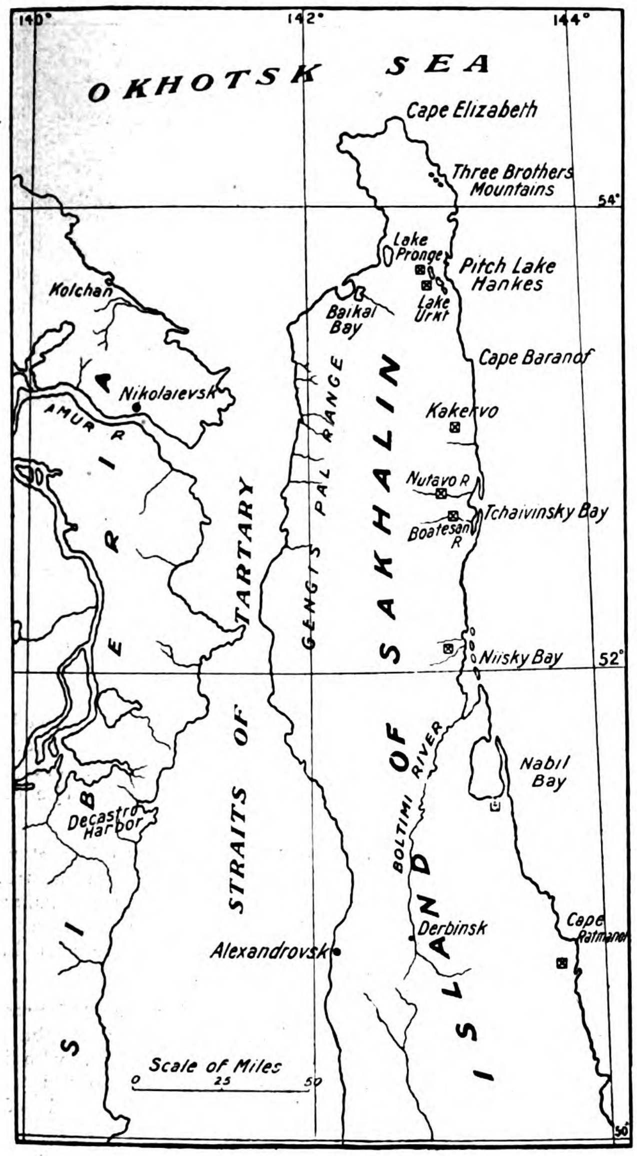
Mr. C. W. Purington has kindly furnished the following additional data: "The most practical point for attacking the oil fields is Baikal Bay, on the northwest coast. This is a good harbour with a depth of from 24 to 36 ft., almost land-locked, in Lat. 53° 30′ and fully open to navigation from May to October of each year. A pipe-line from the shore of Baikal Bay to the pitch lake of Hankes would not exceed 30 miles in length. The island is heavily timbered, well watered, and it has other natural resources of considerable importance. The fish-canners of Nikolaievsk maintain considerable establishments during the season both at Baikal Bay and at Lake Pronge. Small tugs and gasolene schooners ply back and forth between Lake Pronge and Nikolaievsk, a distance of about 100 miles. Japanese and Chinese labour is abundant. Owing to the lack of regular communication and the nearly uninhabited character of the region, the cost of an outfit delivered may be reckoned at three times what it is in California, while the cost of drilling will be five to six times as high. Up to the present the wells that have been drilled to 600 ft. have been unsuccessful, but indications point to the possibility that deep wells may tap reservoirs of valuable oil."

SAGHALIEN: FISHING THROUGH THE ICE

SAGHALIEN: NATIVE LIFE

SAGHALIEN: REINDEER SLEDS

"Further information about the petroleum resources of Sakhalin is given by Mr. D. A. Louis in a report describing his examination of properties made on behalf of Mr. Paul Dvorkowitz. These properties are situated on the rivers Boatesan and Nutavo which drain into Tchaivinsky bay, now known as Kleye Strait. The former was originally discovered by Mr. Kleye as mentioned in the above article. The petroleum is found in pitch lakes in the midst of peaty swamps. The lakes are covered with a black crust and prospecting holes were dug through it at a number of places for the purpose of taking samples of the oil below. The oil thus collected is heavy and of high flash point; it contains practically none of the lighter spirit, which has presumably been evaporated long ago. On the other hand the oil contains no solid carbon and there is no asphalt associated with it, so that it may be considered as naturally filtered oil. In fact the oil closely resembles that found in Borneo, and arguing by analogy, Mr. Dvorkowitz is of opinion that the deposits will develop in the same satisfactory way. It will be seen that Mr. Dvorkowitz and Mr. Pfaffius do not agree as regards the presence of asphalt. The route for approaching this district is by steamer from Vladivostok to Alexandrovsk and then by government post road to the Bostimi or Tym River and then down that river by canoe to Kleye Strait."



Sakhalin Oil Deposits.
Courtesy Mining Magazine.

During the year 1910 there were three oil companies actually drilling in Russian Saghalin and up to Oct. 1st the results were as follows:

A Russian-Shanghai syndicate on the Zotov concession on Oha creek had a bore hole down 400 ft. with a hand rig. A small flow of oil was encountered and, encouraged by this result, the Syndicate expected to instal several power rigs during 1911.

The China Oil Co. in the Nutavao and Boatasin field had started several holes and commenced preparing shipping facilities. One hole had attained a depth of 130 meters with a steam rig and at that depth showed some oil.

A Russian-English syndicate in the Nahil Bay field, locally supposed to be a part of the Standard organization, were installing steam and hand rigs with English drill men on concessions controlled by Prince Radizwell.

Besides the above three organizations there were several other Russian syndicates exploring and locating claims

Foreigners can not hold any oil or mineral claims in Saghalin or in Siberia except by special permission granted through the Governor General of the province and the Council of Ministers in St. Petersburg. This permission is hard to obtain. Foreign labor, other than Chinese, is prohibited except by special permission of the Governor General.

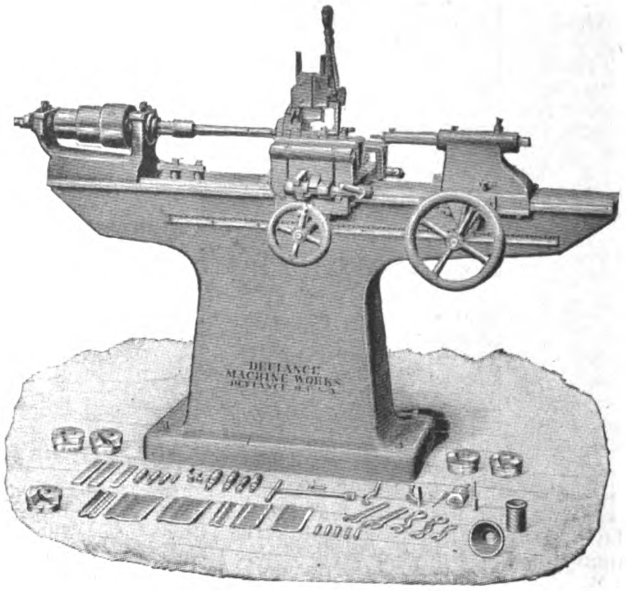
Charters can be obtained from the Russian Government for share companies in which the majority of the holdings can be in foreign name, but the company must be Russian and the managing director a Russian subject.

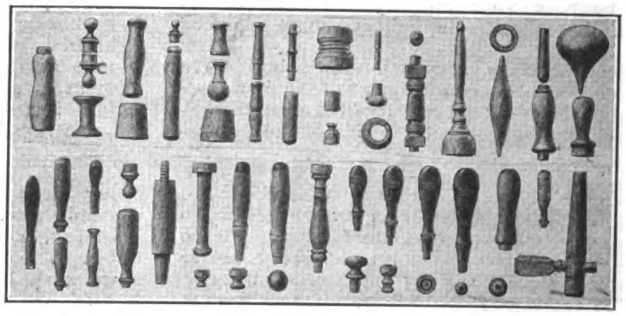
The fishing rights on the Siberian coast and Saghalin are sold to individuals at rates fixed by the Government. Certain places are allotted to Japanese and the latter buy most of the total catch. Many Japanese schooners and various vessels come to Russian waters in the spring and remain until they have bought a full cargo which they salt for the Japanese market. There are also Russian refrigerator steamers which take cargo to the Baltic.

The principal source of revenue in the salmon fisheries is from the eggs which are prepared as caviare for the Russian market. On account of the wasteful methods of fishing the salmon are notably decreasing.

VARIETY TURNING AND BORING LATHE.

The illustration herewith represents the No. 0 Variety Turning and Boring Lathe, manufactured by the Defiance Machine Works



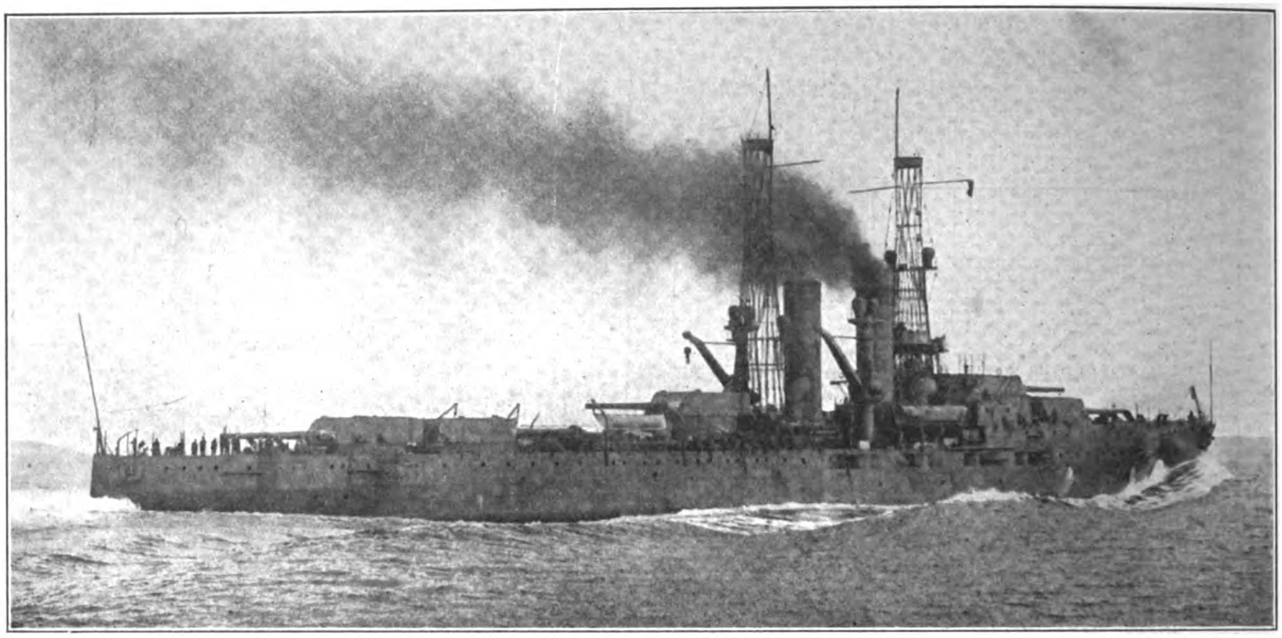


of Defiance, Ohio, which has been designed with the greatest care to embody in it all the essential features to make it a high class machine for rapidly and accurately producing turned articles from wood. Never before has there been a machine invented for producing light fancy turning and boring that would fully meet the demands of manufacturers who wish to produce turned work, sharp, clean, and smooth, in either plain or beaded turning, and do the work so that no hand labor is required after leaving the machine.

This machine is calculated to cover a wide range of work. A few samples as produced with it are shown by the accompanying engravings, although it is by no means limited to these samples. The material from which the work is turned is placed into the machine in short or long pieces, not to exceed 36 inches at the longest, and it is converted into the finished article, bored, turned, polished, and cut off comp'ete ready for use. The design of turning is governed by the shape of the finishing knife used. It requires a special shaped knife for each article of different design to be turned. The shape of turned work desired to be made is milled the full length of the knife, so that the exact

U. S. BATTLESHIP UTAH MAKES 21.63 KNOTS

Twenty-one-and-a-half knots an hour—21.637 to be exact—was the record maximum speed attained by the newest and biggest and fastest battleship of the American Navy now afloat—the Dreadnought Utah, in her standardization trial trip off the coast of Maine yesterday, thus exceeding the Government speed requirements by more than a knot. The news was flashed by wireless from aboard the giant craft direct to officials of the New York Shipbuilding Co., in Camden, her makers, upon the completion of the tests.



THE S. S. UTAH ON HER TRIAL TRIP

Aside from the gratification of the builders in the successful accomplishment of the first day's trials, interest of the country at large and particularly among shipbuilding firms and in Government circles centred in the work of the Utah's Parson's Turbine Engines, the fate of such means of propulsion for giant war-craft and, in short, the efficiency of the turbine engine over former equipment resting upon the vessel's behaviour in her trials.

The test required eight hours to complete, the big battleship going on the Rockland course a little after 8 o'clock, and made 20 runs as her standardization trial. There were three runs each at ten knots, 12 knots, 19 knots, and 20¾ knots, then five at the highest possible speed, followed by three runs at 16½ knots. Her contract requirement is 20¾ knots, to be maintained for four hours.

During three of these runs she made a speed of 10.556 knots, on three others, 12.015, on another group of three, 16.799 knots, and in still another, 19.049. In addition to these there were five top speed runs and three at cruising speed.

During the top speed runs the Utah averaged 31.288 knots. Her contract requires 20.75 knots. Tests showed 329.17 propeller revolutions per minute necessary to maintain the maximum speed and 314 5 necessary for the contract speed. The engines developed 28.477 horse power.

In addition to her standardization runs, the Utah was given a trial displacement, this showing 21,247 tons, and an anchor-test, both of which proved satisfactory. Captain William G. Randle was in charge of the Battleship.

On board were DeCourcey May, President of the New York Shipbuilding Co., Captain William S. Benson, who is to comand the ship when she goes into commission, the members of the Board of Inspection and Survey, and others.

The next day the Utah had a four hour run at a maintained speed of 20.75 knots and a two-hour run at the same speeding burning both coal and oil.

The battleship is 98.4 completed and it is now expected that she wiil be ready to go into commission about August 19. In addition to annexing the title of the fastest battleship in Uncle Sam's Navy, and possibly in the world, considering her size, the Utah has, without apparent question, fully demonstrated the worth of her turbine engines, with ten of which she is fitted.

The receipt of the news of the speed trials at the Camden plant gave rise to the greatest gratification among the officials of the firm, and none the less among every foreman, superintendent, carpenter, riveter, mechanic and laborer, that had a hand in putting together this greatest of war craft, which exceeds by 1825 tons the Delaware, the 20,000 tons dreadnought which carried off all laurels in point of size at the recent review of representative vessels of the world by King George V and his Queen at Spithead.

The wireless flash was forwarded by the wireless operator on the Utah's deck and was relayed to the station at Atlantic City, and thence to the wireless station at the shipyard.

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duplicate of work is always secured, and in sharpening the knife it is only necessary to dress the cutting edge, thus reducing it to the simplest possible form so that it can be handled successfully by inexpensive labor.

The frame of this machine, of neat design, is cast in one piece with cored center and a broad floor base to stand firm. The top is accurately planed anp scraped to bearing for the working parts.

The head spindle, of steel, runs in large bronze, self-lubricating bearings, and it is driven by a three-step cone pulley, giving three changes of speed for small or large work. The front end of the spindle is fitted with a screw chuck to hold one end of the material to be turned, the other end turning in the roughing head bush.

The cutter head carriage is thoroughly gibbed to the top of the frame of the machine, and it is provided with a horizontal movement by hand-wheel to move the cutters to where the turning shall begin. It also has a right angular movement by hand lever, to move the finishing knife to the work.

The roughing cutter is attached to the carriage immediately in advance of the finishing knife. It reduces the square material to the smallest diameter to which it wil l nicely finish. The cut-off attachment is also fitted to the carriage and travels with it. It stands in a vertical plane and is brought down to its work by a convenient hand lever.

The tail stock is gibbed and accurately fitted to the top of the frame, central with the head spindle. It is fitted with a large spindle to carry a boring bit to bore holes of different sizes. When work is intended to be bored, the boring is performed before the turning is accomplished, leaving the boring bit in the hole while turning, it acting as a steady rest. For doing work that requires no boring, a cup center is used in place of the bit. The tail spindle is brought up to or from its work by a convenient hand-wheel.

In operating this machine, the square material to be turned is placed into the chuck while the machine is in motion. No stoppage is necessary either to place in the rough material, or to take out the finished product. The material is first roughed by sliding the carriage forward in a horizontal plane a sufficient distance to suit the length of the article to be turned. The boring is then performed, after which the finishing knife is brought up to the work, which is shaped complete at one movement. The cut-off knife is then brought down by hand lever and the finished product is discharged from the machine, and so the work is continued until the material in the lathe is entirely consumed.

The capacity of this machine is sufficient to produce from 5.000 to 8,000 pieces per day, depending upon the size and shape of work and the quickness of the operator. It will turn irregular work eight inches long and shorter, but plain round work, such as rollers, pins, etc., can be turned up to 36 inches long, and from 1/8 inch to 3 inches diameter.

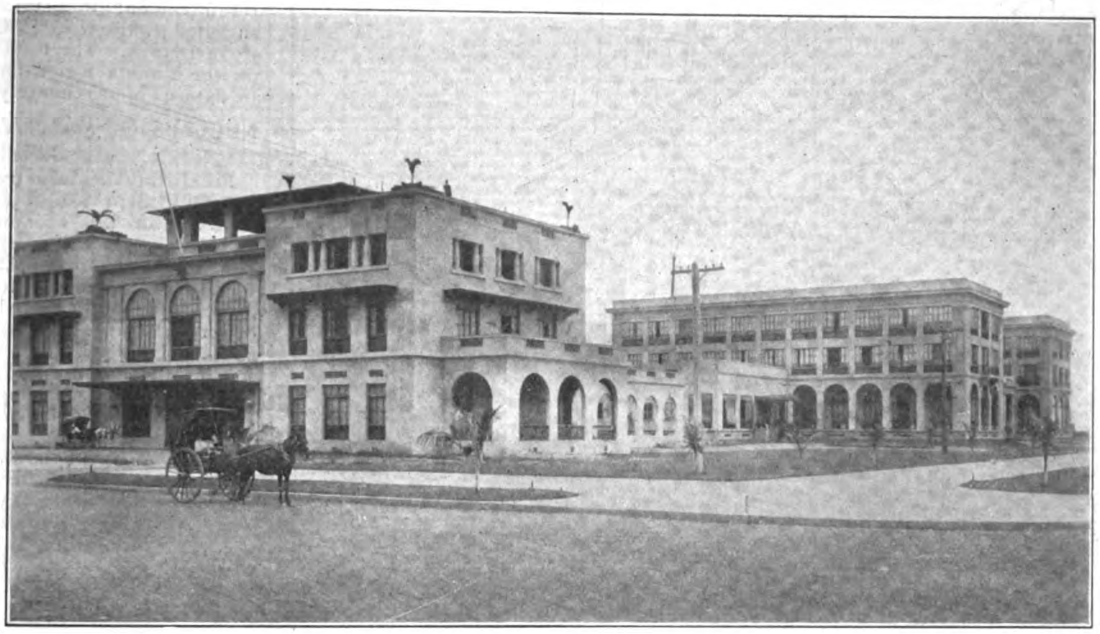
The counter is furnished as follows: Shaft, 11-16 inches by 42 inches; two No. 2 ball and socket adjustable drop hangers; one improved belt shipping apparatus; one step cone pulley, 14 inches, 15 inches and 16 inches diameter, for 3-inch belt; the tight and loose pulleys are 10 inches by 4 inches; speed, 650 turns per minute.

Horse power to drive, 2; floor space occupied, 28 inches by 78 inches.

THE NEW PORT OF MANILA AND THE LUNETA EXTENSION

Continued effort on the part of the Philippine Government to provide Manila with modern port works and a warehouse district conveniently located for the storing of goods every step has more than fulfilled the expectations of the authorities.

All these improvements are along the lines proposed to develop at Manila a great distri-



THE ELKS' CLUB THE ARMY & NAVY CLUB

BOTH BUILDINGS ARE CONSTRUCTED OF REINFORCED CONCRETE—THE KAHN SYSTEM OF THE TRUSSED CONCRETE STEEL CO. OF DETROIT WAS UTILIZED IN THE A. & N. BUILDING

with facilities for economic distribution throughout Luzon finds expression today in the wonderful development in building construction on the reclamation in conformity with the government's purpose. The improvements along the bay shore, however, are not confined to plans for the new port. The Luneta extension which two years ago offered little attraction is now the club center of Manila and on the north end the new Manila Hotel representing an outlay of ₱1,000,000 will be completed and thrown open to the public by the end of the year. All these improvements are but the beginning of the Government program, but so far as progress has been made buting center for the Orient and are illustrative of the scope of the administration's policy in the direction of trade encouragement.

The new port reclamation covers an area of 192 acres approximately. It is served by a harbor capable of accommodating the largest vessels in the Pacific carrying trade and is equipped with wharves for the expeditious loading and discharge of cargo. Two steel wharves have been built by the Insular government and two new piers are under way to accommodate the steadily increasing trade of the port. The Federal Government, also, has constructed large wharves and warehou es on the fill to accommodate the U. S. Quartermaster service.

The immediate development in the warehouse area immediately in touch with the wharves includes the large godowns erected by Messrs. Derham Bros., the first private enterprise in this direction, while the Bureau of Supply is expending ₱450,000 in providing warehouses for government supplies in that vicinity The plans for the new Custom House, to be erected conveniently to the wharves, have been approved and preliminary construction under way. Besides these buildings a number of private enterprises such as garages, etc., are being located in the new warehouse center.

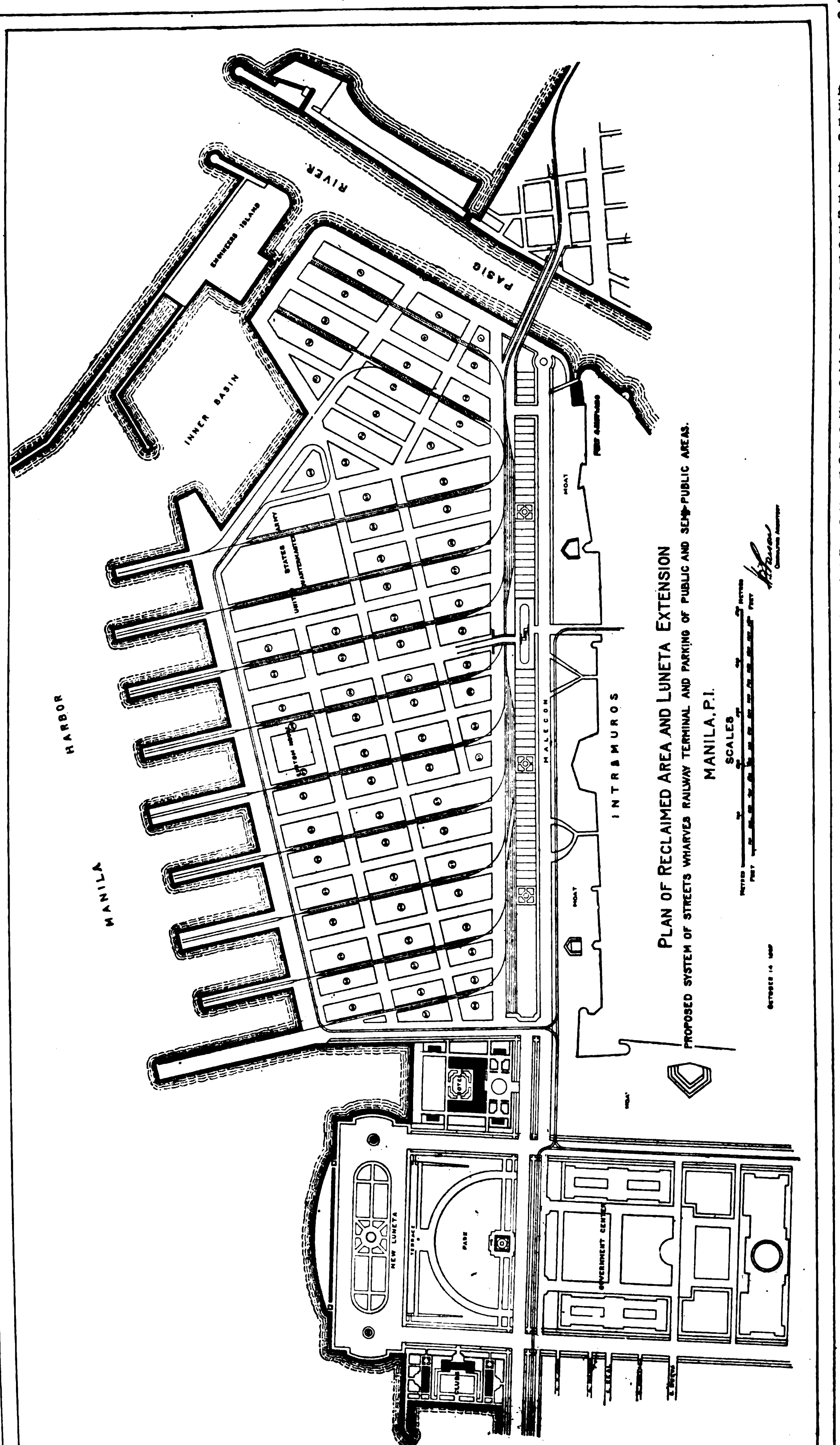
The preliminary surveys for the Electric Railway and the Manila Railroad Company's extensions have been approved. The latter includes a huge steel bridge across the Pasig to connect the port with the entire system of steam railways throughout Luzon. Cars will be loaded at the wharves and warehouses and delivered directly to any point along these lines while delivery to any point in the city will be made expeditiously over the electric lines.

One special feature of the new private warehouse enterprises will be their detachment from participation in wholesale or retail enterprises, which has heretofore characterized the direction of godowns in the city. The firms engaged will simply store the goods to order of consignees at tariff rates. This will greatly facilitate receipt of large shipments of goods on consignment to small dealers so that the goods may be released in such quantities as they are required. The burden of expense of carrying large stocks for long periods will thus be obviated and manufacturers will find the warehouse system a source of great convenience in handling Philippine business. It is also not improbable that this warehouse system will appeal to firms now maintaining their own godowns as a matter of convenience and economy, thus greatly extending the warehousing enterprise in this section.

The Luneta Extension.—This new fill covers an area of 292,000 square meters which includes the hotel and club sites, the boulevard and the park and drive features.

The hotel site includes 20,573 square meters, the Elks' site 9,558; another club site not assigned 4,543; all building sites, while a public garden covering 11,376 meters on the sea side

LARGE WAREHOUSE CONSTRUCTED BY MESSRS. DERHAM BROS. ON THE NEW PORT.



of the hotel has been laid out. The remainder of the Luneta Extension is laid out as follows:

New Luneta......	79,000	Sq. Meters.
Grand Plaza......	76,000	" " "
Boulevards......	87,300	" " "

Then there is the Cavite Boulevard running from the Extension along the Bay Shore which is well advanced and will make one of the most delightful driveways in the tropics when completed.

All the buildings are constructed of reinforced concrete. In the construction of the Army and Navy Club, the Kahn system of reinforcement was utilized, the steel being supplied by the Trussed Concrete Steel Company of Detroit. The total building construction on the Luneta Extension represents an outlay to date of approximately ₱1,750,000.

NUCLEUS OF MANILA'S NEW WAREHOUSE DISTRICT

Following the initiative of the Insular Government in providing a modern harbor and wharves for the economical and expeditious handling of cargo, Messrs. Derham Bros., one of the leading American firms in the Philippines, demonstrated their faith in Manila's future and especially in the department of foreign trade, in a most substantial manner as evidenced by their large and splendidly equipped warehouse and office building facing the Government wharves and opened on July 1.

The building is a two storey structure, 125 feet by 250 feet, and of reinforced concrete construction throughout.

The first floor is divided into two equal sections by a trackway connecting the wharves with the bodega and running through the center the total length of the building. On one side of the trackway the entire space is devoted to a public bonded warehouse and on the other side, a free warehouse for the general public. Each of the two warehouses above mentioned are partitioned into five sections of 50′×52′ for the reception of different classes of merchandise. Each section is absolutely dust proof and goods are received directly from the cars on the trackway from the wharves by the section to which they are assigned and when released are delivered to the importers' trucks from doors on the side of the building, the reception and discharge of merchandise for each section being entirely independent of the other sections, eliminating confusion and preserving goods stored from exposure. The heavier freight is stored on the first floor. The space available for storage on this floor is over 26,000 square feet.

The second floor is divided into two equal sections of 125×125. The front section facing the Government wharves is set aside for office suites and the back section for a free bodega where lighter merchandise is stored. A freight elevator connects the second floor with the trackway, of sufficient capacity to meet all goods carrying requirements. It is the purpose of the management to fit out the entire second floor in office compartments should the demand for offices warrant and it is also prepared to construct additional bodegas as are necessary to meet the increasing demand for warehouse space and the proper and economical handling of goods coming into the port. The demand for office and storage space since the opening of the building indicates that the firm in preparing for expansion exercised the best possible judgment. Shipping firms, brokers, wholesale houses, etc., have become interested and the new port has taken on unusual indications of activity and permanency.

The transportation facilities from the new wharves to the Derham Bros. bodegas consist of a 3′ 6″ gauge railway, the standard gauge of the Philippine steam railways. The tracks run directly through the center of the building so that it might be said to be a central bodega for the island of Luzon as a car may be loaded there when connecctions with the new port are completed, and delivered over the Manila Railroad Company's lines to any point on the system.

On the other hand, the Manila Electric R. R. & Light Company is connecting the new port with the Manila city system and spur tracks are to be built on either side of the bodega so that goods may be placed on board for delivery in any part of the city.

THE MANILA HOTEL

With the close of 1911 and the opening of 1912 will be thrown open the doors of the "Manila," one of the Orient's most modern and pretentious efforts towards attracting and caring for the tourist and globe trotter.

The external appearance of the Manila Hotel is well represented in the illustration shown with this article, with the exception that roof gardens have been substituted for the roof as originally planned and shown.

The building rests on a foundation of piles of native timber extending to an approximate depth of 16 meters below grade. The load carried by each pile does not exceed one-sixth of its full bearing value. These piles are capped (below the point of permanent saturation) with a continuous concrete course binding the entire structure together. From this the walls of the building run continuous, reinforced with steel. The entire structure including the floors is of reinforced concrete, with the exception of the roof trusses on the four corners, not devoted to roof gardens, which are of wood, with tile roofing. Wood floors where used are laid on strips embedded in the concrete floor slabs. Only the main rooms and ground floor will have wooden ceilings The balance of the rooms have concrete partitions, or walls, and plastered ceilings on underside of concrete floor slabs.

The location of the hotel is ideal, situated as it is at the entrance of the new Luneta occupying, with its terraces, sunken gardens and lawns, almost two city blocks.

The main entrance faces the new Luneta Green and is approached from the north Luneta boulevard through the spacious circular drive leading up to the entrance. The visitor enters under an artistic, broad, marquee or canopy, which covers the main entrance and four of the great arched openings on either side, of which there are nine on the frontage. Six steps lead the main lobby level. This brings the lobby floor about three and a half feet above the level of the drive and surrounding lawns. There is also a side entrance, approached from the Cavite boulevard, passing between sunken gardens, to the east wing of the building.

The most impre sive architectural features of the first floor are the great arches and pillars, in the main entrance and lobby, which is 24 by 135 feet. Directly in front of the entrance the general office and clerks' counter, to the left the manager's private office, and to the right the telephone room, with its four private booths. From the office lobby are located the two main staircases to the mezzanine floor, one to the east and the other to the west wings. At each end of the main lobby are the electric passenger elevators and booths for the sale of such indispensables and curios as every guest looks for in the modern hotel. To the rear and directly behind the general office is the service hall and stairway, service elevator, trunk room, furniture storeroom, and servants' sleeping and dining rooms.

The dining room, which looks out on Manila Bay, is 40 by 75 feet, surrounded by a

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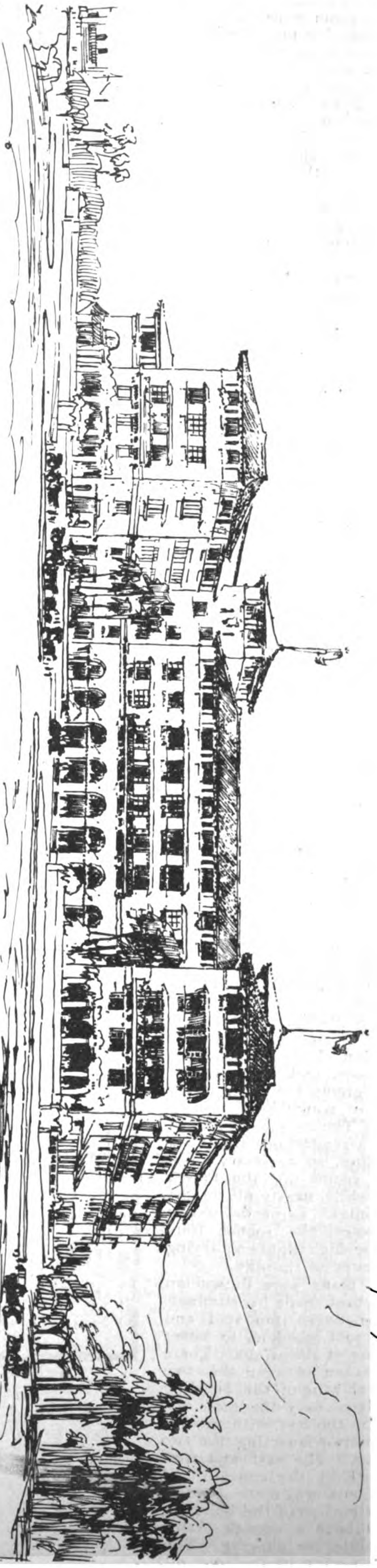
Where the development of the new port has not reached a very advanced stage, the year 1911 will see a wonderful advancement, judging from present activity. The port is to be connected with the Manila Railroad Co.'s lines by a bridge across the Pasig River and construction will soon be under way; the new Manila Custom House in front of Pier 5 is under construction; the Bureau of Supply is erecting bodegas and several large exporting houses are preparing plans for a number of buildings. The Philippine Government is constructing additional piers to accommodate the increasing shipping trade of the port and altogether a practically new warehouse district along the most modern lines is developing.

Messrs. Derham & Co. may be said to have taken the initiative. They had all the difficulties incidental to pioneer work anywhere but good judgment and enterprise do not lack evidence of substantial reward.



THE MANILA HOTEL TO BE OPENED BY THE END OF 1911.

veranda intended for use as an auxiliary, weather permitting. However the climate is such in Manila, during most of the year, that this is likely to be the favorite place for dining. The dining room is flanked for its entire length by a corridor 12 feet wide, leading direct to the kitchen, which is a room 42 by 43 feet. Adjoining the kitchen are the cold storage and supply rooms. The cold storage plant, with its nine separate compartments and over 700 square feet of floor space; its modern system of refrigeration outclasses everything in its line in the Philippines with the exception of the Government Ice & Cold Storage Plant. Included in the system of refrigeration are coils for the bar room, buffet on the roof garden, and for the distilled water tank, reducing the use of ice to the minimum.

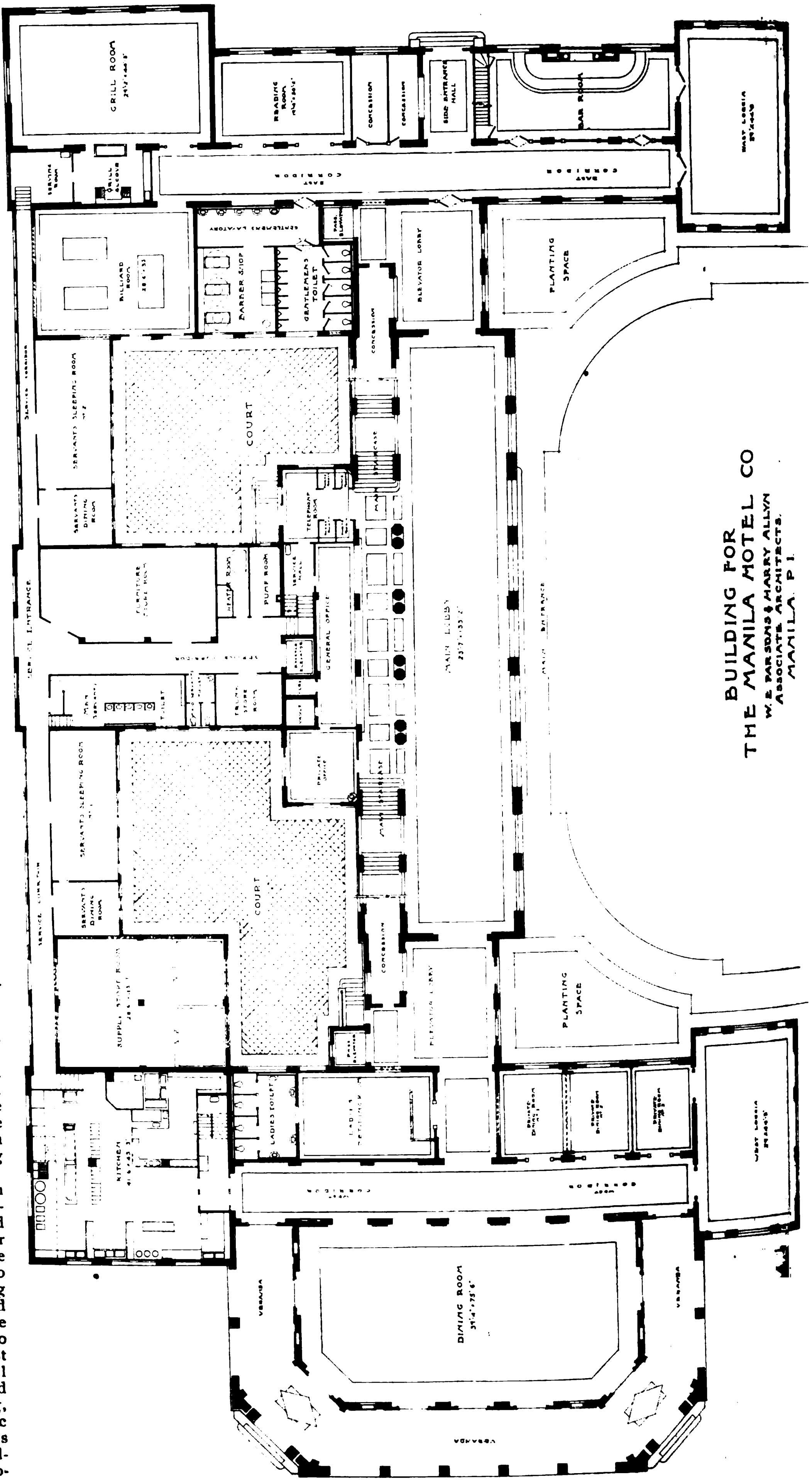
On the opposite side of the corridor which flanks the m in dining room are three private dining rooms that can be thrown together into a ban ,uet room, 43 by 20 feet, and the ladies' retiring and toilet rooms. At the front of the house is the ladies' reception room, otherwise the West Loggia. On occasions it is certain that this end of the house will be the scene of many social events, to which the arrangement lends itself admirably without sacrifice of convenience in handling the every day business of the hotel. The dining room faces west, overlooking Manila Bay, from which point of vantage the beautiful tropical sunsets for which Manila is justly famous may be viewed with the Mariveles mountains creating just sufficient skyline for contrast and foreground.

The east end of the building may best be described as the men's wing. It corresponds in size, 30 by 45 feet, as well as location with the West Loggia at the other side of the house. Back of this is the bar, a haberdashery shop, and a reading room, a grill room, 30 by 45 feet, with grill alcove and service room. While the grill is connected by service corridor with the main kitchen, it will be practically independent, having its own broiler, range and other culinary apparatus, fully capable of catering to the fastidious ta-tes of the modern grill habitué. In this part of the house is also located a billiard room, with English and American pool and billiard tables, a three chair barber shop and men's toilet room.

On the mezzanine floor are located a guests' parlor, 20 by 60 feet, a children's dining and play room, with butler's pantry connected direct with the kitchen by service stairway, also two suites each comprising bed room, parlor, bath and dressing room, sixteen bed rooms with baths and dressing rooms, and a suite of rooms especially designed for the manager.

The fourth illustration shows the arrangement of the second floor, and is typical of the three floors above, giving the house in all 149 guest rooms, half of which have private baths in connection. The object sought to be attained in the arrangement shown is plenty of air circulation, so necessary in a tropical climate. All rooms on the fourth floor have verandas, while nearly all on the second floor have balconies. Large decorative media aguas will protect the rooms from storms and the intense high lights so trying during the middle hours of the day.

Since the original plans were drawn an important change has been made by eliminating the objectionable sheet iron roof and substituting therefor roof gardens to cover all but the four corners of the wings. There will be a covered garden between the two towers over the central wing of the building and uncovered gardens over the east and west wings, each 35 by 100 feet, with passage ways through the towers connecting the two wings with the center. The east and west wings will be finished in the conventional asphaltum and sand floors while the covered garden over the main portion of the building, 35 by 130 feet, will have a smooth elastic floor of conolite suitable for dancing. This space, with its concrete balustrades and pillars, can in a few moments be fully protected from the severest weather without losing its attractive openness during sultry, calm evenings; thereby, in this tropical climate, it is particularly adaptable for use as a banquet hall, ball room, or for the accommodation of conventions and other public gatherings. The electric elevators will land its passengers directly on the roof, eliminating the objectionable climb always necessary in other Manila sky-scrapers. There will be a buffet



with iced drinks for the thirsty and tea with other delicacies for those not inclined towards stronger refreshments. To keep edibles for banquet and dinner service at the correct temperature there will be refrigerators and steaming tables installed. Both ladies and gentlemen's toilet and dressing rooms are also provided, in fact the roof gardens as a whole neglect no essential of comfort or convenience. The four corners of the wings, not included in the roof garden scheme, and the two towers will be roofed with tile. The plans as worked out will give the building a much taller appearance and with its six towered skyline it will present very pleasing architectural lines. Above the roof garden, in the towers, are two rooms which are to be known as the "Aeroplane cafes," reserved for members of the Aero Club and others who aspire towards higher altitudes and a surfeit of the pure ozone.

Dropping now seven stories, and landing one floor below the lobby, the kitchen basement is reached where the boilers for the supply of live steam to the kitchen cooking, apparatus, and the supply for the hot water circulating system, are located. Here also are the oven, bakery, ice cream factory, fuel storage and garbage disposal.

The floors of the main lobby, elevator lobbies and side entrance are finished in white vitrious tile, with suitable borders, while all other corridors and hallways have conolite floors, and all bath and toilet rooms have glazed white tile floors. The interior wood work, including all windows, doors and finishings, are of the highest grade of Philippines mahogany, known locally as "narra". The main dining room will have a wood floor of alternate light and dark boards, 15 inches wide; for this "montol" and "manguachupay" have been selected. All suites and bed rooms, with bath, will have similar floors with boards 12 inches wide, while the balance of the bed rooms will be finished in 1 by 3 inch inlaid wood floors.

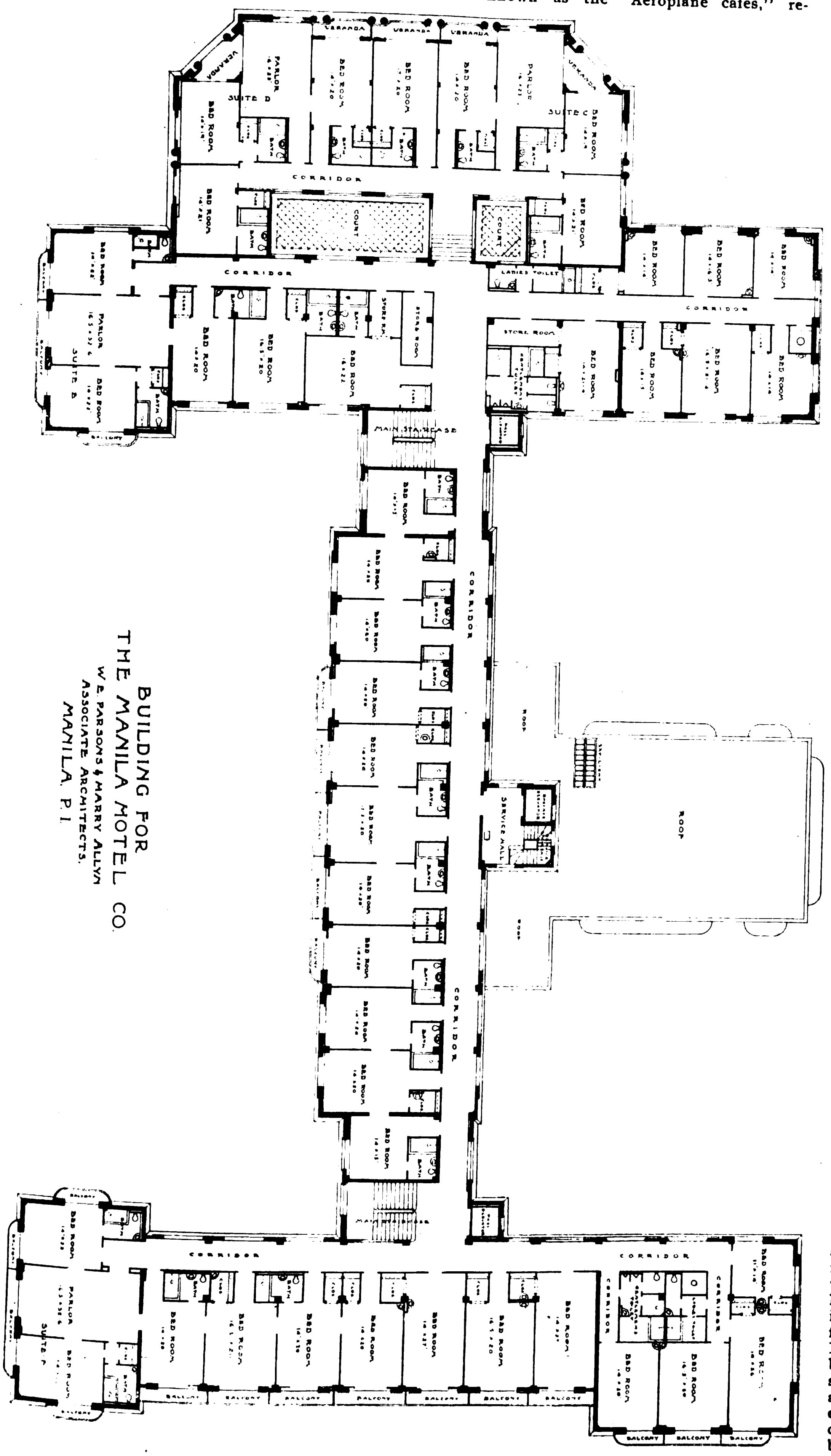
One can not appreciate the magnificent views to be had from any window of this structure, standing as it does in solitary grandeur in the center of what will be an immense park, without the actual experience. Looking from the front towards the south, with the Luneta Green in the foreground, the Army & Navy and Elks' Clubs receive the justice due them from an architectural standpoint. To the east, especially from the upper floors, the Walled City, its old moats and sunken gardens, are seen and appreciated as from no other point of the city. Then to the west and north, historic Manila Bay, with its panorama of shipping, and the new port, every day assuming more of a business aspect, are all spread out in the not too near distance, but just far enough to eliminate the noise and bustle so unpleasant to one seeking rest and comfort.

Just as every room has outside exposure, making them equally desirable except as to size, so the furnishings of practically all rooms are of uniform quality. The house is furnished throughout with the very best grade of Philippines mahogany (narra), with the exception that the cool, comfortable rattan is liberally provided for verandas, balconies and lounging rooms. All furniture, including the rattan, has been especially designed and manufactured locally for the hotel. Special attention has been given to the furnishings of the bridal suite, located on the second floor, which will be finished in antique colonial, and the state suite located on the third floor, and finished in empire design. Similar suites with modern Colonial and French designs of furniture are located in each wing of the other floors of the building.

To attempt details of the other equipment would require pages, suffice to say that the silver is furnished by the Meriden Britannia Company, and that the china, glassware and linen is complete, luxurious, and in keeping with the refined elegance of the house.

The Manila will be the first hotel in the Far East to be equipped with complete intercommunicating telephone system. Every guest room, as well as all public rooms, corridors and service halls, have telephones, together with push buttons for ordinary call service.

It is the intention of the management to make the hotel not only a center for the traveling public but for the social life of Manila. The object will be to meet every requirement of those to whom the hotel is a home, and to supply facilities unexcelled in any other city of the Orient, for those who wish to avail themselves of a modern hotel for entertaining. In this latter respect it is hoped to realize the charm and taste found in cosmopolitan hotels of America and Europe, combined with accommodations for balls and social functions such as have made some of the European hotels famous. In a word, it is expected to give Manila an establishment that will take its place as one of the famous hostelries, not only of the Orient, but of the world.



BUILDING FOR THE MANILA HOTEL CO
W. E. PARSONS & HARRY ALLYN ASSOCIATE ARCHITECTS. MANILA, P. I.

SECOND FLOOR PLAN

FAR EASTERN RAILWAY NEWS

CONNECTING SHANGHAI-NANKING AND SHANGHAI-HANGCHOW RAILWAYS.—Plans are completed for the junction between these two lines which will be placed under one administration when the connection is completed. This will be effected by a line running eastward from the Nanking line between Ferry Road and Jessfield and joining the Hangchow railway near Loonghwa Pagoda west of Sicawei Road.

THE KILIN-CHANGCHUN LINE.—In discussing the probability of the early completion of this line the Japan press is quoted as stating that more funds than originally estimated will be necessary to complete the work.

JAPANESE ROLLING STOCK.—The manager of the Japan Rolling Stock Co. estimates that in the next decade the Government railways will require 500 locomotives to meet the extensions proposed besides a large number required for private lines.

AMERICAN LOCOMOTIVES FOR JAPAN.—The American Locomotive Co. has secured orders for 5 engines for use on the Antung-Mukden division of the South Manchuria Railway and 6 engines for use on the Government railways in Chosen. The first award represents one-half of a purchase of 10 locomotives of the "10-wheeler" type. The order for the other 5 has been placed with Beyer, Peacock & Co., an English firm, which competed in the bidding with the American Locomotive Co. The latter company also recently secured a large order for locomotives for use on the Imperial railways of Japan. This latter order calls for 30 of the Pacific type and 6 of the Mallet type.

TIENTSIN-PUKOW TRAFFIC.—The passenger service on the Tientsin-Chinan section now includes a daily service instead of the former semi-weekly trains. These are exclusive of construction trains.

JAPAN'S WIDE GAUGE CONFERENCE.—The discussion has developed that the cost of the maintenance and necessary improvement of the present narrow gauge system of the Empire from 1912 to 1940 would reach yen 269,650,000 wheras if converted to the standard gauge the maintenance and improvement for the same period would reach yen 290,640,000, a difference of yen 21,000,000. On the other hand if the narrow gauge were adapted the necessity for construction and improvements to keep pace with the development of the country and increased traffic would mean an outlay of yen 1,270,000,000 while the cost of constructing the standard gauge with the exception of the Kyushu and Hokkaido lines would reach yen,1,427,000,000.

CHOSEN RAILWAY PURCHASE.— The private line connecting the colliery at Sadong and Pyongyang, a distance of nine miles, has been taken over by the Railway Bureau.

F. M. S. RAILWAYS.—A through night service has been inaugurated between Singapore and Kuala Lumpur, July 1st, by which the trip is made in less than twelve hours and with the extension of this service the distance from Singapore to Penang will be covered in 24 hours. The special train that inaugurated this service made splendid time on the F. M. S. section, but the fourteen miles of the Singapore Government line consumed 75 minutes. The special carried a modern dining saloon car constructed in the railway shops and sleeping cars have been ordered from the Metropolitan Railway Carriage and Wagon Co. of Birmingham.

F. M. S. ANNUAL REPORT FOR 1910.—General Manager Anthony's report indicates a prosperous year. There was a decrease in minerals carried but a large increase in product and footstuffs, while double the quantity of rubber was transported compared with the previous year.

Passenger receipts show a satisfactory increase, particularly the 3rd class, which increased 24.27 per cent in number. Gross earnings from all traffic increased by 13.11 per cent. Working expenses decreased by 2.11 per cent. Net earnings increased by 50.90 per cent.

The mileage opened for traffic on December 31, 1910, was 538 miles 75 chains, the length added during the year was 68 miles 48 chains.

The dividend earned by the open lines (exclusive of motor services) on a capital of $51,335,128.16 was 4.35 per cent., or a net profit for the twelve months of $2,236,231.14, as compared with 3.18 per cent. in the previous year. The aggregate net profits earned by the Federated Malay States Railways from the commencement, 1885, to the end of 1910, amounted to $21,178,044.68. Taking the open lines of railways and motor services together, the profit amounted to $2,159,814.01 (profit Federated Malay States Railways $2,236,231.14 less loss on motor services $76,417.13), equal to 4.17 per cent. on a capital account of $51,784,083.53.

MANILA-ANTIPOLO LINE.—The promoters of the Antipolo Hotel Co. have concluded an arrangement with the Manila Railroad Company for special rates to and from Manila. These rates will apply to special morning and evening trains for the purpose of carrying commuters to and from Manila. The schedule of rates follows: First Class: Tickets good for one year—₱225; half year—₱125; three months—₱82. Second class tickets will be sold as follows: good for one year—₱170; half year—₱110; three months—₱57.

The trains will leave Manila at 6 o'clock in the evening and Antipolo at 7 o'clock A. M. The purpose is to accommodate Manila business men taking up their residence at Antipolo, a cool mountain town.

CHINESE RAILWAYS TO BE NATIONALIZED.—According to the *Sinwanpao* the following lines will be included in the program of nationalization:

The Kirin Changchun Railway—The line is under construction and the total length is 80 li which will be extended from Kirin to Chientao for 240 li after the line between Kirin and Changchun is completed.

The Chingchow Aigun Railway—The contract was signed in 1910 with a British Syndicate for a length of 750 li to be built by the said British Contractors with British funds.

The Kalgan Shuiyuancheng line—The length is 180 li and it has been built up to Chiaichupao to be extended to Kulun (Urga) and Kiakhta.

The Chenting Tehchow line—The length is 110 li to connect the Peking-Hankow and the Tientsin-Pukow Railways at Tehchow but work is not commenced yet.

The Chefoo Weihsien line—From Chefoo to Weihsien the length is 170 li. The Shares of the Company are not subscribed yet and it will become a government undertaking.

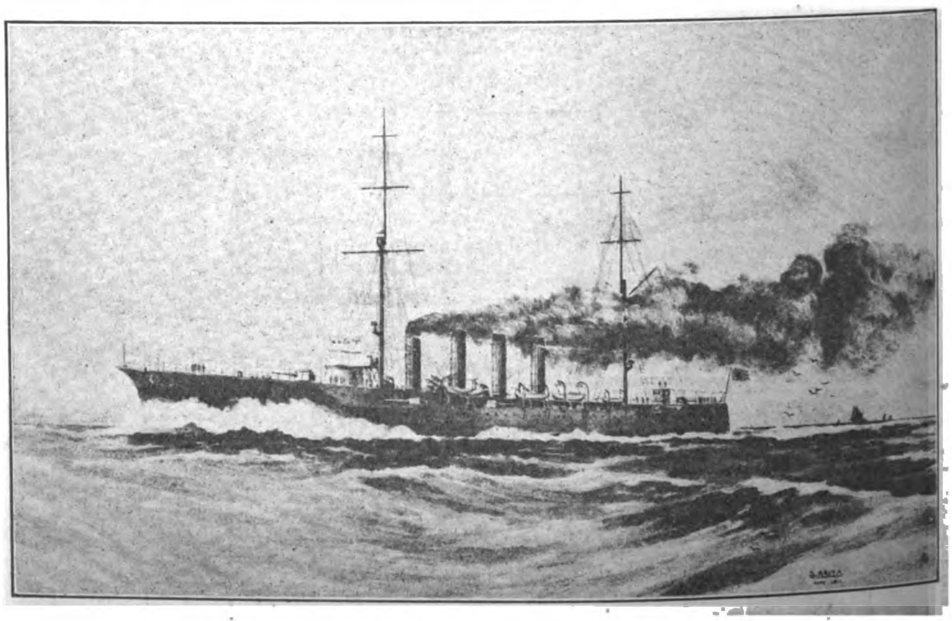
NEW JAPANESE CRUISER

The launching of the Japanese armored cruiser Hirado from the Kawasaki Dockyard at Kobe the latter part of June marked the beginning of a new-era in naval construction in the history of the Kawasaki Dock Company. Heretofore the warships turned out at the company's included vessels of about 1,500 tons, among which were gunboats for Siam, Korea, China and Japan and destroyers and submarines for the Japanese navy. The cruiser Hirado, however, has a displacement of 4,955 tons and orders have been placed for another cruiser at this company's yards at Kobe. This is significant of the enterprise of the management.

The official description of the Hirado follows:

Class	2nd class cruiser.
Tonnage	4,950 tons.
Length	475 feet.
Beam	46.6 feet.
Depth	28 6 feet.
Draught	16.7 feet.
Horse-power	22,500.
Speed	26 knots.
Engines	Latest Turbine.
Boilers	Water-tube style.

The occasion of the launching was made memorable by the presence of H. I. H. Prince Kita Shirakawa, accompanied by Baron Saito, Minister of the Navy, Vice-Admiral Baron Ijuin, Vice Admiral Kato and Inspector General Fukuda. A collation was served after the ceremony at which Mr. Kawasaki, vice president of the company, Baron Saito, and Governor Hattori delivered short addresses. Among the official guests were Sir Douglas Brownrigg, Naval Attache, British Embassy, Captain Shipley, U. S. N., Attache, American Embassy, and a large number of foreign naval officers.



H. I. J. M. SECOND CLASS CRUISER "HIRADO."
(CONSTRUCTED AT THE KAWASAKI DOCKYARD CO., LTD.)

The Tatung Puchow line—From Tatung to Puchow, Shansi, length 450 li. Completed up to Pingyaohhsien, 60 li.

The Tongkwan Loyang line—From Honanfu to Tongkwan, length 30 li. The survey concluded in 1909. Prepared to be built.

The Hsian Tongkwan line—From Hsianfu to Tongkwan, 56 li. Surveyed in 1910, waiting for construction.

The Hsian Lanchow line—From Hsianfu to Lanchowfu, 80 li, in the course of surveying but not within the list of the Ministry of Communications.

The Lanchow Ili line—Length 1,250 li, surveyed and waiting the arrival of the Tartar General Chih Jui of Ili. Further investigation will be effected.

The Kaifeng Hsuchow line—From Kaifengfu, Honan, to Hsuchow in Kiangsu, length 175 li, surveyed in 1910 and is prepared for construction.

The Hsuchow Chingkiangpu line—Length 120 li to be completed in 1912.

The Chingkiangpu Haichow line—a Trunk line—from Chingkiangpu to Haichow, Kiangsu, from the East to the West.

The Chingkiangpu Kwachow line—Length about 100 li.

The Sinyang Pukiang line—From the Singyang Station of the Peking Hankow Railway to Pukiang. Length 270 li.

The Swatow Chowchowfu line—200 li from Chowchowfu to Swatow via Huichow and Silung or Tsencheng to join Canton Kowloon Railway.

The Macao Fatshan line—75 li. Portuguese got concession in 1902.

The Kweilin Techow line—Length 80 li, surveyed.

The Yunnan Railway—Survey by American engineer by the order of the Viceroy of Yunnan.

The Lienshan Lungchow Railway—The French concession coming from Hoiho, length 46 li, if extended to Nanking 150 li.

Yunnan Burma Railway—Length 123 li, whole line already surveyed.

SUPPLY OF INDIAN RAILWAY MATERIAL.—Messrs. W. and T. Avery, Limited, English weighing machine manufacturers, have a large order in hand for the supply of eight automatic self-contained weigh bridges to the Burma Railways Company. Messrs. S. Maw and Sons, and Messrs. Mayor and Maltzer, had an order each for the supply of surgical instruments and hospital necessaries, etc., to this line; and the Dental Manufacturing Company, Limited, for the supply of dental instruments. Messrs. Walter's Electric Manufacturing Company, Limited, had a contract for the supply of 35 sets of arm and lamp repeaters, together with 3 bells, to the Burma Railways. Messrs. J. and T. Howard, Engineers, Bedford, Beds, have, we hear, an order for the supply of two hundred pairs of steel wheels and axles, 2 feet 6-inch gauge, to the North-Western State Railway. Messrs. Head, Wrightson and Company, Limited, Teesdale Ironworks, Thornaby-on-Tees, have the contract of the East Indian Railway Company for the supply of the 16 spans of girders which are required for the new second track over the Jumna Bridge, Allahabad. The Patent Shaft and Axletree Company, Limited, Wednesbury, English girder bridge manufacturers, have the order of the East Indian Railway Company for the supply of 14 spans of girders and 13 pairs of slip rails, which are required for the second track over the Jumna Bridge, Delhi. The Leeds Forge Company, Limited, is to furnish the underframes, bogies, wheels, axles and body fittings required for fifty-five 60 feet third class passenger coaches and for fourteen 45 feet third class and baggage cars, also sixty sets of pressed steel bogie parts of coaching stock on the Bengal and North-Western Railway system, and fifty-six-wheeled ballast trucks and fifty four-wheeled low-sided wagons for the metre gauge lines of the Eastern Bengal State Railway system.

PHILIPPINE MINING NEWS

AUSTRALIAN CAPITAL LOOKING FOR INVESTMENT.—According to the present outlook there is every indication that the labors of several unobtrusive citizens of Manila during the past six months will result in interesting some of Australia's most prominent public men and mining financiers in Philippine placer mining propositions. The task of bringing land owners and capitalists to see eye to eye is one of great difficulty, particularly when the methods of doing business peculiar to two countries are involved, each of which is foreign to the other, and especially in an initial deal, but patience and perseverance eventually triumphed and an adjustment of terms concluded satisfactory to both parties. The conclusion of the deal rests upon the report of the expert.

Mr. J. Bertenshaw, the expert who departed for Melbourne on the 10th inst. to report upon the various properties in the Paracale District which have been engaging his attention since his arrival there some 10 weeks ago, represents a group of notable mining financiers, and is himself a man of extensive experience in gold dredging, having been associated with the business for 17 years in New Zealand and Australia, the last eight of which he has been manager of the Campbell's Creek Gold Dredging Co., which operates its dredges at Castlemaine, Victoria.

The Syndicate, which is represented by Mr. Bertenshaw, controls companies which operate no less than 14 dredges in Victoria, and its personnel comprises some men of repute among whom might be mentioned, Sir Henry Weedon, J. P., M. L. A., (Member of the Legislative Assembly), late Lord Major of Melbourne; the Hon. John McWhae, M. L. C. (Member of the Legislative Council), ex-Chairman of the Melbourne Stock Exchange, the Hon. J. G. Aitken, M. L. C., a well known merchant prince who is proprietor of a large dry goods establishment and gigantic hotel property known as the Melbourne Coffee Palace, both occupying extensive frontages on Bourke Street, one of the principal thoroughfares of Melbourne where land changes hands at the remarkable figure of £1000 per foot, and A. F. Showers, prominent in mining circles as the legal manager of a number of the most successful mining ventures.

The Syndicate has under offer to it practically the whole of the claims on the Paracale and Malaguit rivers that are worth having and it is probable in the event of the parties concerned coming to a satisfactory arrangement a large electrical generating plant will be installed and the dredges and mills operated by electricity. The cost of operating would thus be reduced to a minimum enabling the poorest ground to be worked whereas if the more costly method of steam power on each dredge be adopted certain portions of the ground containing low values would have to be passed over.

There is held in the district a quantity of ground which does not contain sufficient flats in proportion to the hills to make it worthy of consideration at the price asked by the owners and in regard to the ground which is held for "paddock dredging" the water question has still to be solved. It is one thing for the owner to point out how nicely one can arrange for water to be brought up by the tide, and another thing to convince the expert, who has years of experience under such conditions and who knows just how much water is required to enable the work to be carried on without the pumps refusing to lift the "soup" in which the dredge would be floating before the tide returned to replenish the supply.

There is plenty of property in the Paracale district to be exploited and plenty of capital willing to exploit it as soon as the owners are willing to come down to a reasonable proposition. There is no reason why connections cannot be made through representatives of capital now in Manila which will enable the owners to have their ground experted and the values disclosed. It should also be borne in mind that the values are not represented by the amount of gold contained per cubic yard, but by what the proposition represents in net returns after the cost of extracting and saving the precious metal.

We have reason to believe that satisfactory arrangements will be concluded between the Melbourne capitalists and the owners represented by J. Burlingame Johnson, and in the event of these negotiations being brought to a successful termination a modern, 7 foot bucket dredge will be installed as soon as it can be constructed and placed on the ground, while the present dredge of the Paracale Gold Dredging Co., will be subjected to certain alterations which will greatly affect the gold saving capacity. The consummation of this deal will mean much to the industry and it is only those in the know who are able at the present moment to realize the extent of the beneficent influence which the introduction of capital will mean to the Philippines.

THE COLORADO MINING CO.—Advices from Masbate are to the effect that the installation of the mill and cyanide plant of the Colorado company is about completed and that it will be in operation by the end of September. This plant has a capacity of 100 tons a day and is the largest yet brought to the islands.

THE HEADWATERS MINING CO.—This plant having a capacity of 70 tons has been operating for the last month, but no official report has been received although the result of the first clean-up arrived in Manila about August 10.

THE EXPLORATION COMPANY.—The flotation of the Gumaus placer property undertaken under option by the Exploration Company has been successfully consummated, the necessary stock being subscribed by local Philippine capital. The dredge designed for this property has been ordered through the New York Engineering Co. and will be installed with expedition. The Exploration is now controlled by Philippine capital with a local board of representative businessmen of Manila. The flotation of the Gumaus is evidence of the faith of Philippine capitalists in Exploration properties notwithstanding the surreptitious closing of the San Mauricio. The company will proceed conservatively and expect to be in a position to reopen the San Mauricio and proceed to the development of its other properties as soon as feasible.

AMALGAMATION OF SEVERAL GROUPS OF BENGUET CLAIMS.—British capital is interested in a project to secure control of a number of groups of properties that are now being investigated with a view to consolidation and the installation of a large plant in that district. These groups are: The Muyot, Bua, Antimok Valley, Madison, Camote-Clayton, Fianza, Antimok Consolidated, and Hillside Groups.

LONDON METAL MARKET

JUNE 9, 1911.

COPPER.	£	s.	d.		£	s.	d
*Tough cake and ingot	60	10	0	..	61	0	0
*Best selected	60	0	0	..	61	0	0
*Electrolytic	60	15	0	..	61	5	0
*Sheets and sheathing	71	0	0	..	—		
*Flat bottoms	74	0	0	..	—		
STANDARD †Cash	56	15	0	..	56	16	8
STANDARD †Three months	57	6	3	..	57	7	6
*Copper tubes, seamless per lb.	0	0	8½	..	—		
*Lake	—			..	—		

* Less 8½ per cent. † Net.

ALLOYS.	£	s.	d.		
BRASS: Wire	0	0	6¾	..	—
,, Tubes (solid drawn)	0	0	6¾	..	—
,, Sheets	0	0	7	..	—

TIN.	£	s.	d.		£	s.	d.
English ingots, f. o. b.	193	0	0	..	194	0	0
,, bars	194	0	0	..	195	0	0
,, refined	195	0	0	..	196	0	0
Straits... Cash	195	0	0	..	195	10	0
Straits... Three months	188	10	0	..	188	15	0
Australian spot	—			..	—		
Banka (in Holland) Cash	193	0	0*	..	—		
Banka (in Holland)	—			..	—		

*Close of market for prompt.

LEAD.	£	s.	d.		£	s.	d.
Spanish or soft foreign	13	6	8	..	13	8	9
English pig, common	13	8	9	..	13	11	3
,, L. B.	14	0	0	..	—		
,, sheet and bar lead	15	2	6	..	—		
,, pipe	15	12	6	..	—		
,, red	16	0	0	..	—		
,, white	18	10	0	..	—		
,, patent shot	16	10	0	..	—		

SPELTER.	£	s.	d.		£	s.	d.
Silesian ordinary brands	24	10	0	..	24	15	0
,, special brands	24	15	0	..	25	0	0
Sheet zinc	29	0	0	..	—		

ANTIMONY.	£	s.	d.		£	s.	d.
Antimony	28	10	0	..	29	10	0
,, Crude	11	5	0	..	12	5	0
,, Ore (basis 50%)	7	5	0	..	7	15	0

QUICKSILVER.	£	s.	d.		
Flasks, 75 lbs. warrants	8	7	6	..	—

ALUMINIUM.	Per ton.				Per ton.		
98-99 per cent.	60	0	0	..	61	0	0

NICKEL.	Per ton.				Per ton.		
98-99 per cent. guaranteed	167	10	0	..	171	0	0

PLATINUM.

Per oz. Troy, 172s. 6d.; nominal and subject to negotiation.

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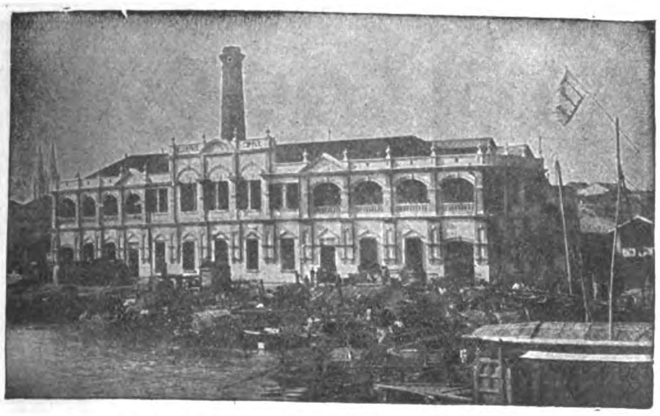

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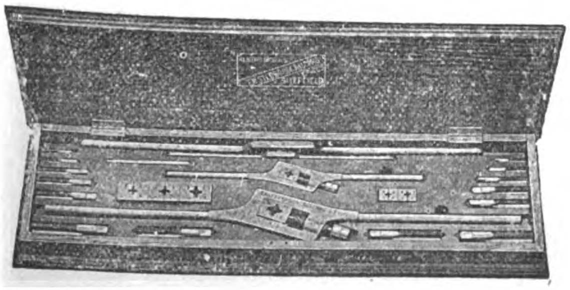

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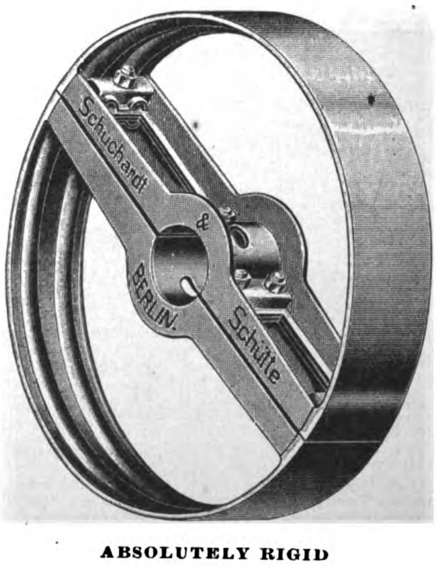

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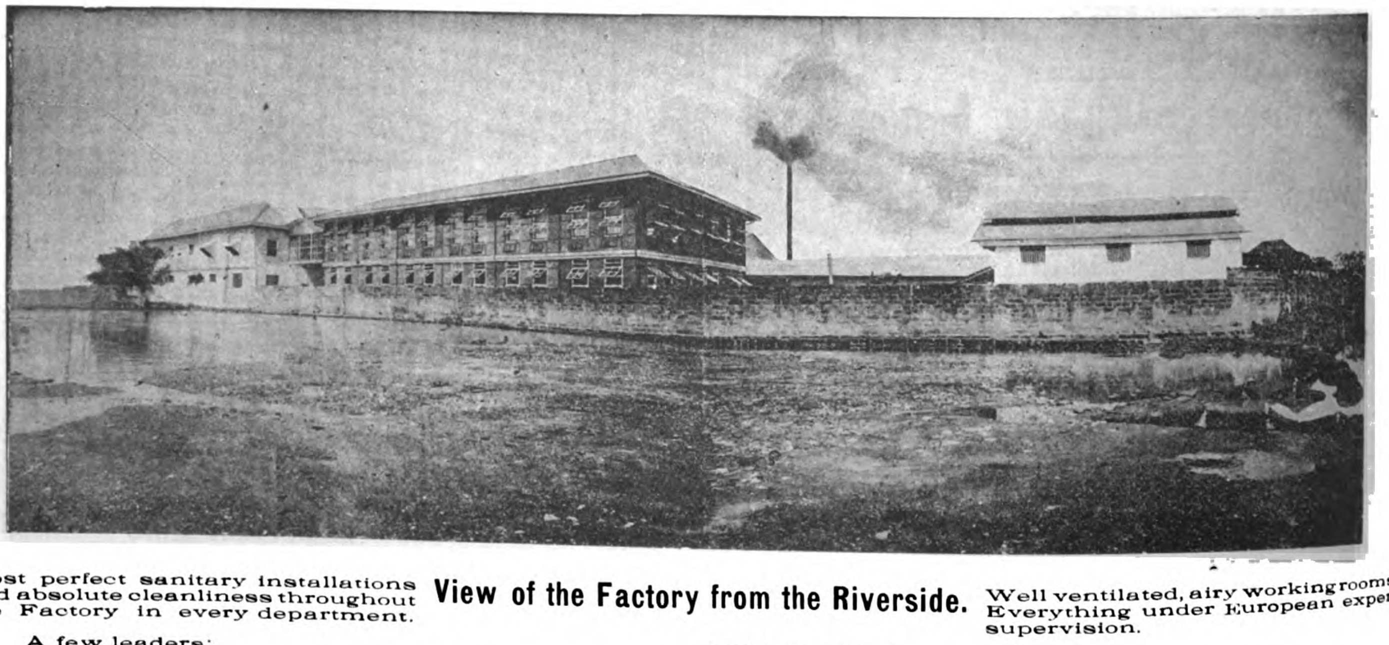

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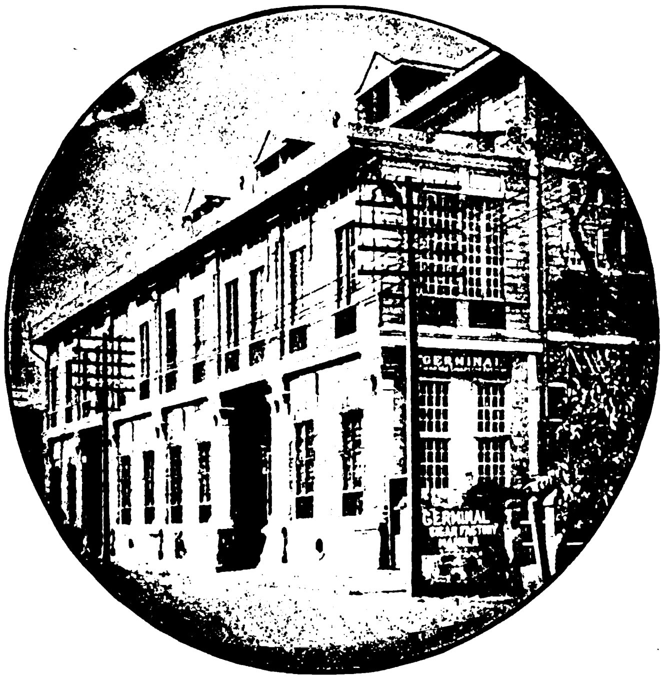

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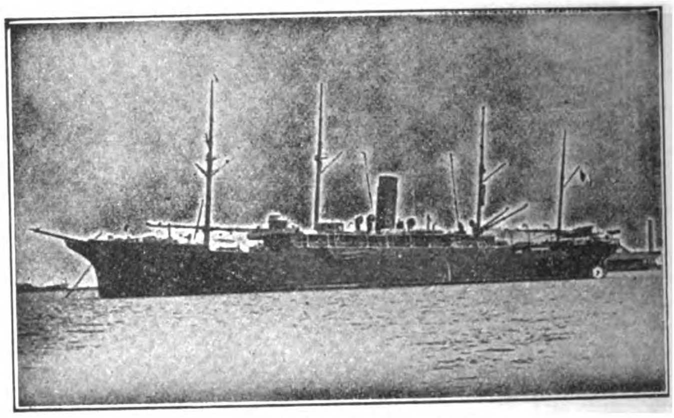

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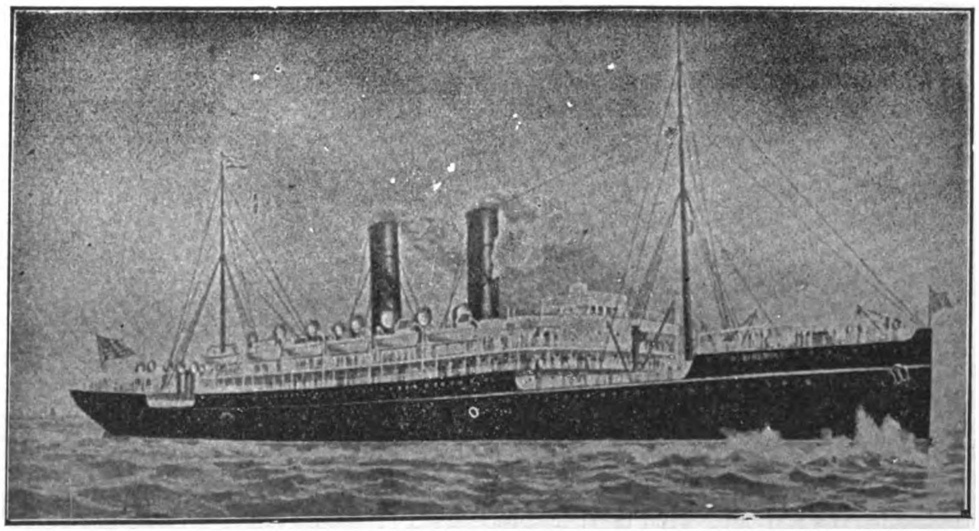

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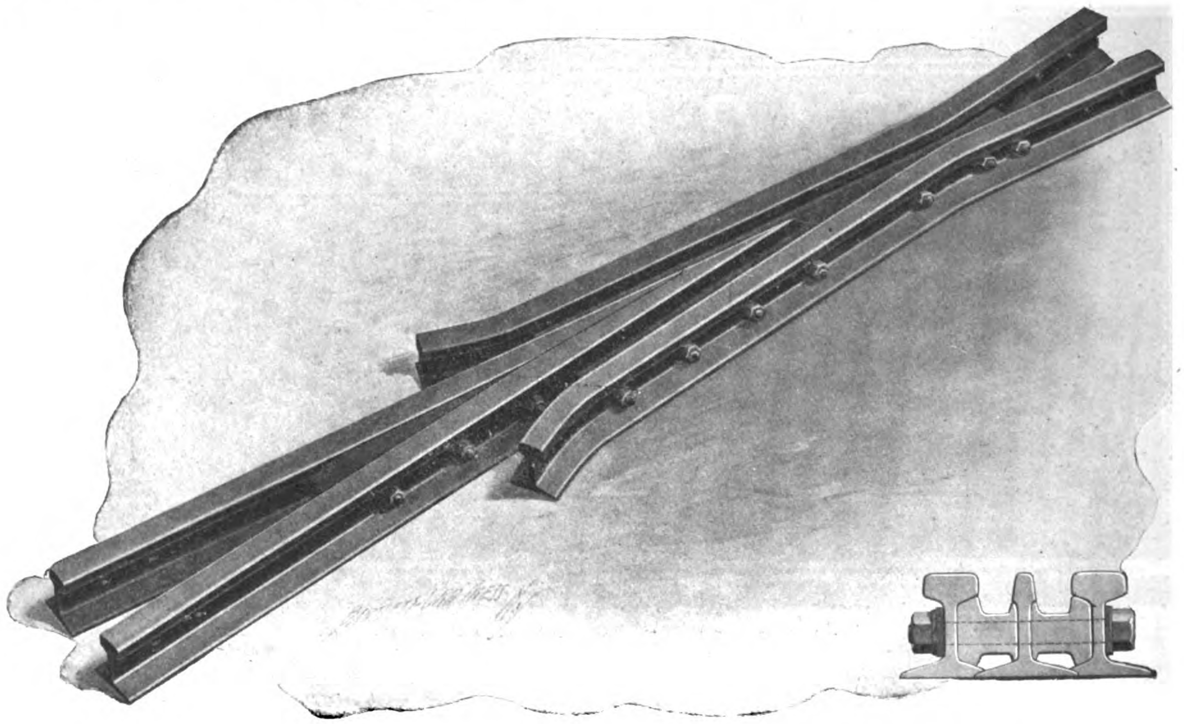

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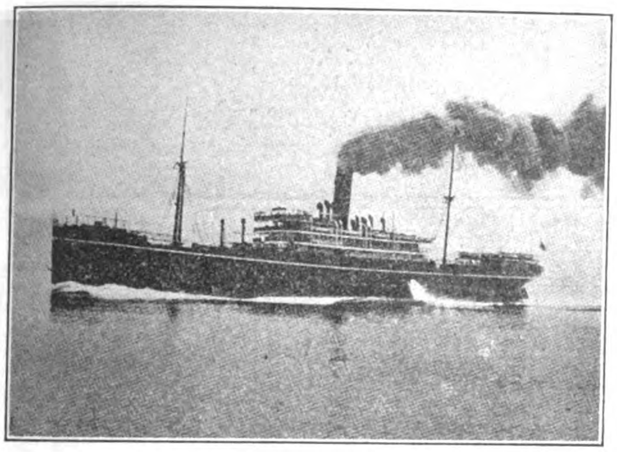

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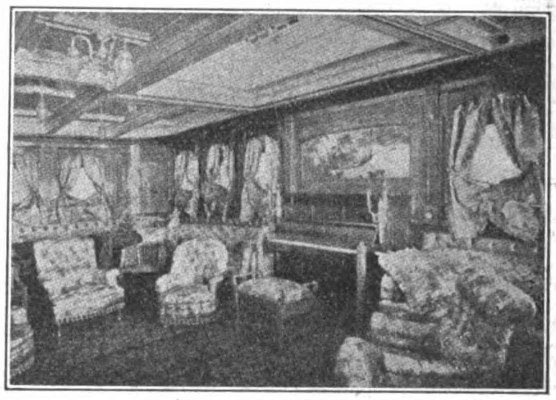

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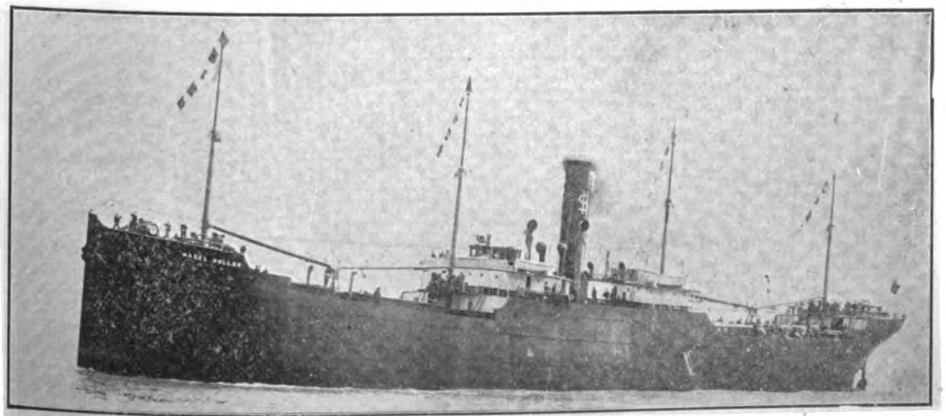

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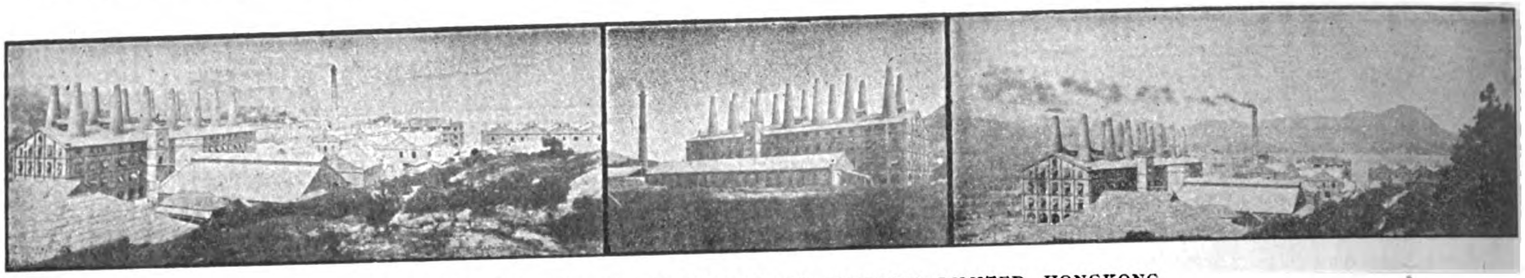

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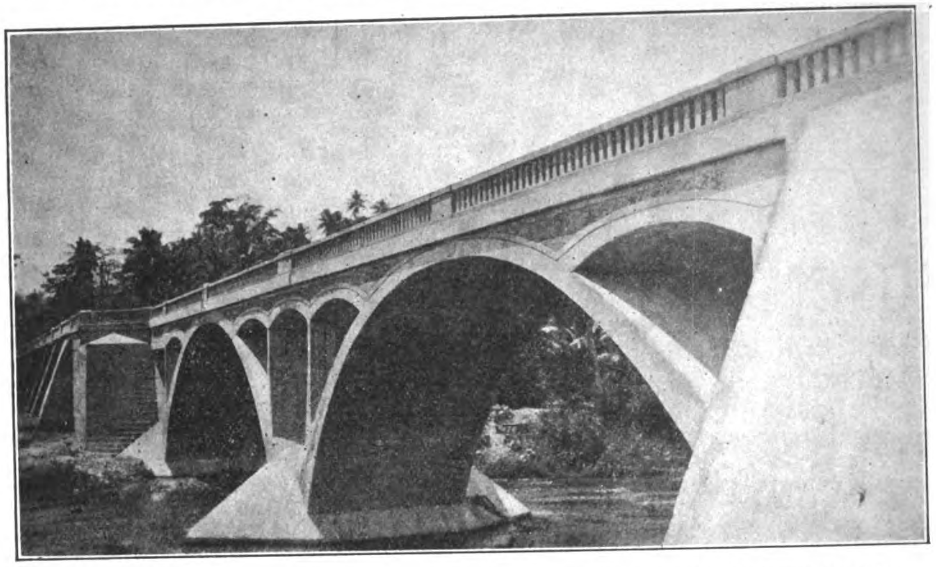

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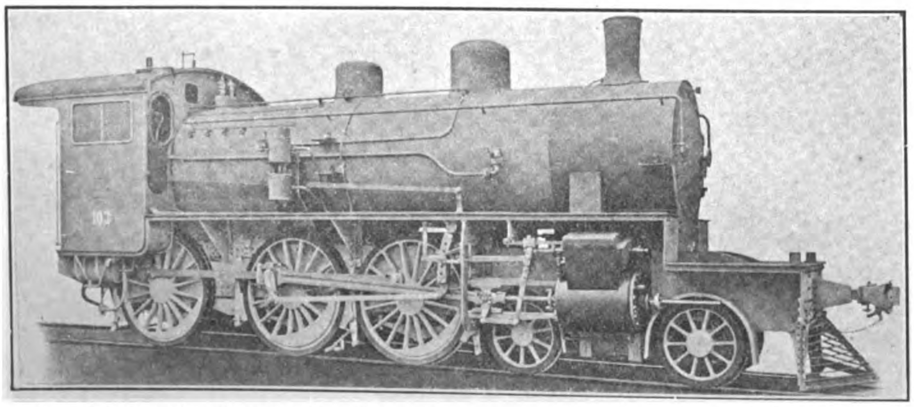

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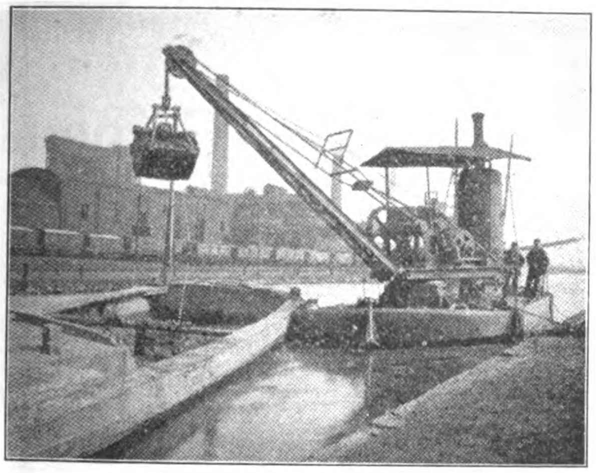

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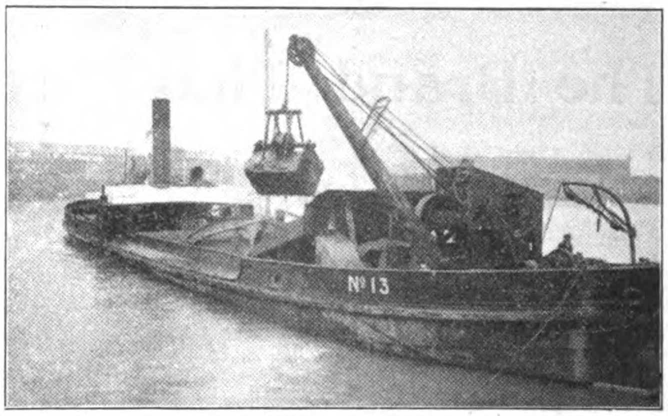

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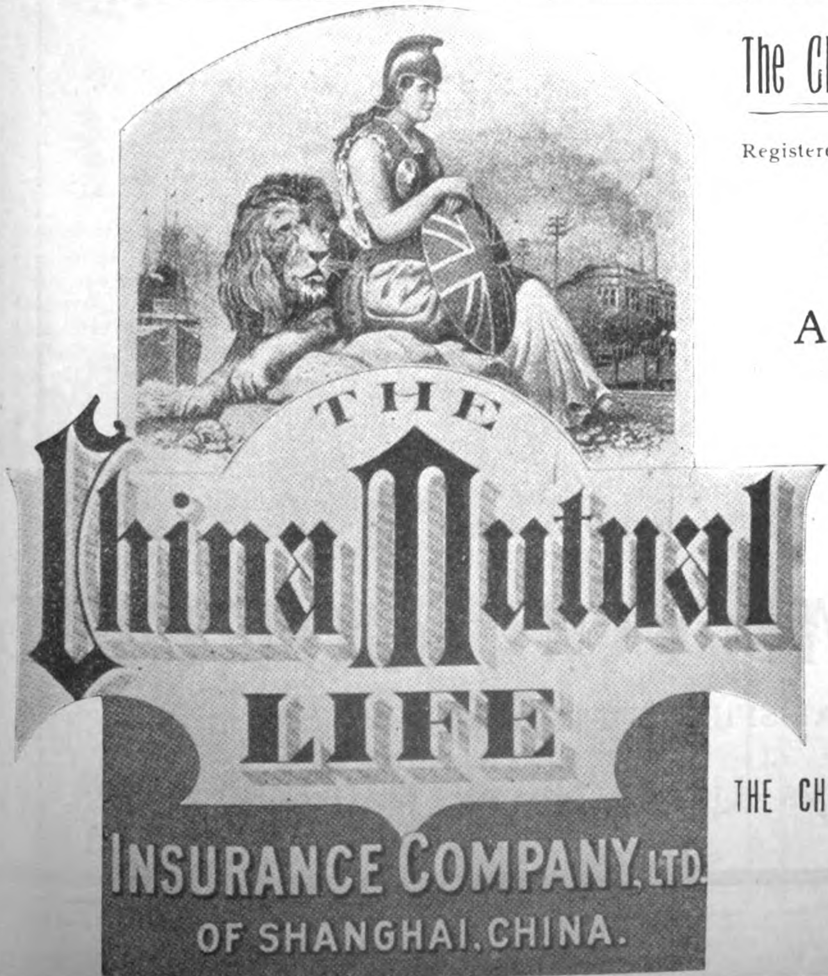

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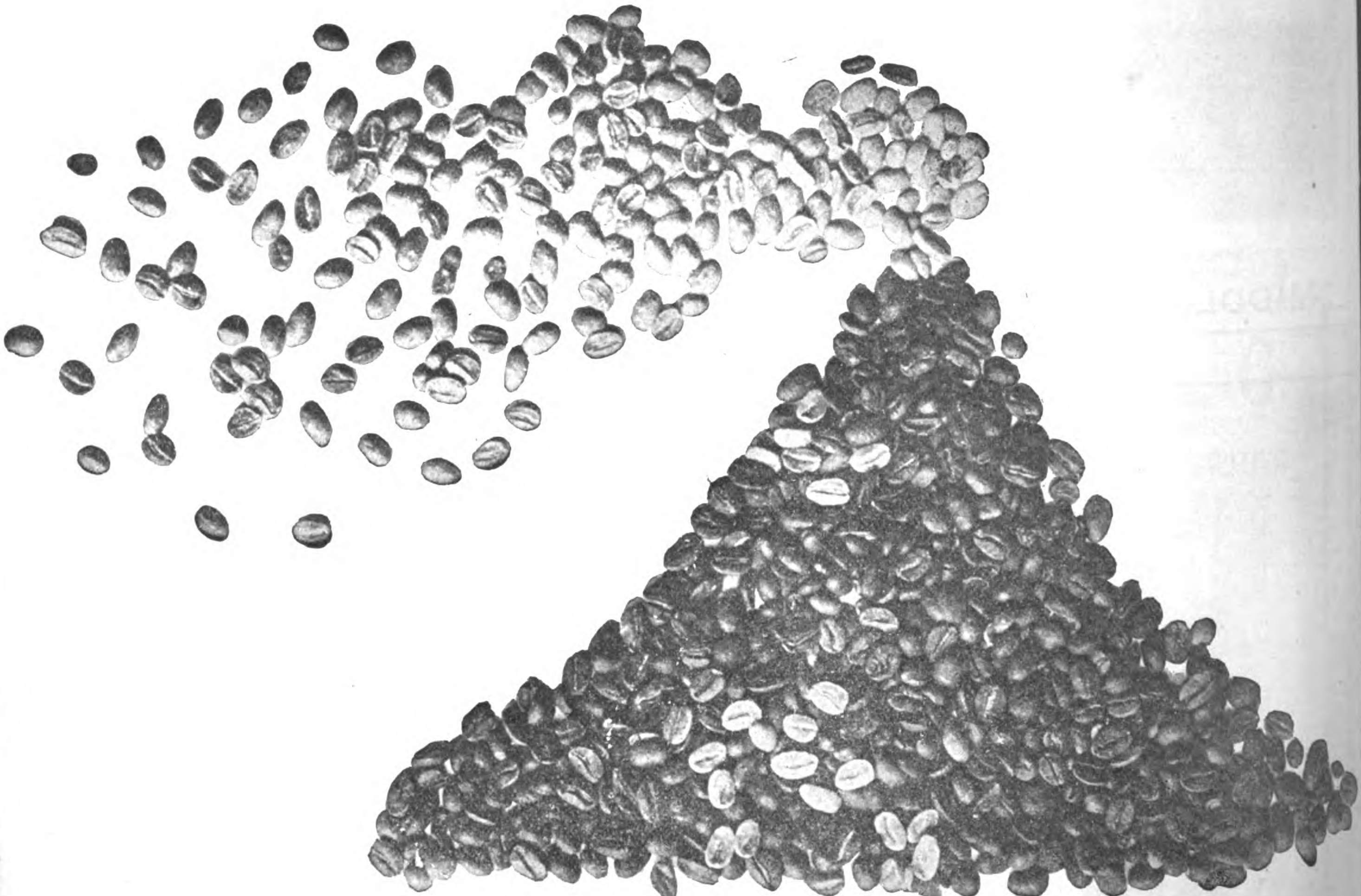

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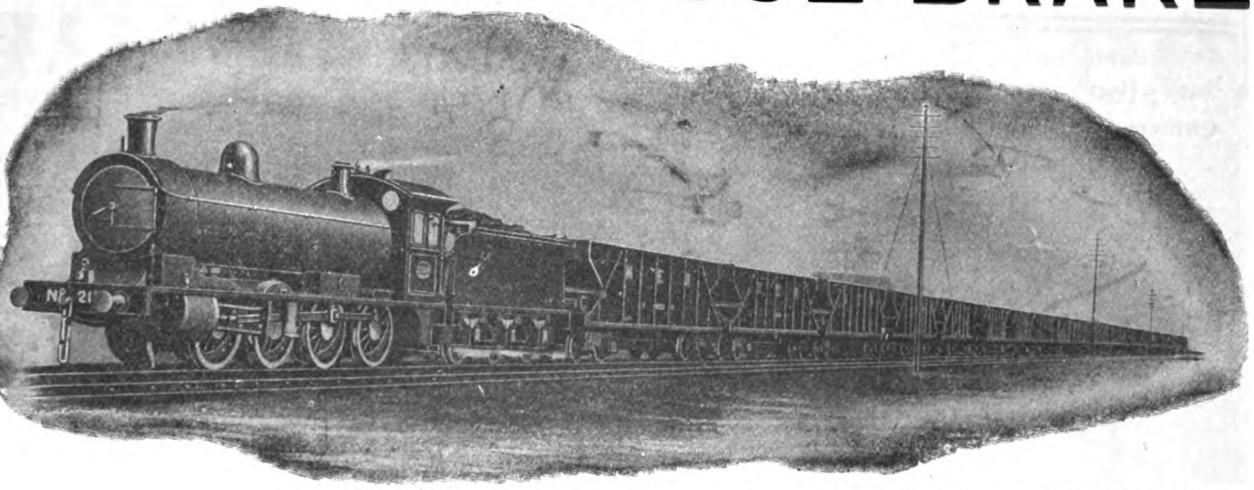

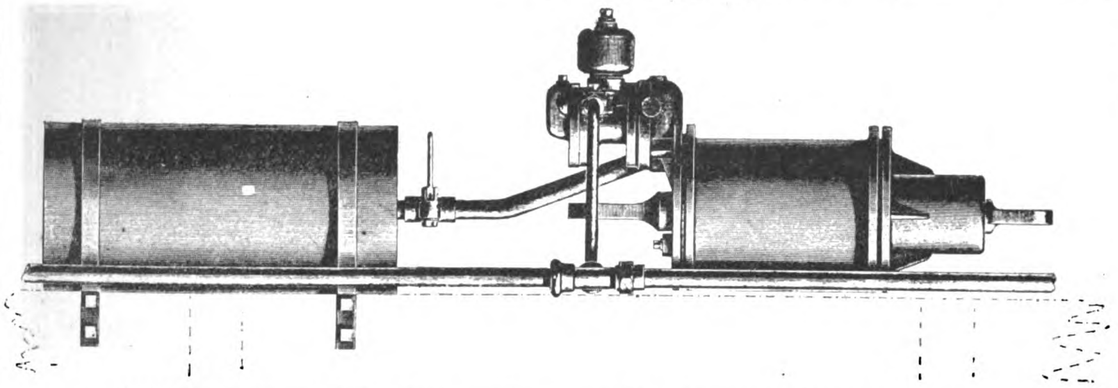

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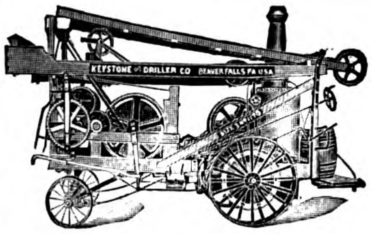

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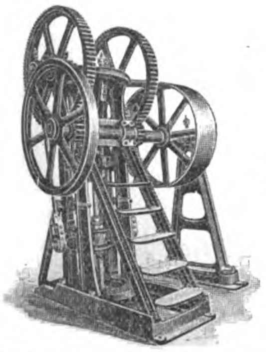

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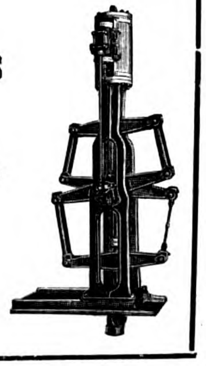

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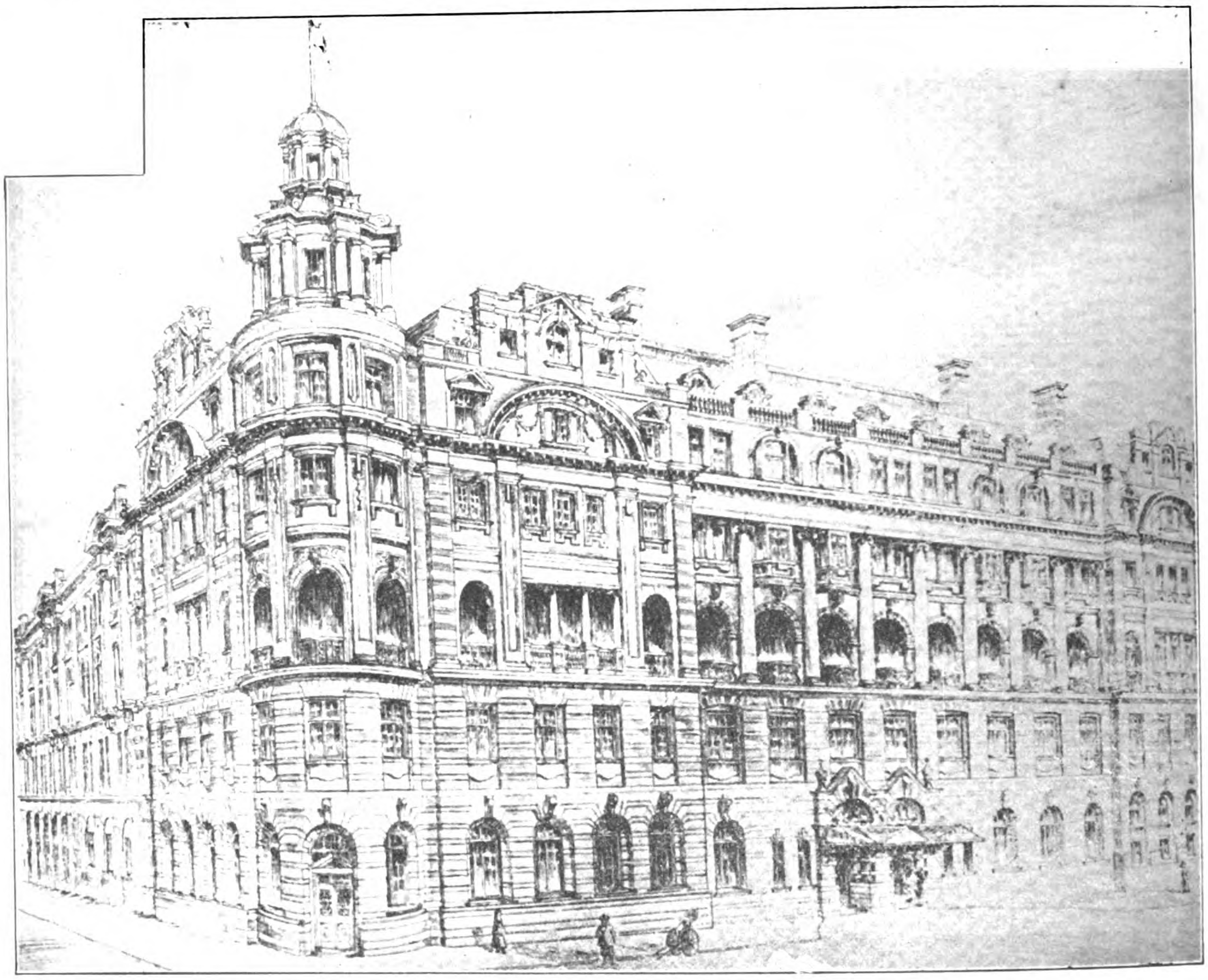

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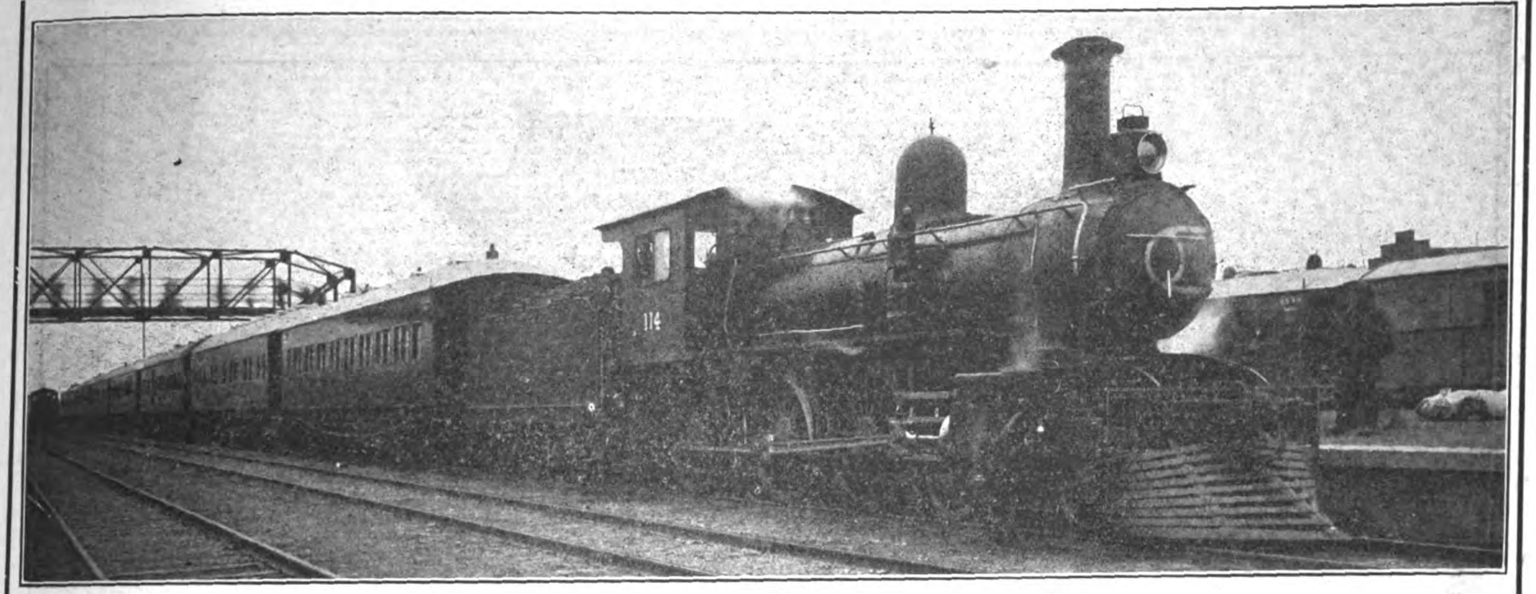

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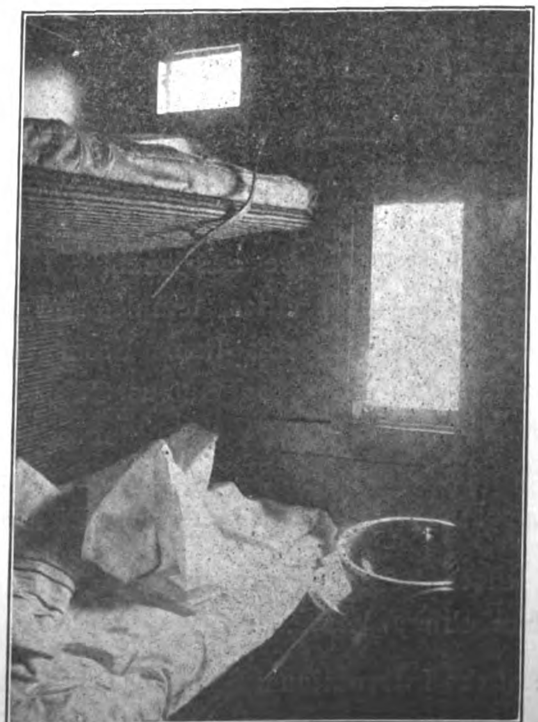

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Avoid the Cold and Rough Weather in the Sea Trip between Shanghai and the North by the more comfortable Route up the Yangtsze to Hankow, and from there via the Ching-Han Railway to Peking, where through connections for Europe are made with the Trains de Luxe of the Imperial Railways of North China.

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A weekly express train de luxe leaves Peking every Tuesday, and Hankow every Friday, making the trip of over 700 miles in less than thirty hours.

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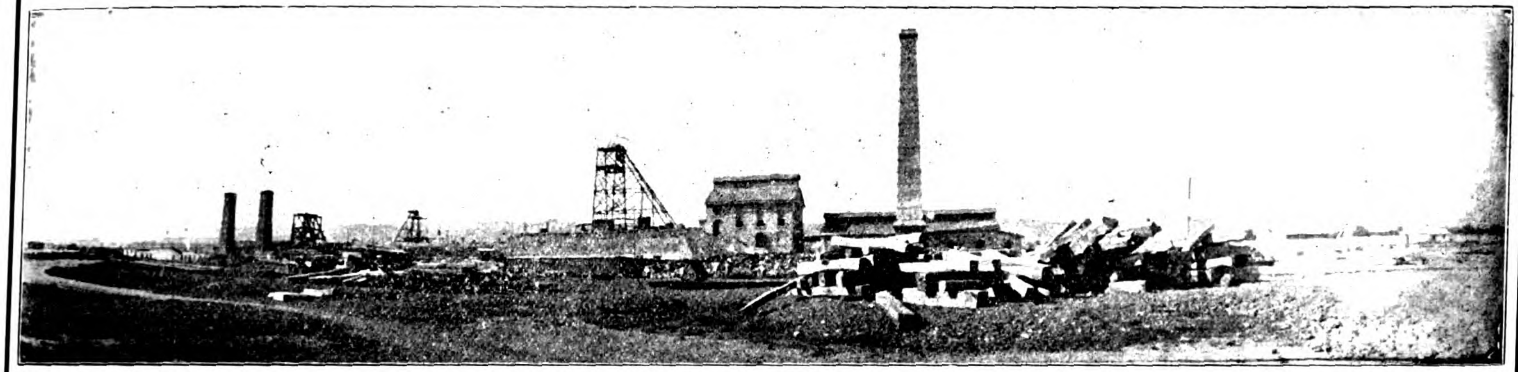
IMPERIAL CHINESE RAILWAYS

THE TAO-CHING RAILWAY

TAOKOU TO CHINGHUA

(Imperial Chinese Government Honan Line)



GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

"China's Road of Anthracite"

THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

THE PIENLO RAILWAY

(KAIFENG-FU TO HONAN-FU)

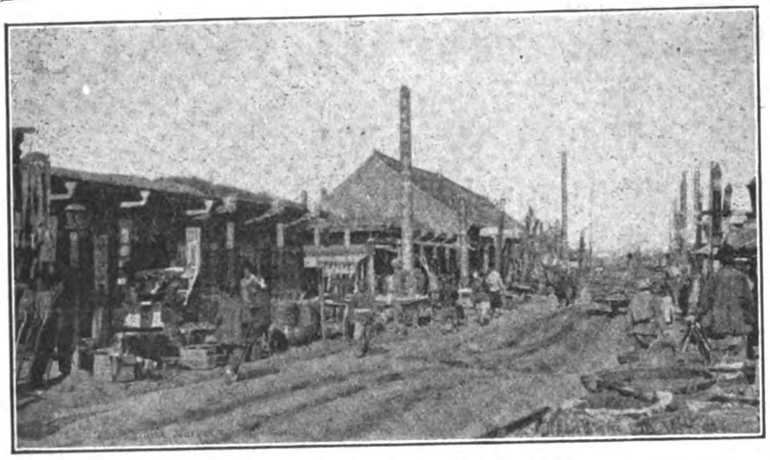
"THE FIRST SECTION OF THE PROJECTED CENTRAL TRUNKLINE"

CHUNG-HUAN TEMPLE, KAIFENG FU.

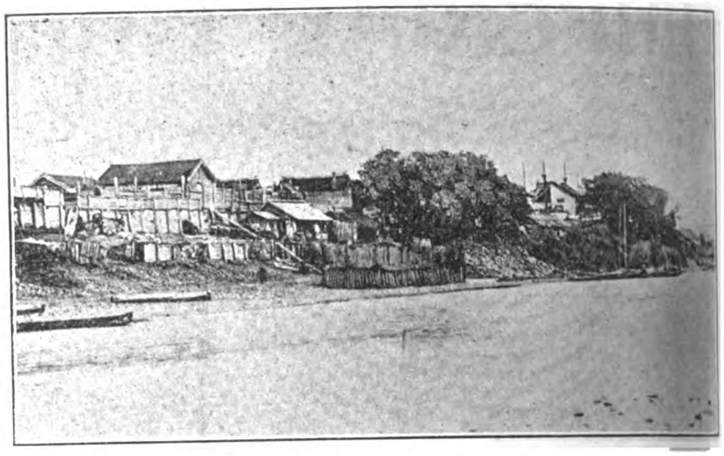
This line connects with the through service of the Peking-Hankow Railway at Tcheng Tchéou, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

IMPERIAL CHINESE RAILWAYS

KIRIN-CHANGCHUN LINE



CHINESE MARKET AT CHANG-CHUN



VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

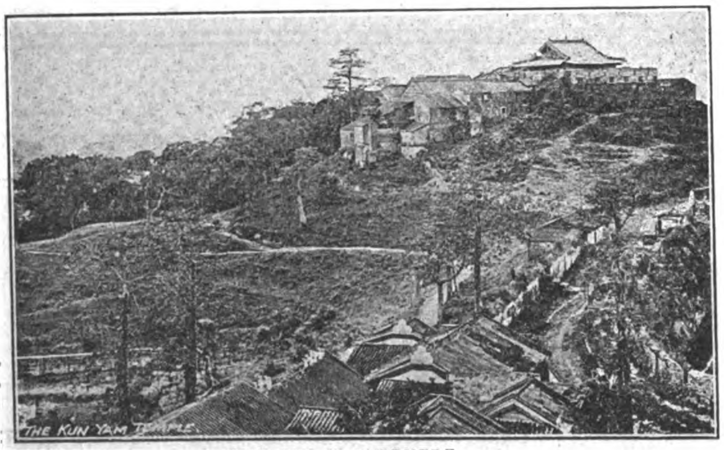
TIME TABLE

The Kirin-Changchung Railway

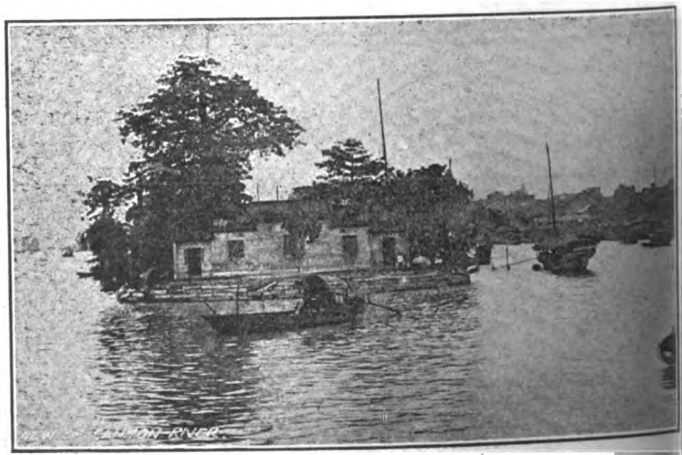
DOWN TRAIN Station	No. 1 a. m.	No. 2 a. m.	UP TRAIN Station	No. 2 a. m.	No. 4 p. m.
Changchung	7:00	12:00	Coran	10:00	5:00
Coran	8:17	1:17	Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS

CANTON-KOWLOON LINE



THE KUN YAM TEMPLE



VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 24th APRIL, 1911, UNTIL FURTHER NOTICE.

Canton (Ta Sha Tou) to Shek Lung

Miles	STATION		Daily Passenger Trains. No. 1 A. M.	No. 3 P. M.	No. 5 A. M.
	Canton (TAI SHA TOU)	dep	7.30	11 00	3 00
3.63	Shiek Pai	arr	7.39	11 09	3 09
		dep	7.42	11.12	3.12
7.90	Che Pi	arr	7.53	11.23	3.23
		dep	7.56	11.26	3.26
12 58	Wu Chung	arr	8 07	11.37	3 37
		dep	8.10	11 40	3 40
17.09	Nam Kong	arr	8.21	11.51	3 51
		dep	8.25	11.55	3.55
21.67	Sun Tong	arr	8.37	12 07	4.07
		dep	8.41	12.11	4.11
23.61	Tong Mei	arr	8.46	12.16	4.16
		dep	8.50	12 20	4.20
25.64	Nga Yeo	arr	8 55	12 25	4 25
		dep	8 58	12.28	4 28
29.00	Sien Tsun	arr	9.07	12.37	4 37
		dep	9.11	12 41	4 41
32.25	Shek Ha.	arr	9 22	12.52	4 52
		dep	9-24	12,54	4 54
34.77	Shek Tan	arr	9.33	1.03	5.03
		dep	9.37	1.07	5 07
36.34	Shek Lik Kou	arr	9.43	1.13	5.13
		dep	9.45	1.15	5.15
40.15	Shek Lung	arr	9.58	1.28	5.28

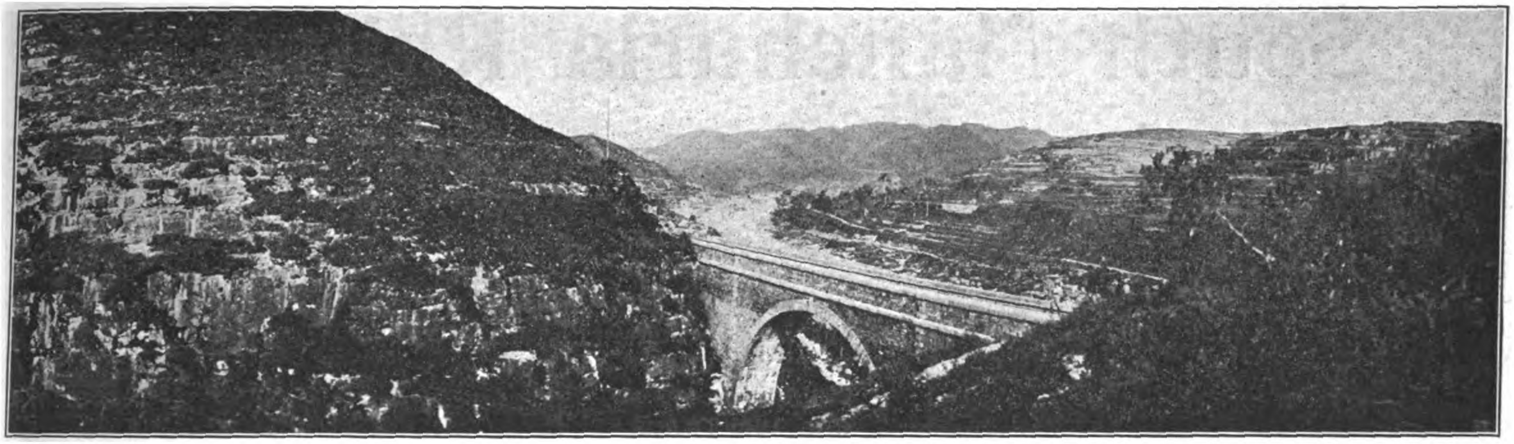
Shek Lung to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2 A. M.	No. 4 P. M.	No. 6 P. M.
	Shek Lung.	dep	7.35	11.05	3 05
3.81	Shek Lik Kou	arr	7.48	11.18	3 18
		dep	7.50	11 20	3.20
5.38	Shek Tan	arr	7.56	11.26	3 26
		dep	8.00	11.30	3.30
7.90	Shek Ha	arr	8 C9	11.39	3.39
		dep	8.11	11.41	3.41
11.15	Sien Tsun	arr	8 22	11 52	3.52
		dep	8.26	11.56	3 56
.61	Nga Yeo	arr	8.35	12 05	4 05
		dep	8 [illegible]8	12 08	4.08
16.54	Tong Mei	arr	8.43	12.13	4 13
		dep	8.47	12.17	4.17
18. 48	Sun Tong	arr	8.52	12.22	4 22
		dep	8.56	12 26	4.26
23 06	Nam Kong	arr	9.08	12.38	4.38
		dep	9 12	12.42	4.42
27.57	Wu Chung	arr	9.23	12.53	4.53
		dep	9.26	12.56	5 56
32 25	Che Pi	arr	9 37	1.07	5.07
		dep	9.40	1.10	5.10
36 52	Shek Pai	arr	9.51	1.21	5.21
		dep	9.54	1.24	5.24
40.15	Canton (TAI SHA TOU)	arr	10.03	1.33	5.33

IMPERIAL CHINESE RAILWAYS

The Cheng-Tai Railway

(IMPERIAL GOVERNMENT SHANSI LINE—CHENGTINGFU TO TAIYUANFU)

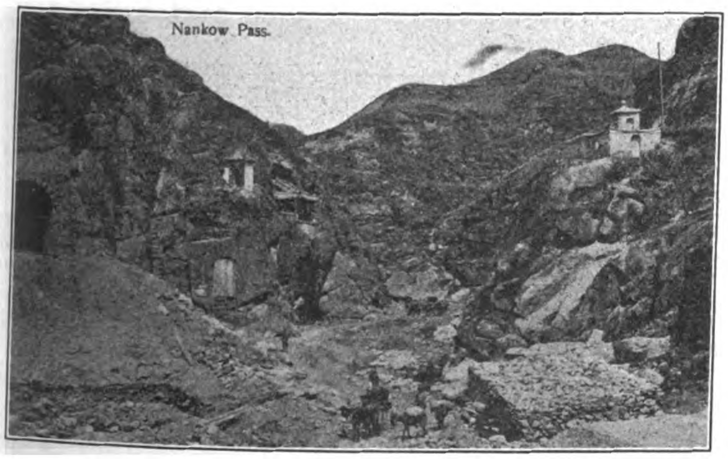


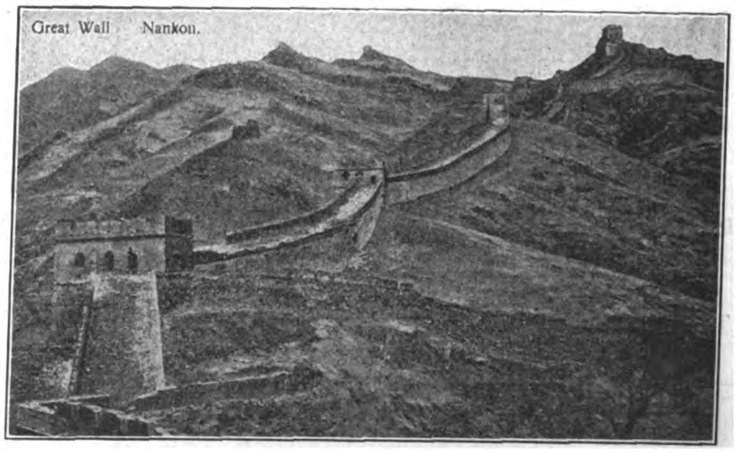
VIEWS ALONG ROUTE OF CHENG-TAI RAILWAY.

The trains of this line connect with the through service of the Peking-Hankow Railway, affording Travellers the opportunity of seeing the most picturesque part of China. The line passes through a mountainous section of country, rich in Mineral Resources to the Provincial Capital of Shansi at Taiyuanfu. This interesting city is a great educational center, and famous for the fine quality of its artistic embroideries.

The Peking-Kalgan Line

"THE ROAD TO THE GREAT WALL"

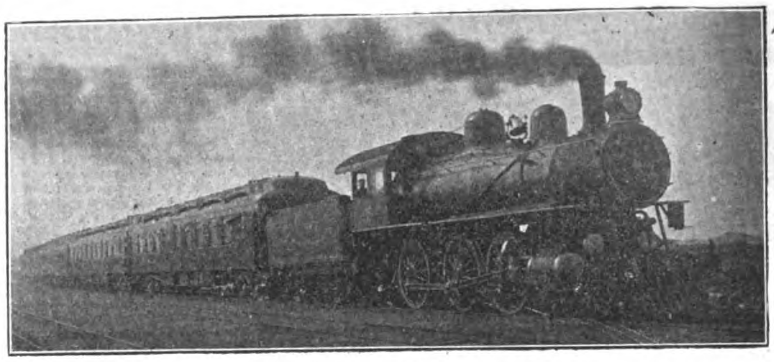




This line follows the ancient caravan route and military highway from Mongolia into China by the way of the historic Nankow Pass. This pass is the Key to Peking, and Kalgan is the gate of the Empire. From here the great camel caravans set out on their long journeys across Mongolia to Siberia and Central Asia. This old frontier mart, retaining its time-honored characteristics, one of the most interesting sights of the Old World, is made accessible by the new railway. The line also carries the passenger in two hours from Peking to Nankow, when the Great Wall of China and the Ming Tombs may be seen. A foreign hotel is operated by the railway authorities at Nankow, where chairs and guides may be secured for the Tombs.

TAOTAI JEME TIEN-YU, Director General

SHORTEST, QUICKEST AND CHEAPEST ROUTE BETWEEN THE FAR EAST AND EUROPE VIA DAIREN (DALNY)



THE SOUTH MANCHURIA EXPRESS

From Dairen	*Time Required*
To Changchun	12½ hours
,, Harbin	25 ,,
,, St. Petersburg (via) Viatka	10 days.
,, Berlin	11 ,,
,, Paris	12 ,,
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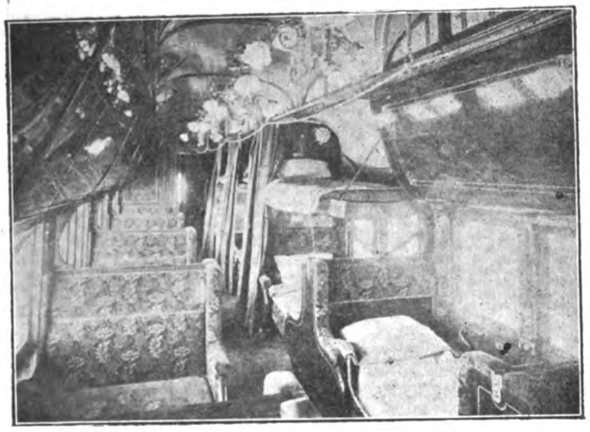
South Manchuria Railway



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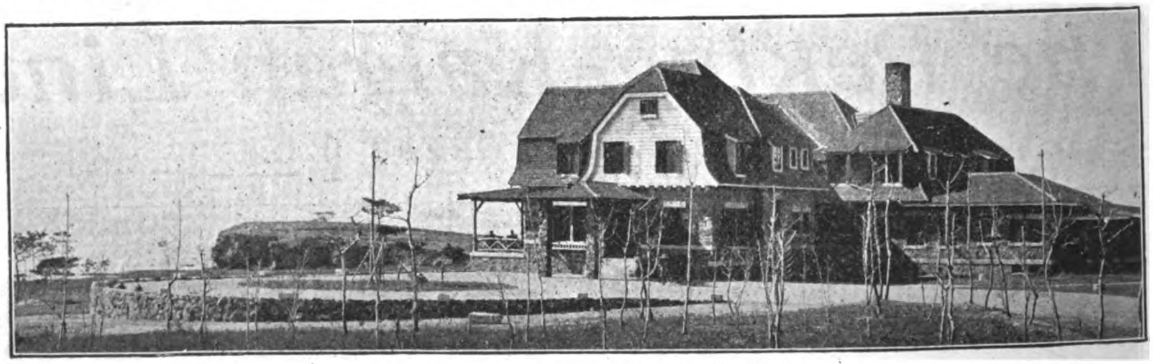

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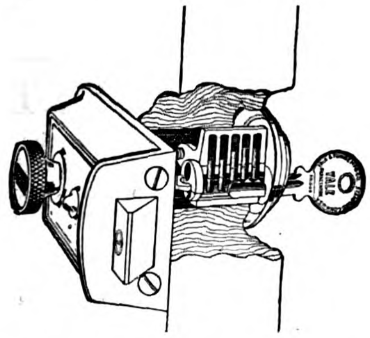

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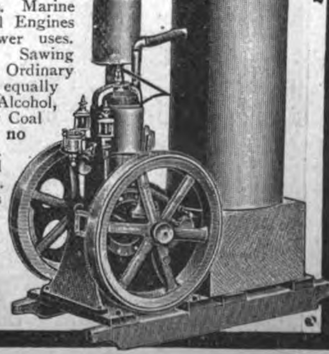

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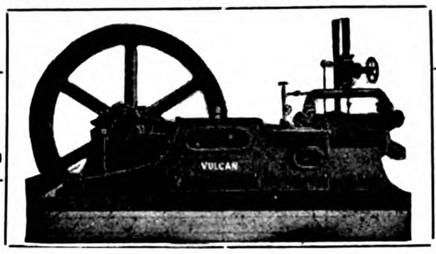
VUL  **CAN**

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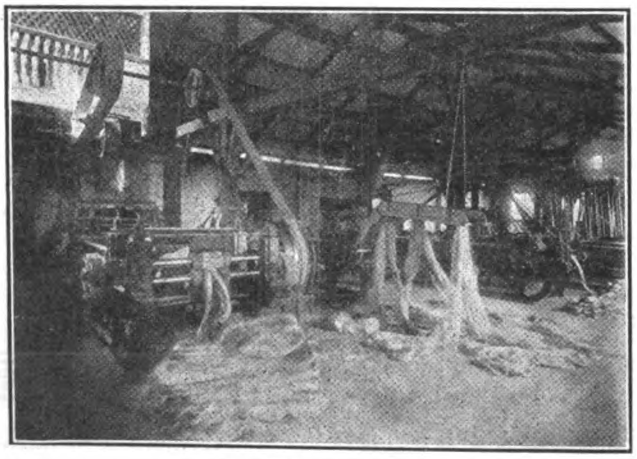

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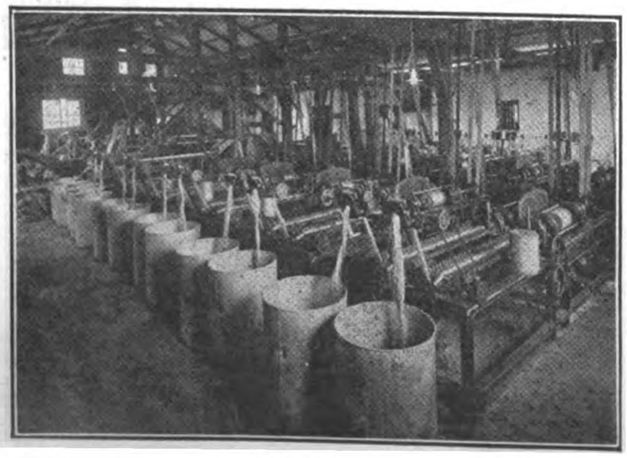

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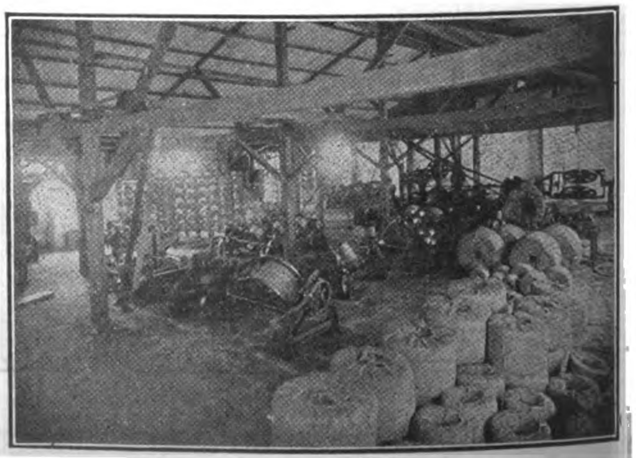

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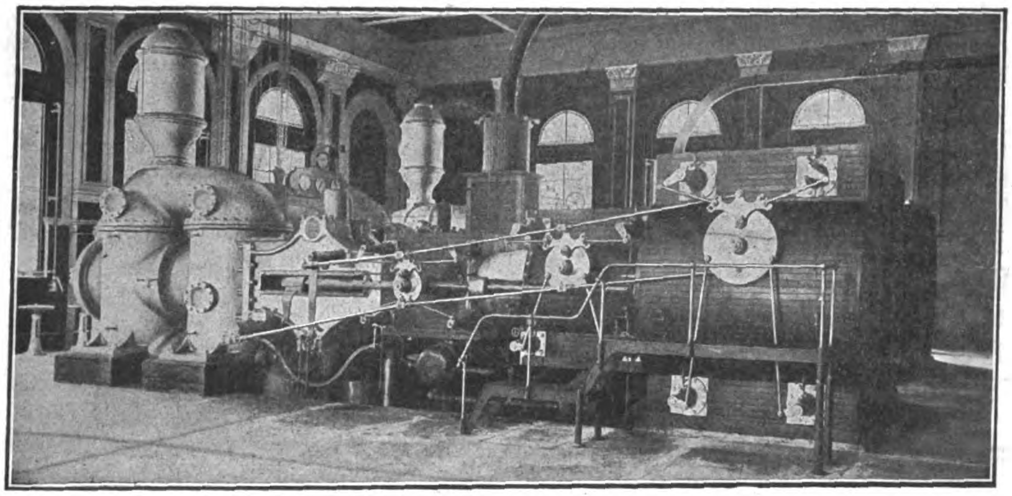

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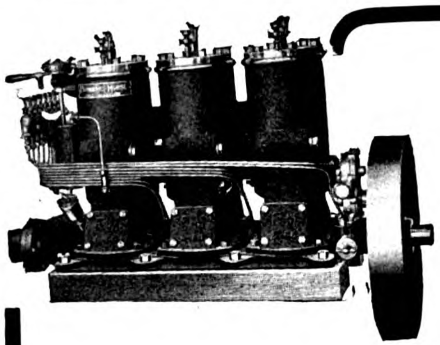

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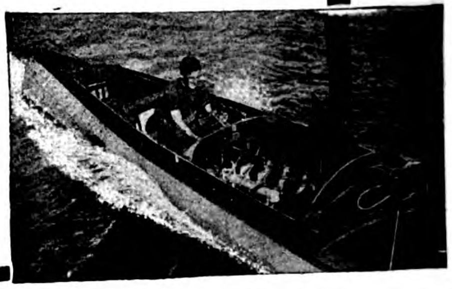

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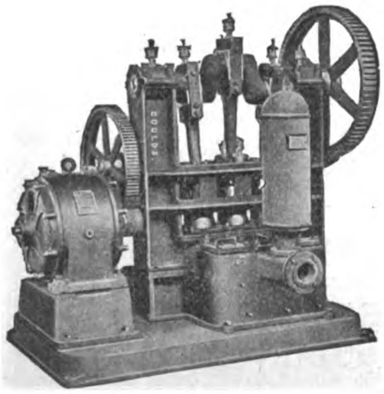

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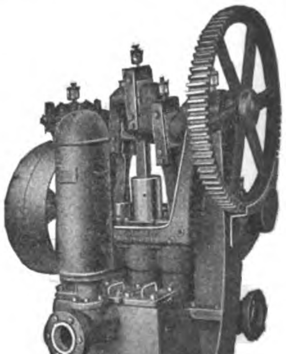

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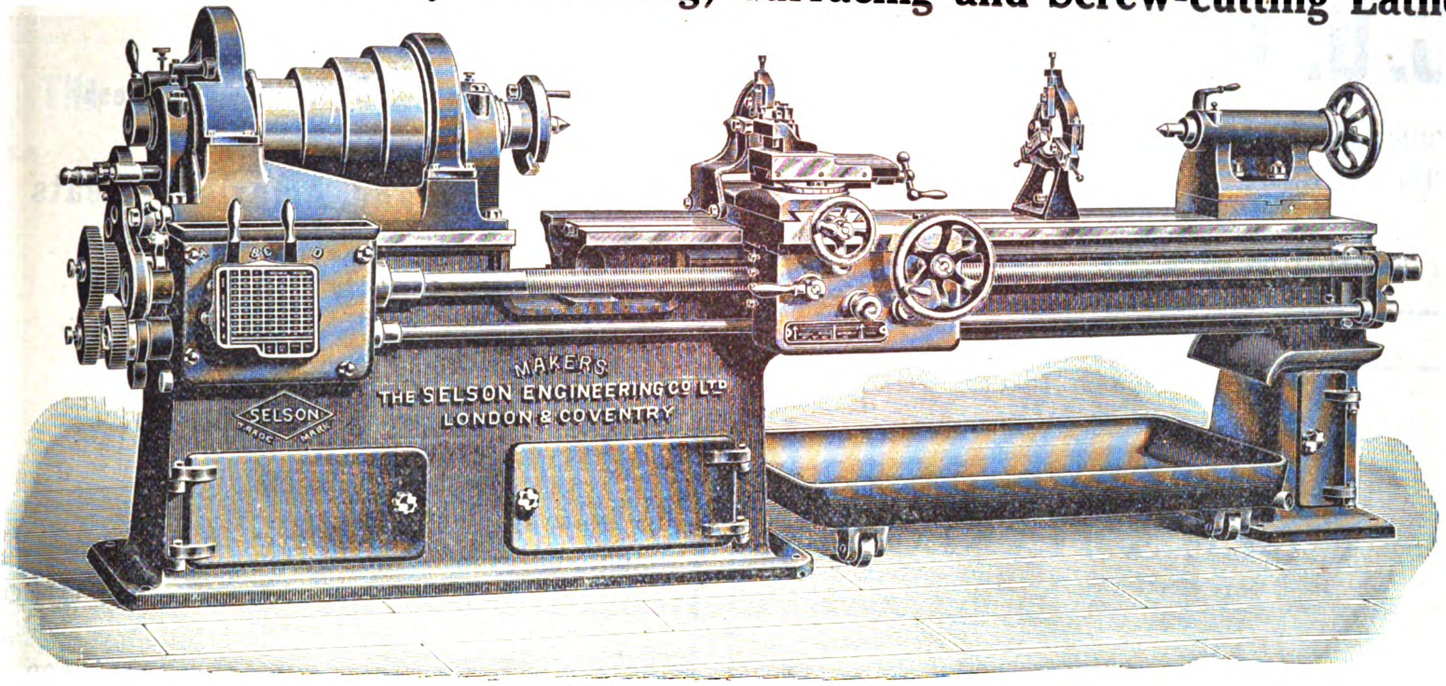

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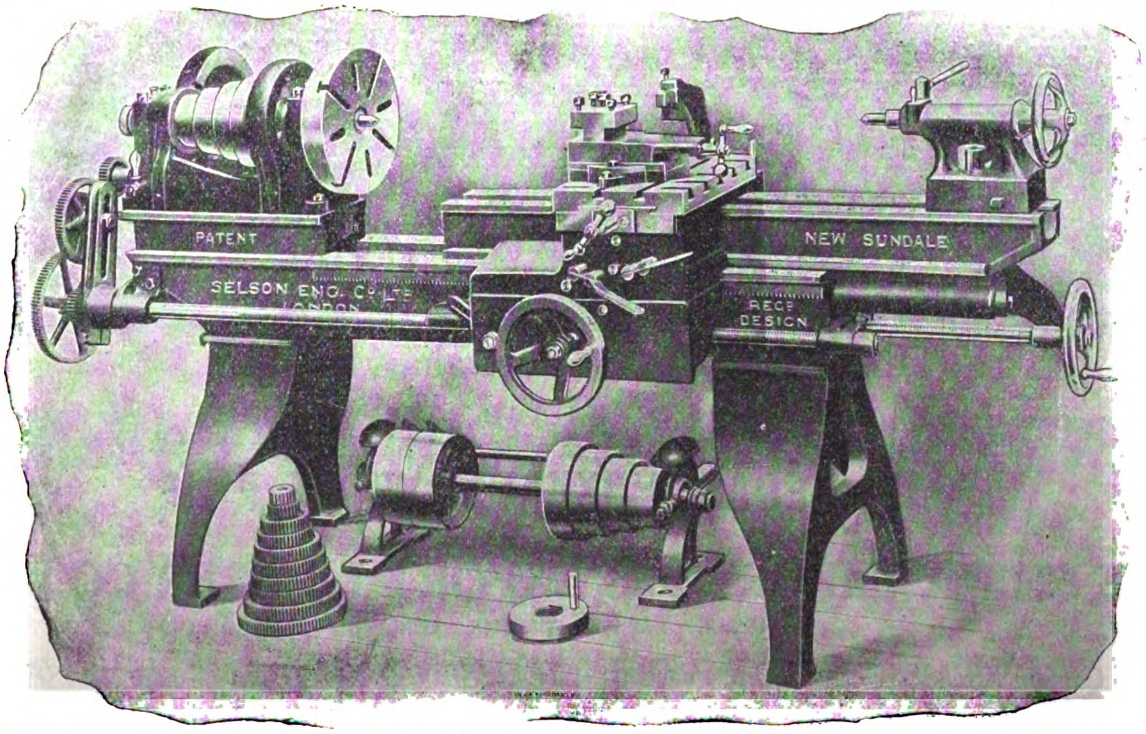

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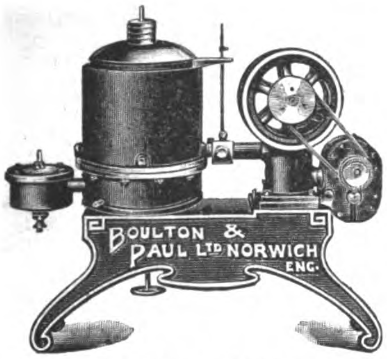

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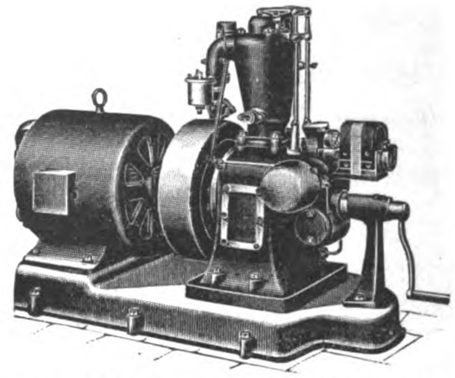

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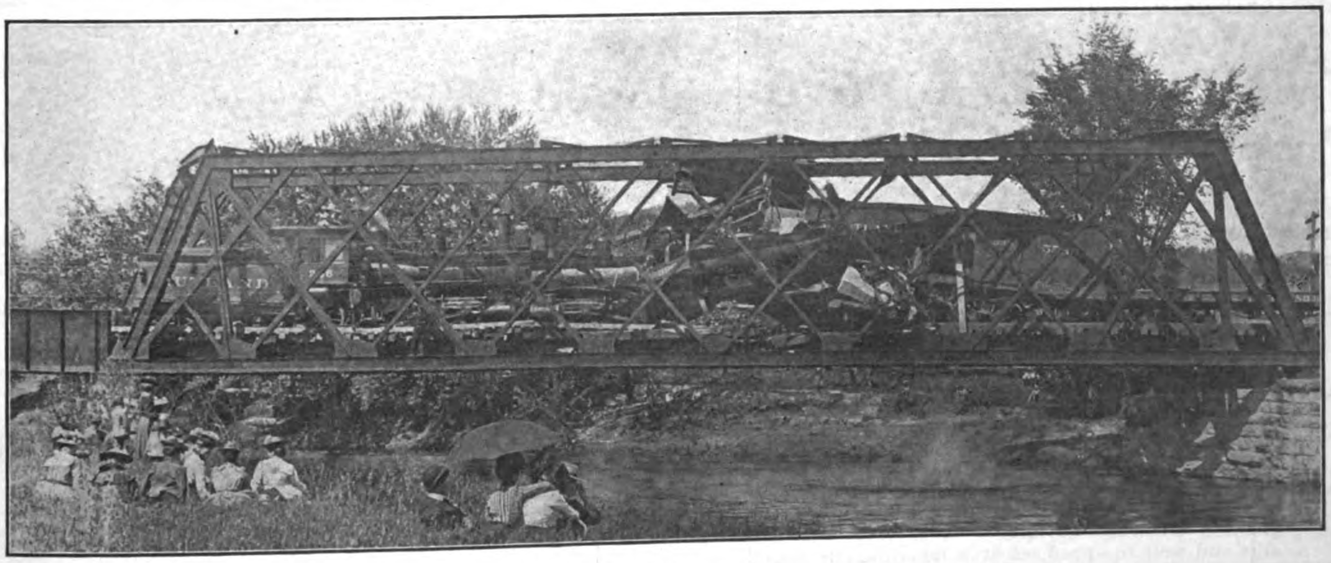

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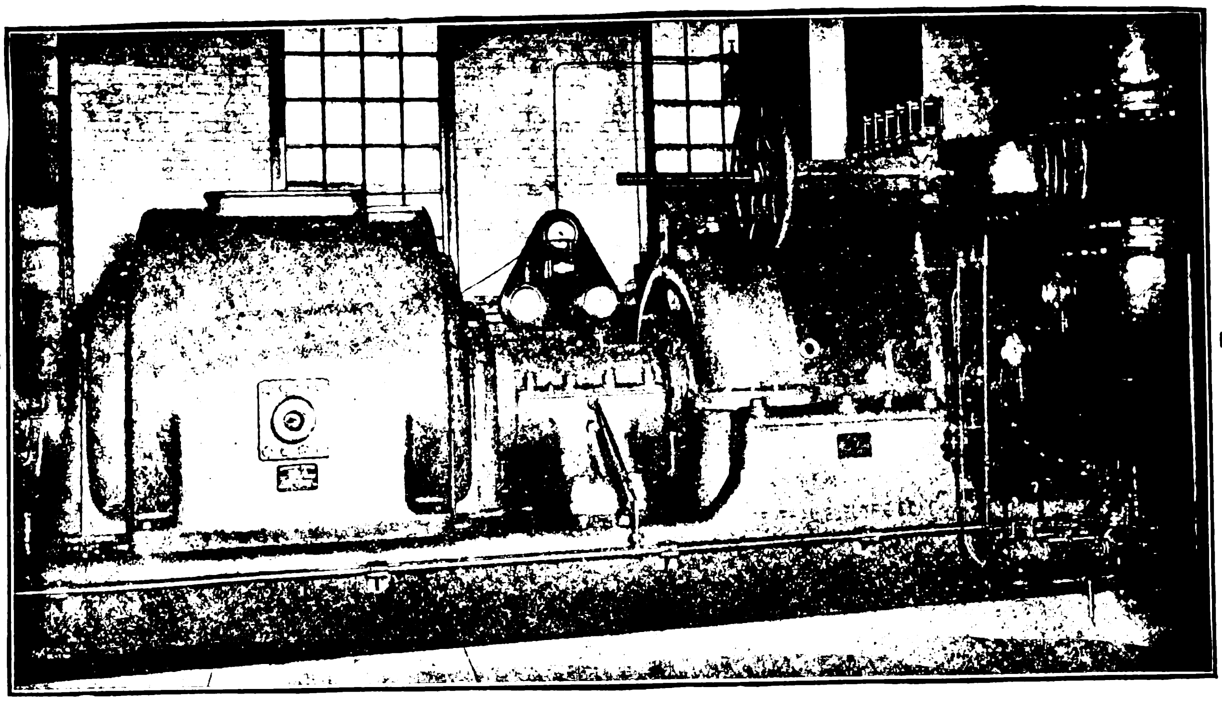

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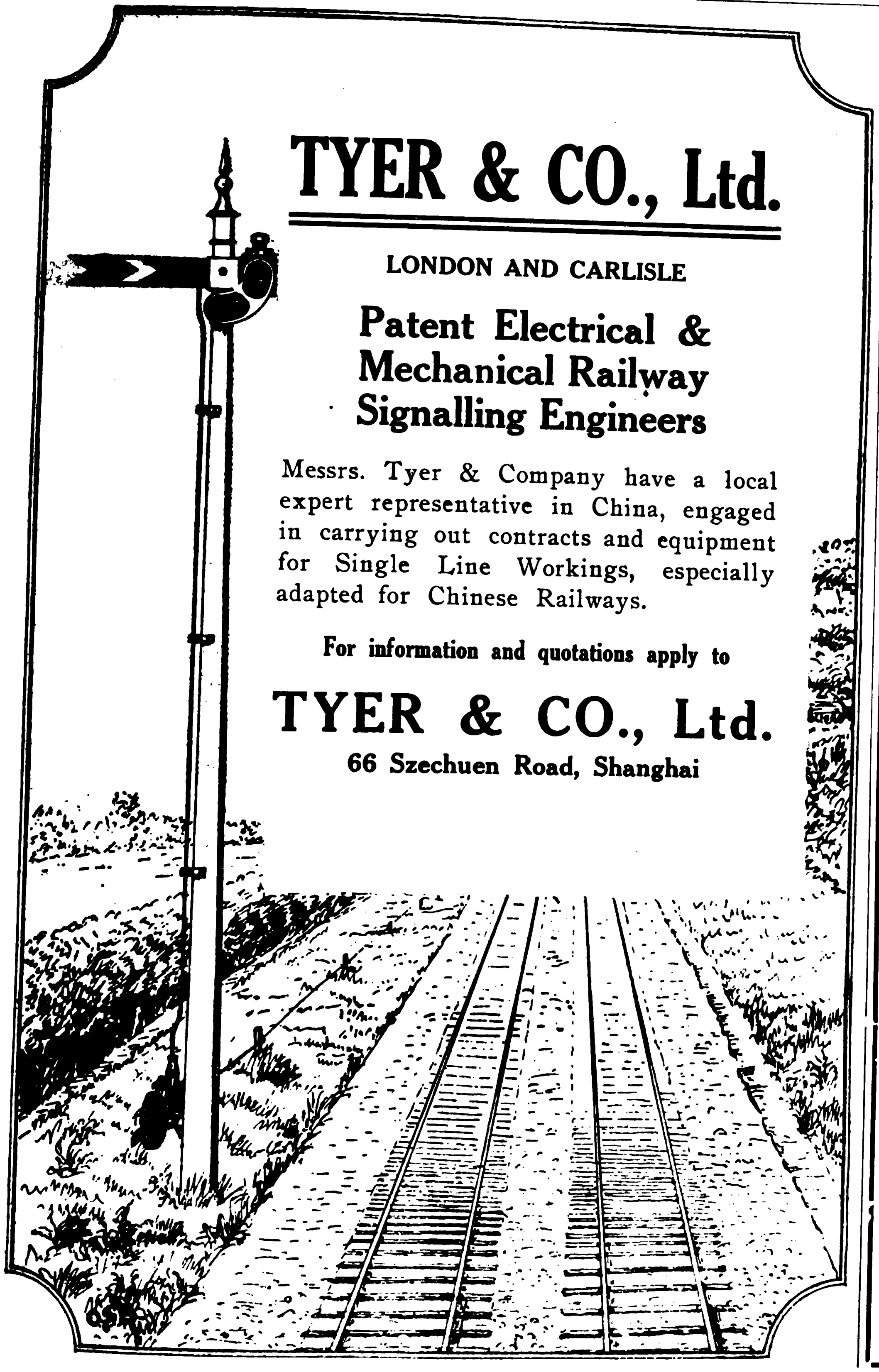

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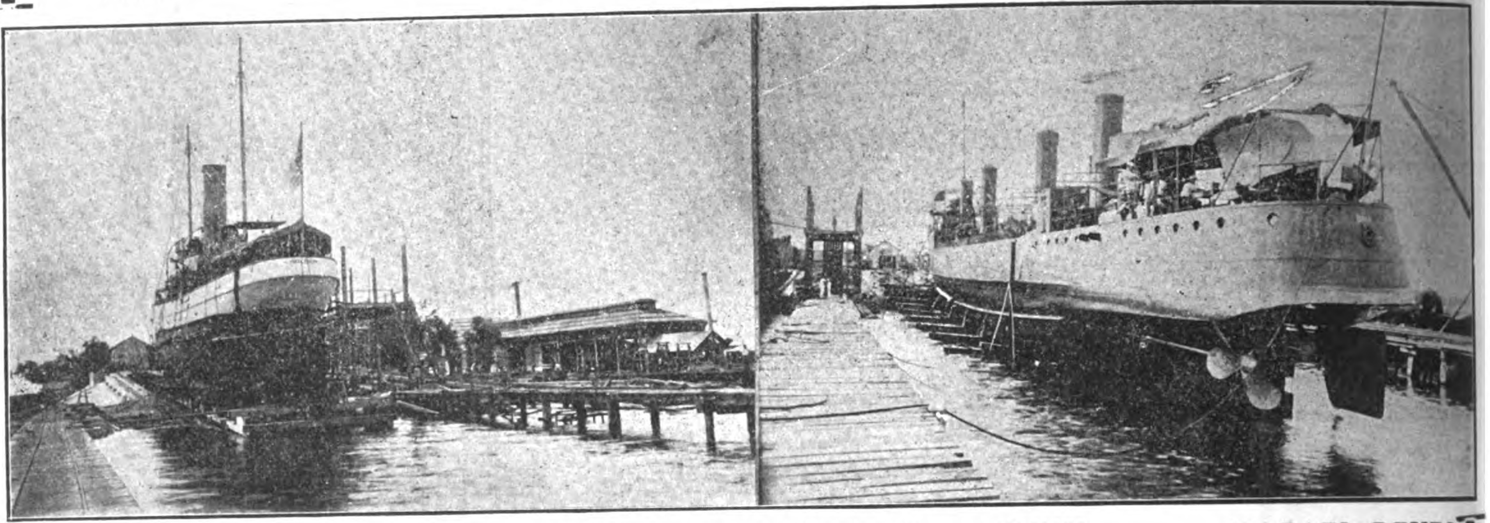

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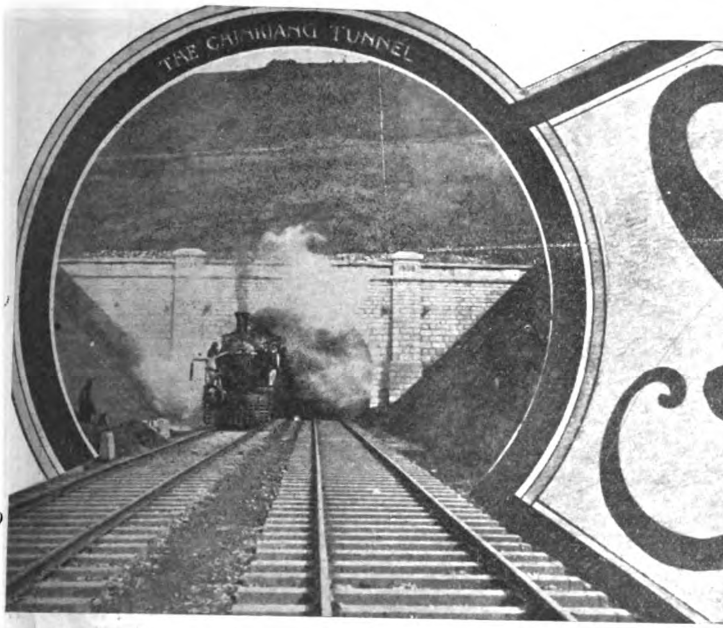

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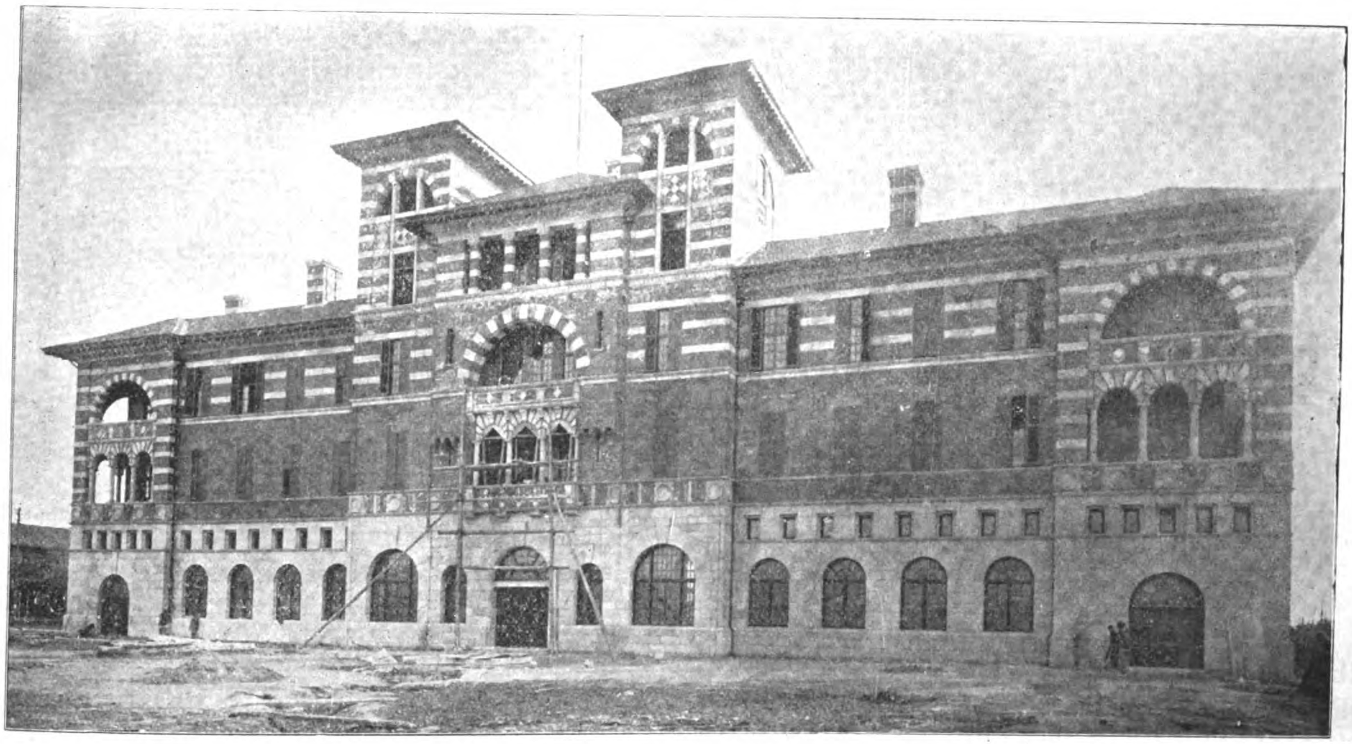

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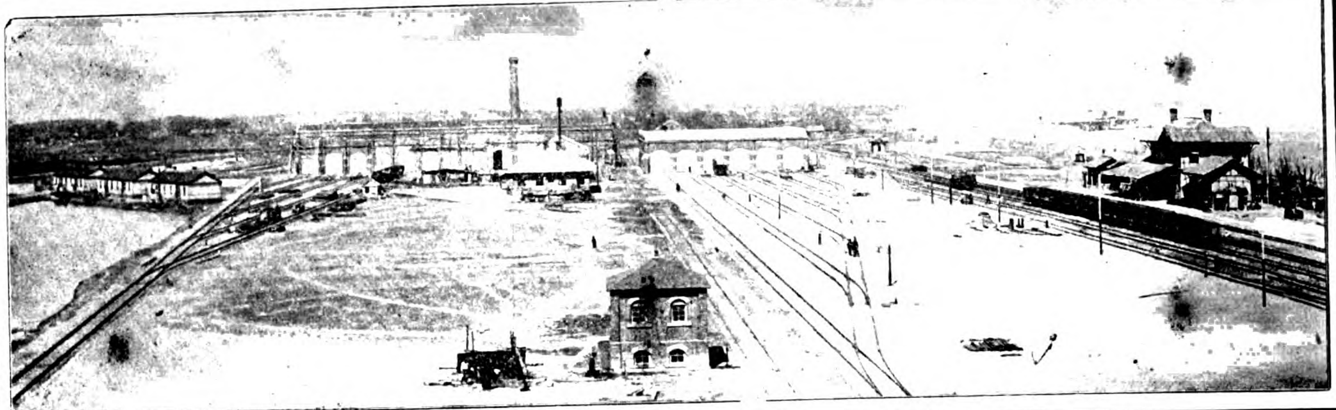

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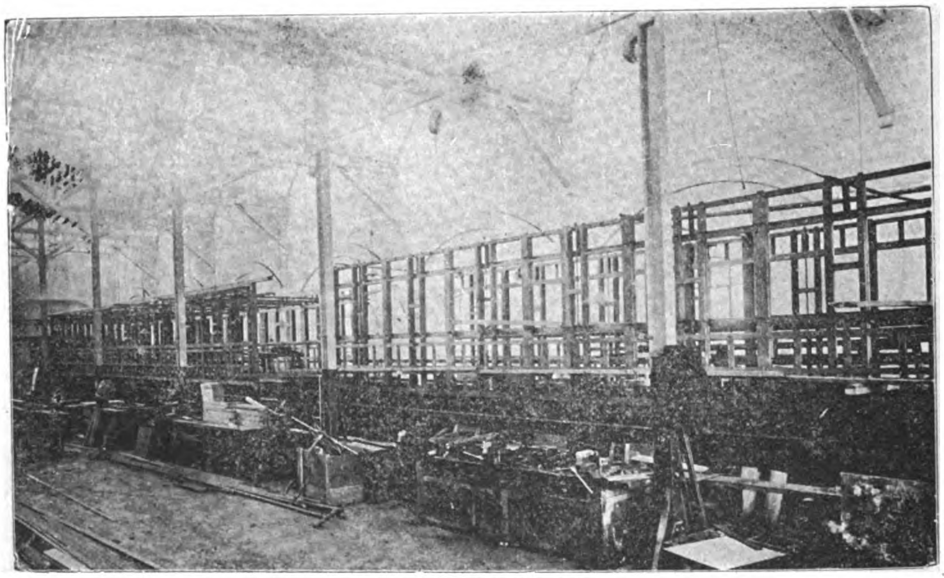

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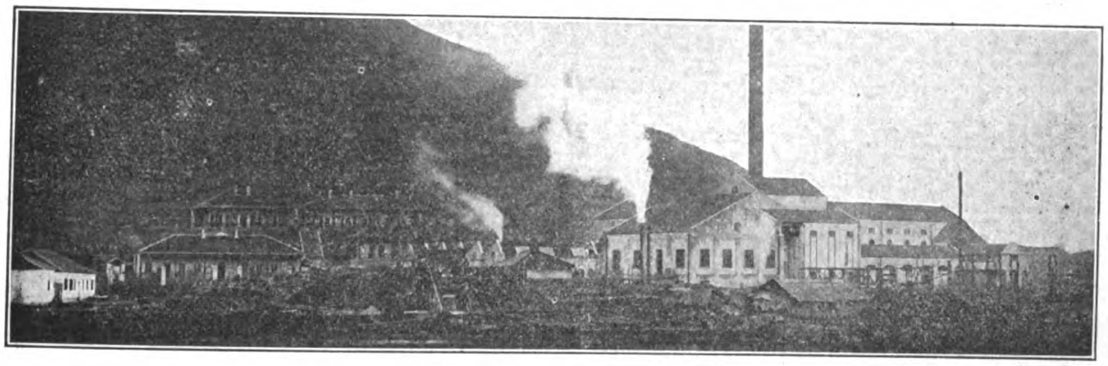

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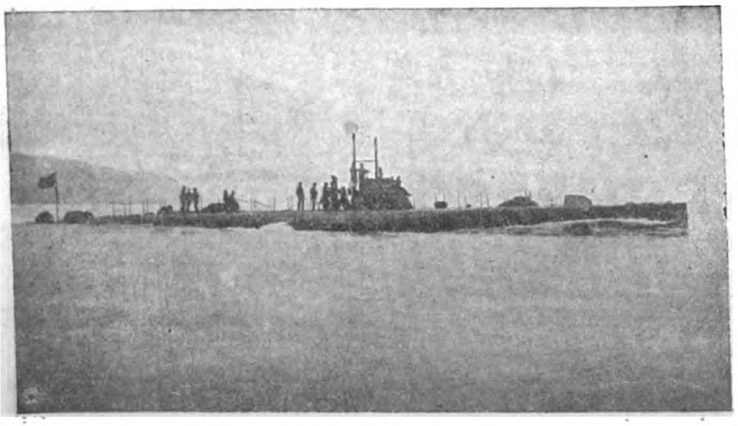

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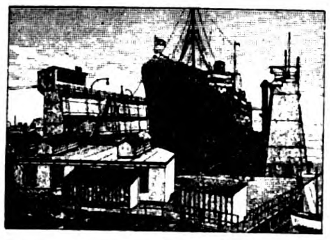

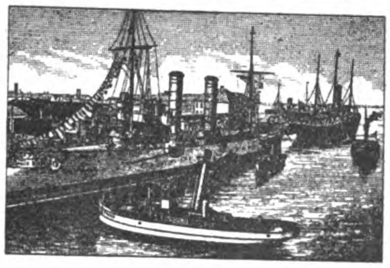

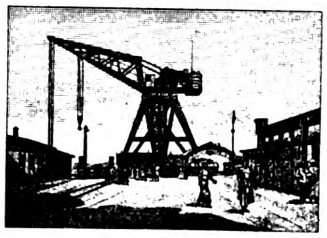

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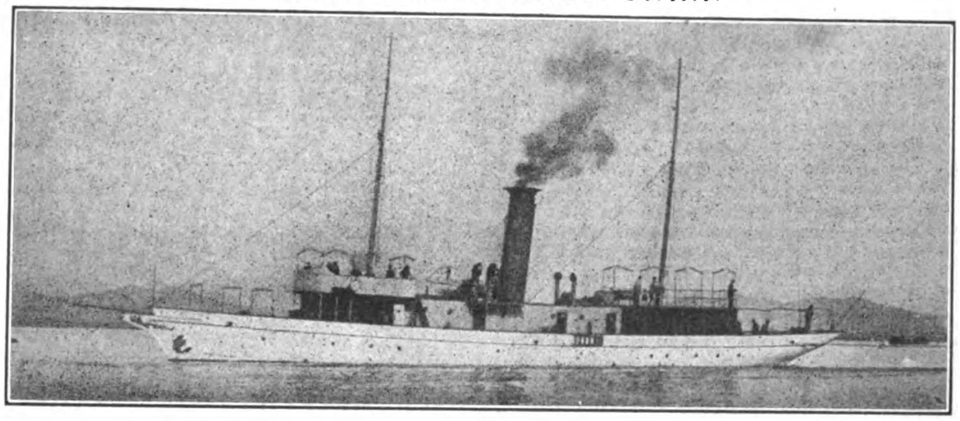

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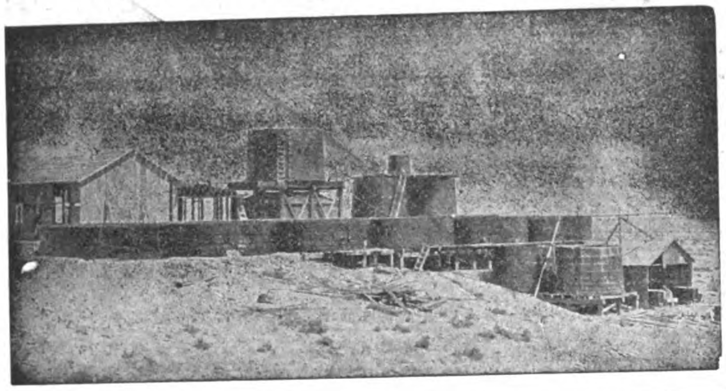

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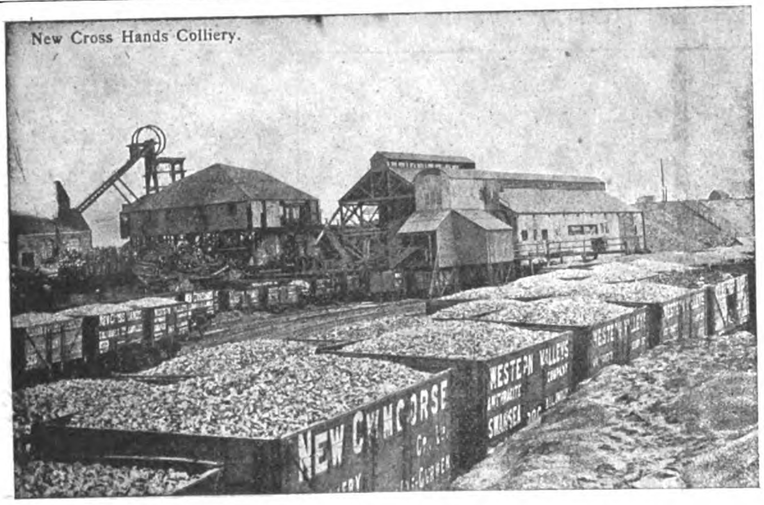
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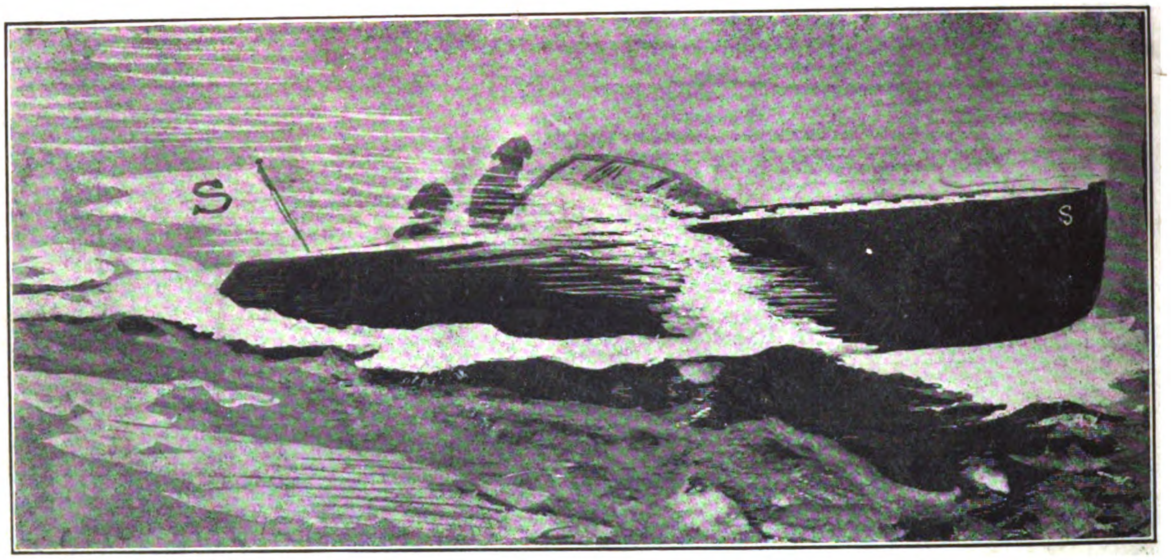

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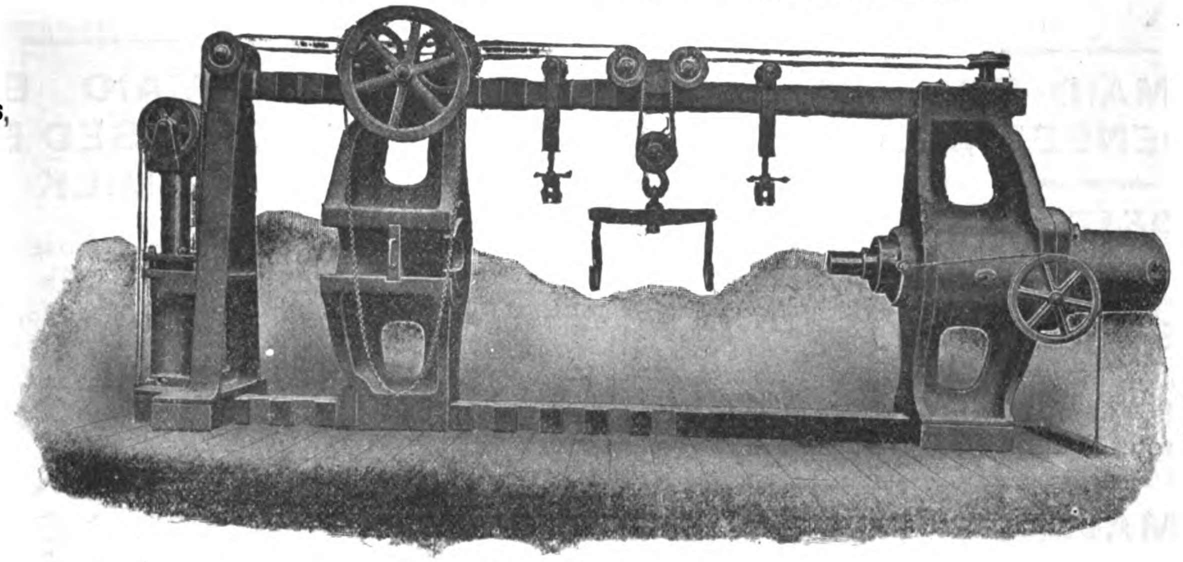

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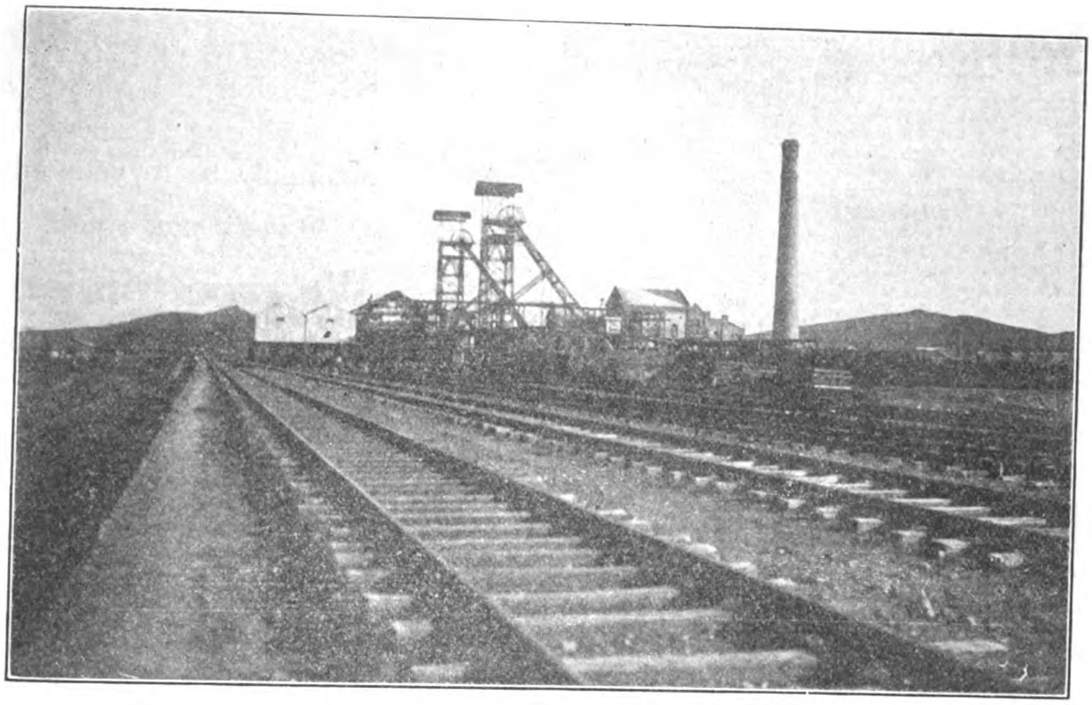

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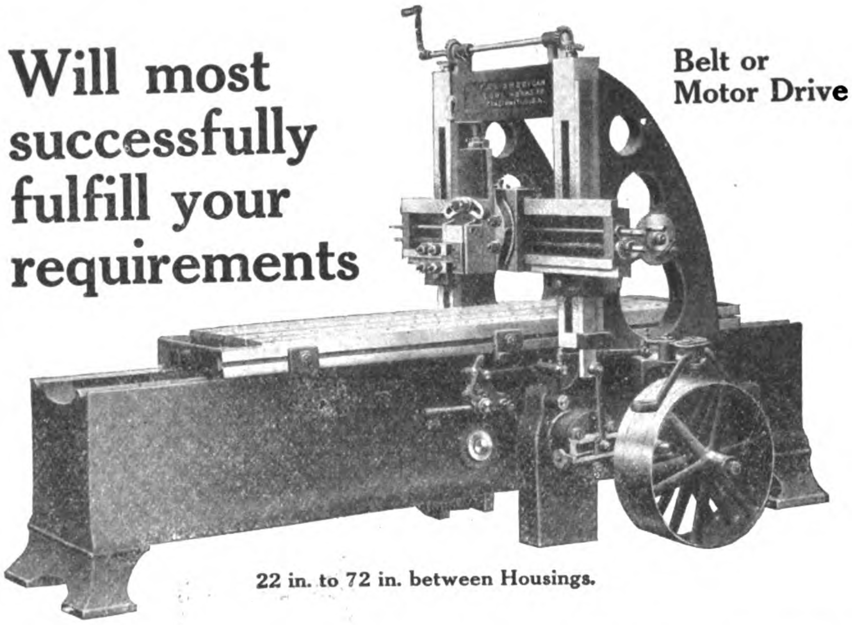

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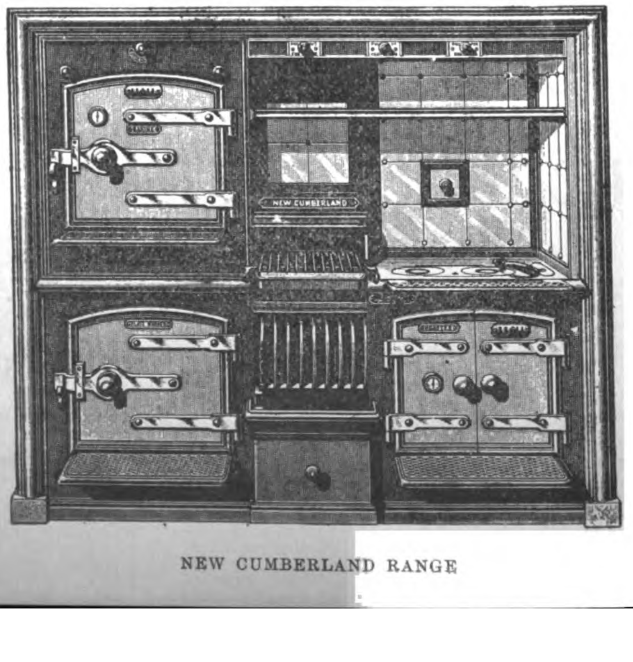

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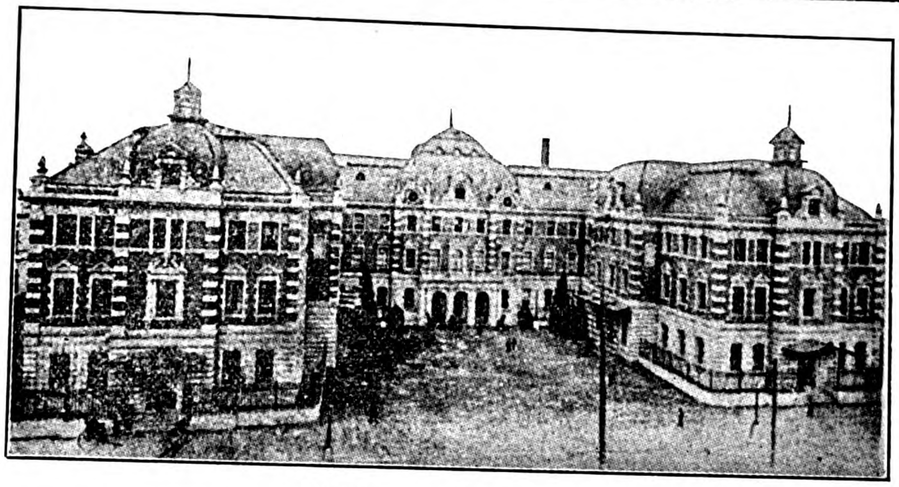

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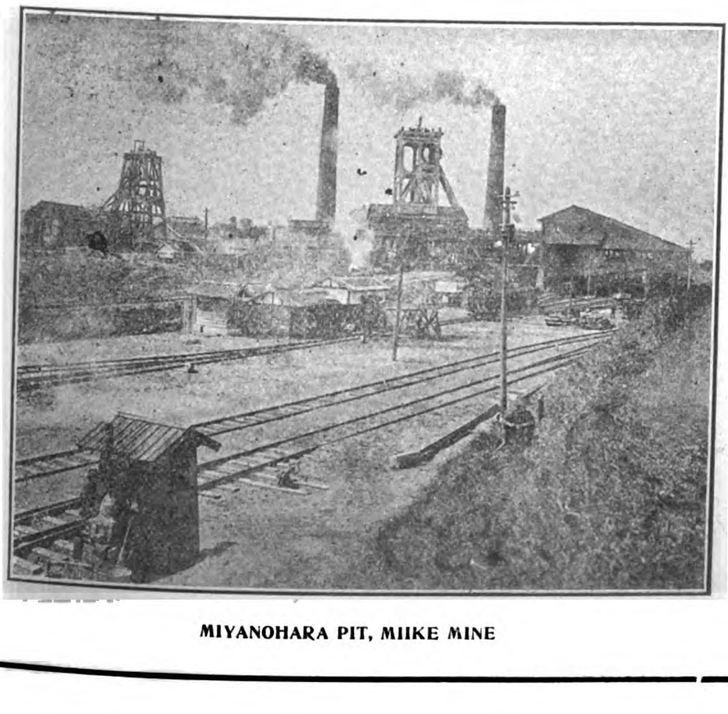

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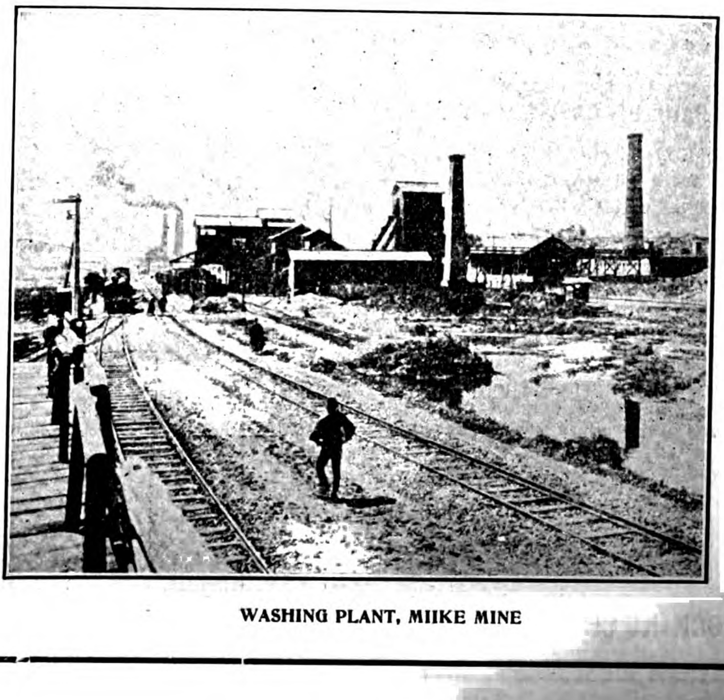

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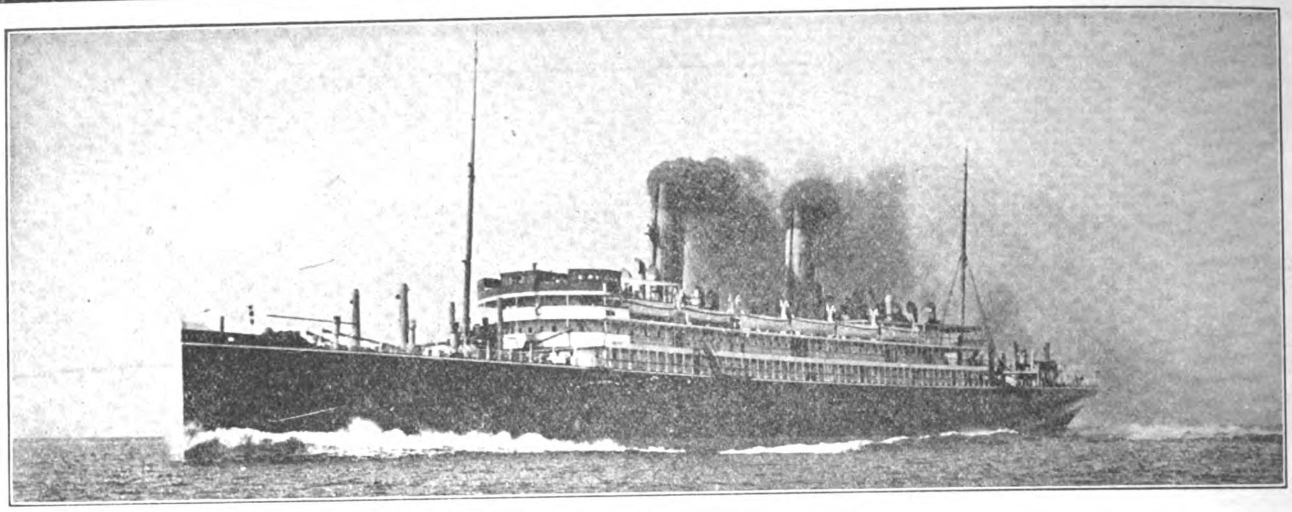

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TRANS-PACIFIC TURBINE DRIVEN PASSENGER STEAMER "CHIYO-MARU" FOR T. K. K.—Built and engined by the Mitsu Bishi Dockyard and Engine Works, Nagasaki, November 1908.—Length (overall), 570 feet 0"; Breadth, moulded, 63 feet 0"; Depth (shelter deck), 46 feet 6"; Gross tonnage, 13,426 tons; Displacement, 18,725 tons; Engines, Parsons' Three Shaft Arrangement; Boilers, Single Ended Scotch Boilers (13); I. H. P., 19 591; Speed, 21 knots. (This photo was taken on her full speed trials the 13th October, 1908.)

MITSU BISHI DOCKYARDS & ENGINE WORKS, NAGASAKI

DOCK NO. 1.

EXTREME LENGTH	523	FT.
LENGTH ON BLOCKS	513	,,
WIDTH OF ENTRANCE ON TOP	88	,,
,, ,, ,, ,, BOTTOM	77	,,
WATER ON BLOCKS AT SPRING TIDE	26½	,,

DOCK NO. 2.

EXTREME LENGTH	371	FT.
LENGTH ON BLOCKS	360	,,
WIDTH OF ENTRANCE ON TOP	66	,,
,, ,, ,, ,, BOTTOM	53	,,
WATER ON BLOCKS AT SPRING TIDE	22	,,

DOCK NO. 3.

EXTREME LENGTH	722	FT.
LENGTH ON BLOCKS	714	,,
WIDTH OF ENTRANCE, TOP	99½	,,
,, ,, ,, BOTTOM	88½	,,
WATER ON BLOCKS AT SPRING TIDE	34½	,,

THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST,

WITH SPECIAL FACILITIES FOR HANDLING THE HEAVIEST CASTINGS AND THE REPAIRING OR BUILDING OF SHIPS, ENGINES AND BOILERS, ALSO ELECTRICAL WORK.

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THE POWERFUL SALVAGE STEAMER "OURA-MARU" (712 TONS. 700 I. H. P.) EQUIPPED WITH NECESSARY PUMPS AND GEAR, IS ALWAYS READY AT SHORT NOTICE.

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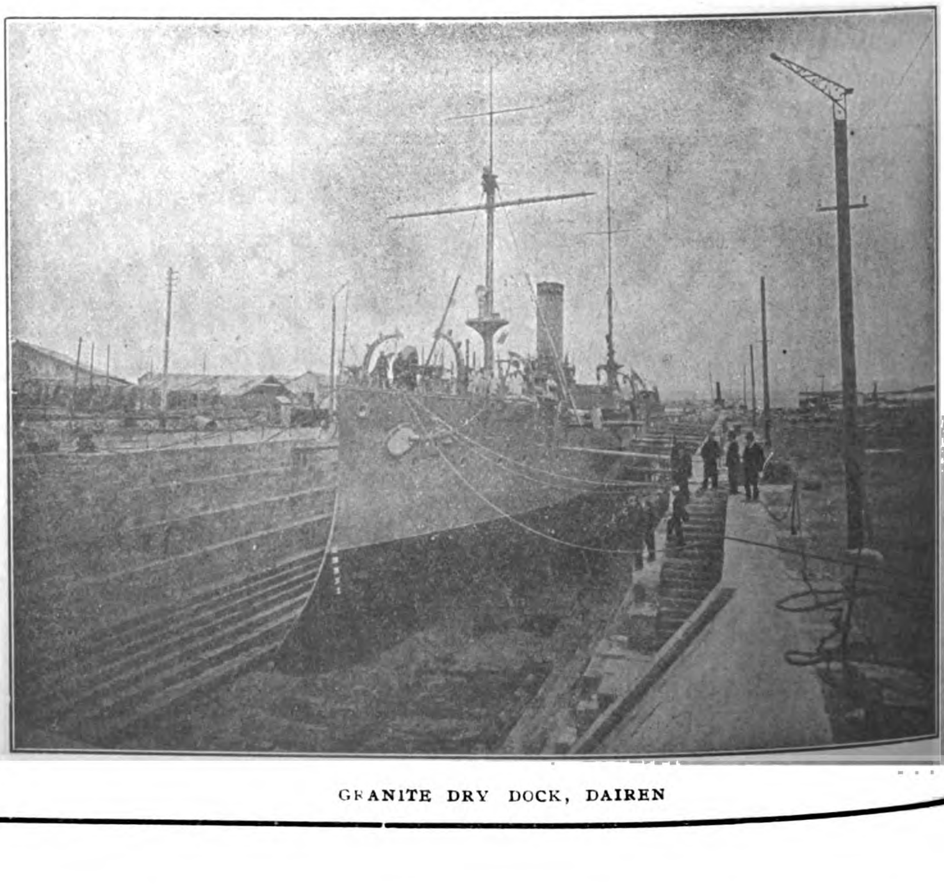
Width	50 ft.
Depth over Sill	20 ft.

DOCKING CHARGES VERY MODERATE



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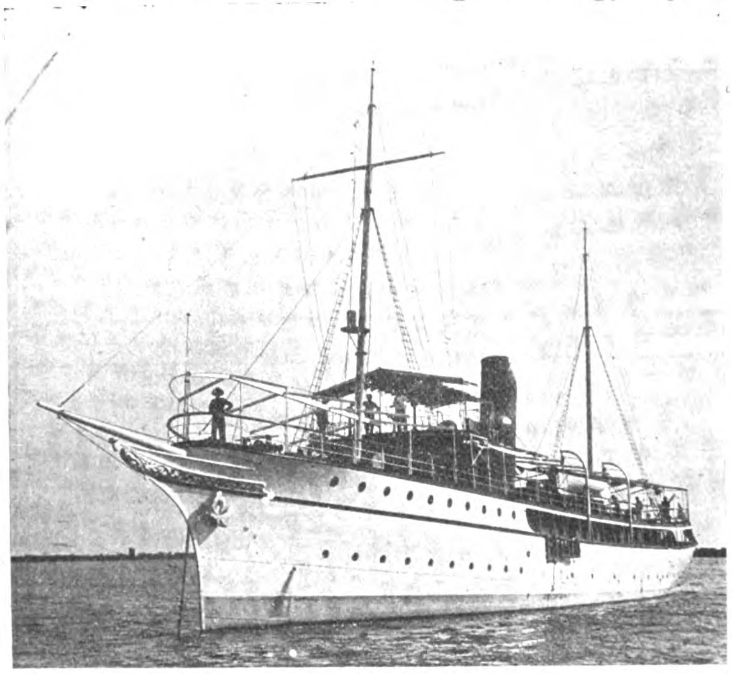

Yacht of H. I. H. Prince Hsui, Built by the Kiangnan Dock & Engineering Works.

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Length over all, 385'; length on blocks, 575'; water on sill, 19'; dock entrance, top 70', bottom, 60'.

The dock accommodates the largest coasting steamers and is equipped with complete modern facilities for handling work thoroughly and promptly.

The new machine and boiler shops, and the foundry and shipbuilding plant are equal to any this side of Suez.

Patent slipway for small steamers and launches. Complete boat and launch building shops.

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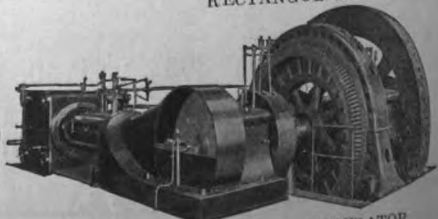

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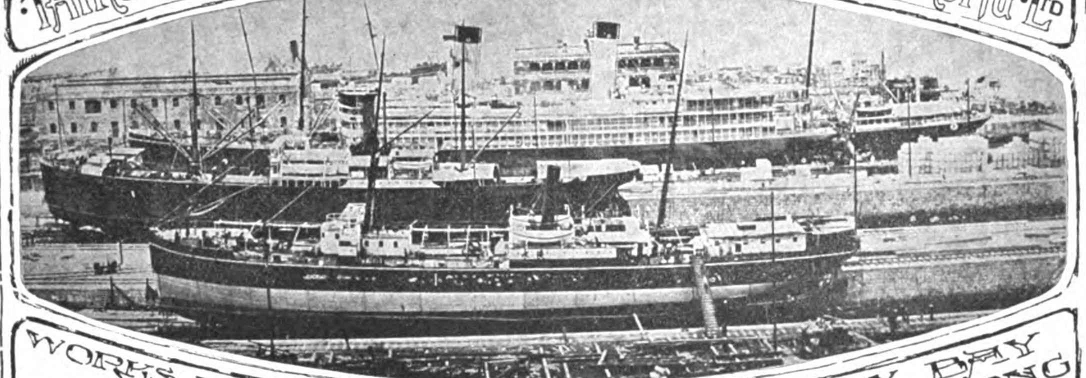

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THE BUILDING YARD IS LAID OUT WITH FURNACES AND PLANT SUITABLE FOR BUILDING VESSELS UP TO 20,000 TONS

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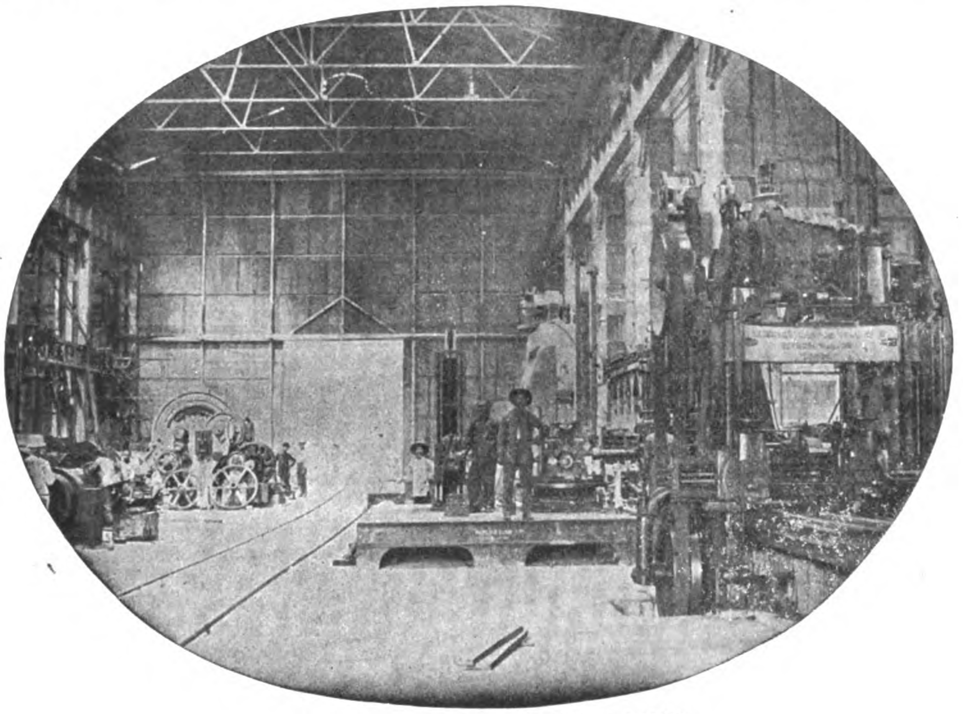

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THE POWER FOR THE ESTABLISHMENT is generated by Gas Producers, on the Mond System, supplying 4 Cockerill Gas Engines of 3,000 collective horse power, driving Electrical Generators, and is transmitted throughout the Works by means of Electrical Motors.

AN ELECTRIC DERRICK CRANE, capable of lifting weights up to 100 tons, is erected on the Sea Wall, and 14 Electric Overhead Travelling Cranes ranging from 5 tons to 100 tons, are fitted throughout the Workshops.

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THE DOCK PUMPS consist of 2 sets of Centrifugal, Electrically driven, pumps, together capable of emptying the Dock with 35 feet of water on the Sill in 2¾ hours.

THE MACHINERY in the Engine Works is laid out for dealing with the heaviest classes of Engines.

THE SLIPWAY CARRIAGES are of the latest pattern by Morton of Leith, and the Winding Gear consists of large electrically driven winches operating massive wire cables.

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All classes of CONSTRUCTIONAL and GENERAL ENGINEERING WORK undertaken, also LOCOMOTIVES, RAILWAY ROLLING STOCK and PLANT, BRIDGES, etc.
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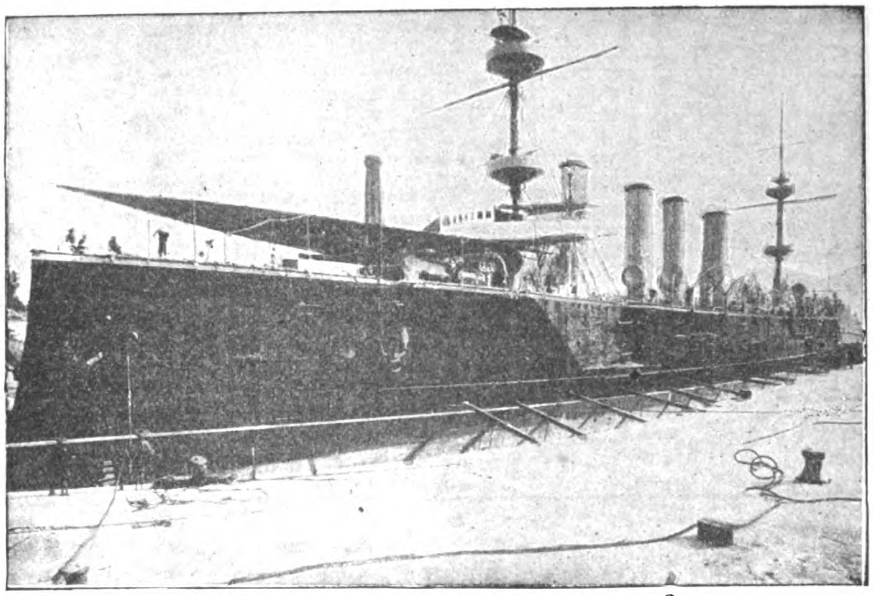
The Company possesses SIX GRANITE DOCKS and TWO PATENT SLIPWAYS and these are equipped for EXPEDITIOUS WORK. Our plant is of the most modern type throughout.
Ship Owners and Captains are assured that DOCKING and REPAIRS are carried out PROMPTLY and at MODERATE CHARGES.



H. M. S. POWERFUL IN NO. 1 DOCK, KOWLOON

The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	Length on Keel Blocks	Entrance Breadth	Depth Over Sill at Ordinary Spring Tides	Rise of Tide Springs	Rise of Tide Neaps
KOWLOON	Feet	Feet	Feet	Feet	Feet
No. 1 Dock, Kowloon.........	700	86 ft. top / 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon.	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon...	240	60′	14′	7′ 6″	—
Patent Slip, No 2, Kowloon...	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock...........	466	85′ 6″	20′	7′ 6′	—
ABERDEEN					
Hope Dock	430	84′	23′	7′ 6″	—
Lamont Dock...........	333	64′	16′	7′ 6″	—

Please Address Enquiries to the Chief Manager, R. M. DYER, B. Sc., M. I. N. A., Kowloon Dock, Hongkong.

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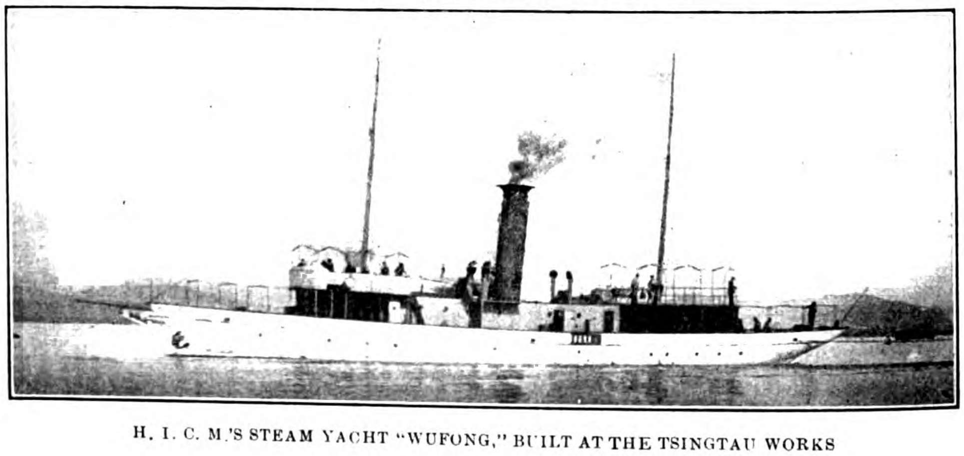

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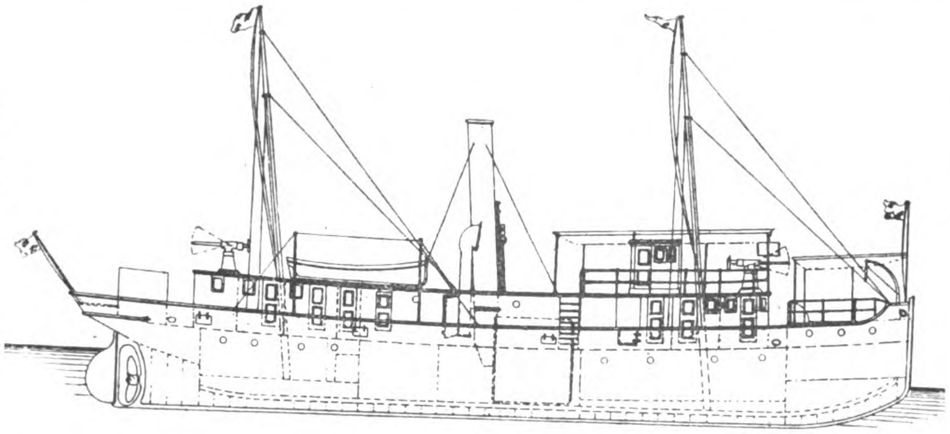

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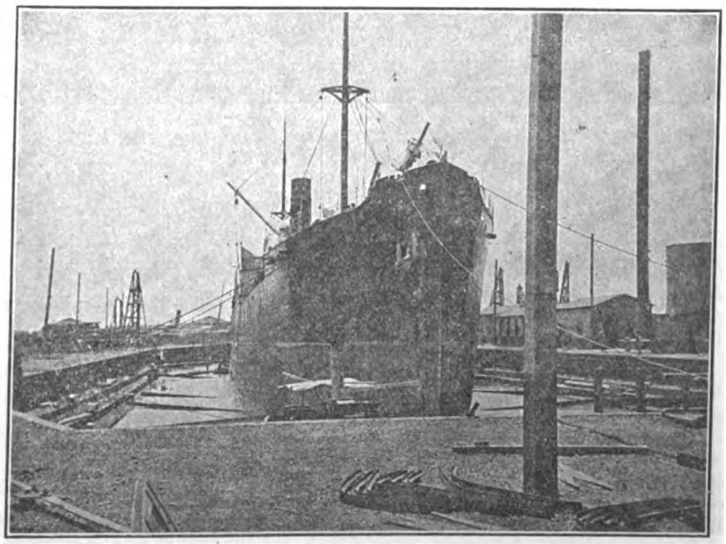
THE DOCK, WORKS AND OFFICE ARE LOCATED ON THE SHANGHAI SIDE OF THE RIVER, 15 MINUTES BY ELECTRIC TRAM FROM HEART OF THE CITY

THE WORKS ARE EQUIPPED WITH THE MOST MODERN MACHINERY, CAPABLE OF HANDLING THE LARGEST MARINE ENGINEERING WORK



VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK
LENGTH ON BLOCKS 455'0"
" OVERALL - 469'0"
WIDTH, ENTRANCE 74'0"
" SILL - - 64'0"
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21'0"
DEPTH ON 3'0" BLOCKS (H. W. O. S. TIDES) 19'0"
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
WORKSHOPS LOCATED AT HEAD OF DOCK

OFFICE, DOCK & WORKS, 37 YANGTSZEPOO ROAD, SHANGHAI

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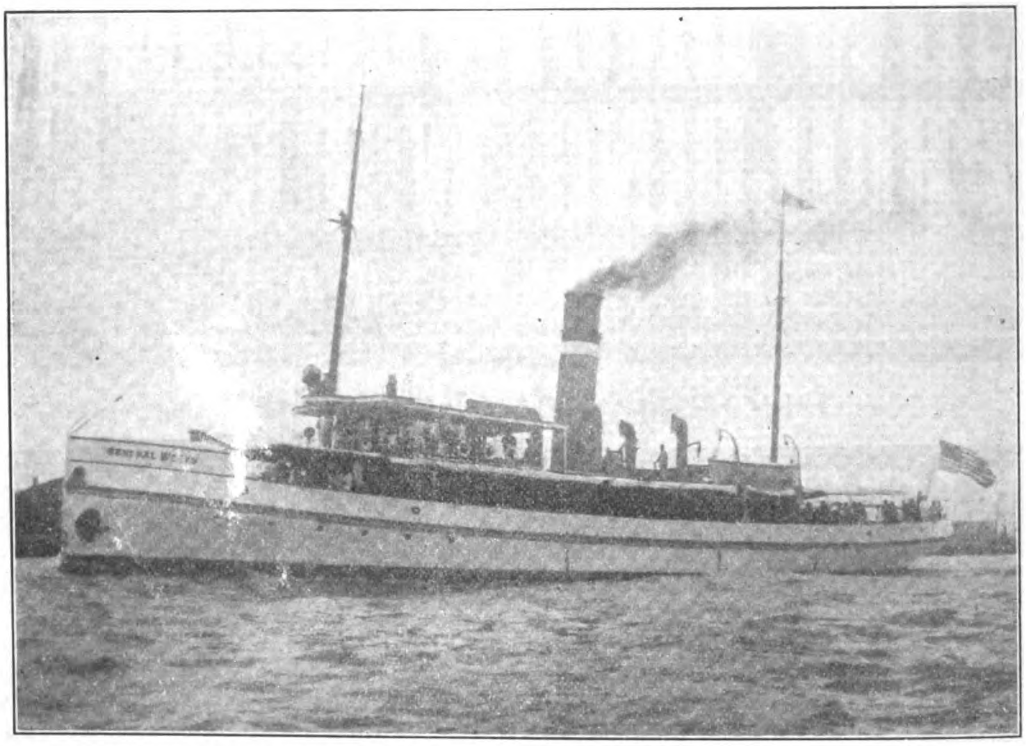

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The Dock charges are very moderate.

The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops are provided with the latest improvements in tools, traveling cranes of 60 tons' capacity, hydraulic and pneumatic machinery.

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Estimates given for all classes of work; Coast Steamers, Side and Stern-Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

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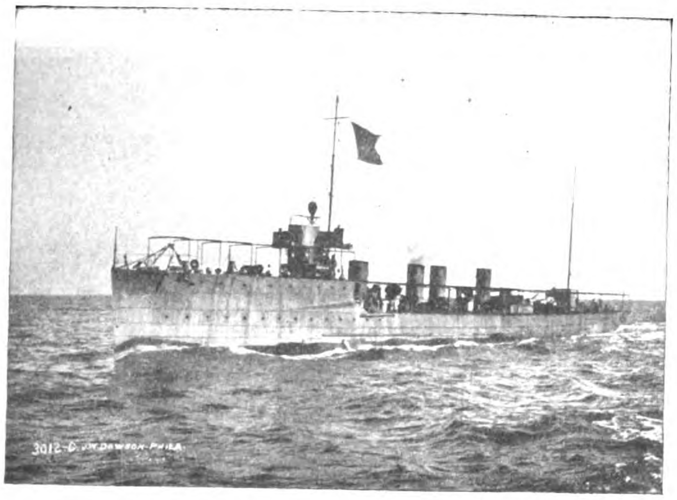

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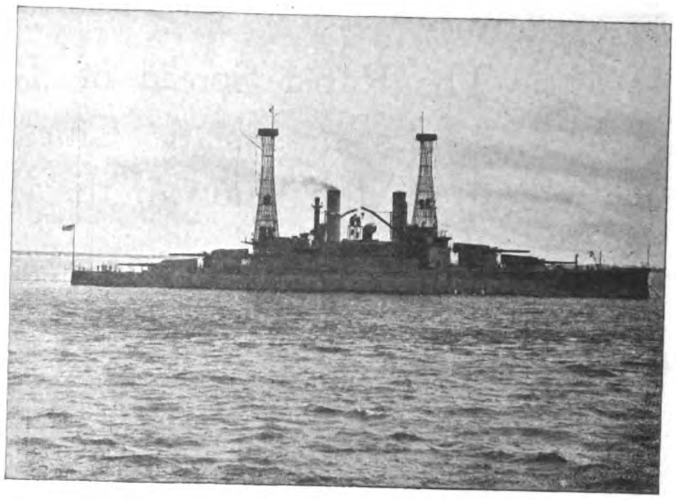

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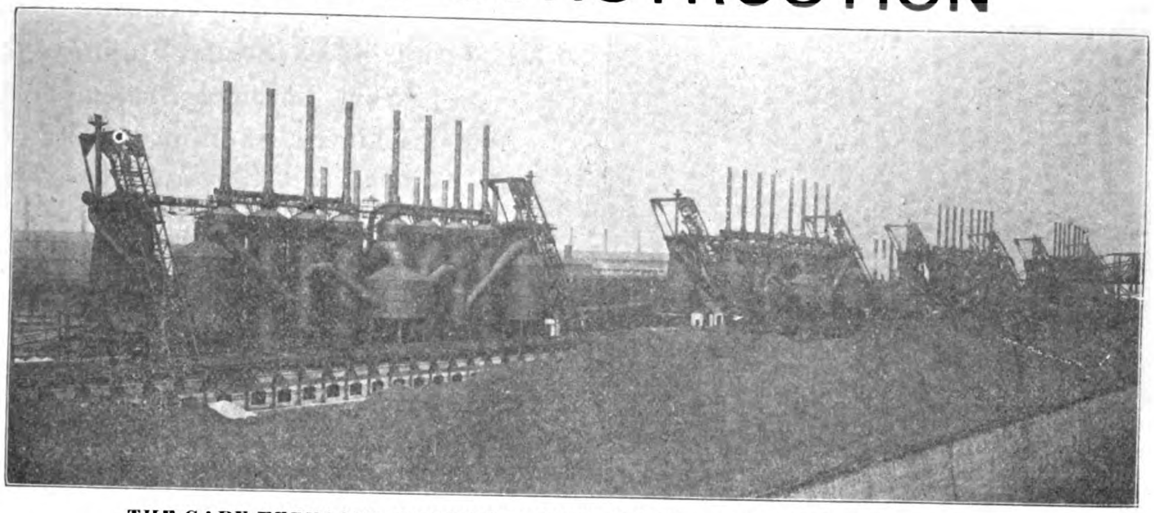

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Temporary Piles of 4 Group timber 10 to 70 ft. long.

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Total amount cut and manifested 12 months ending October 1st, 1908, 3,034,651 Board Feet.

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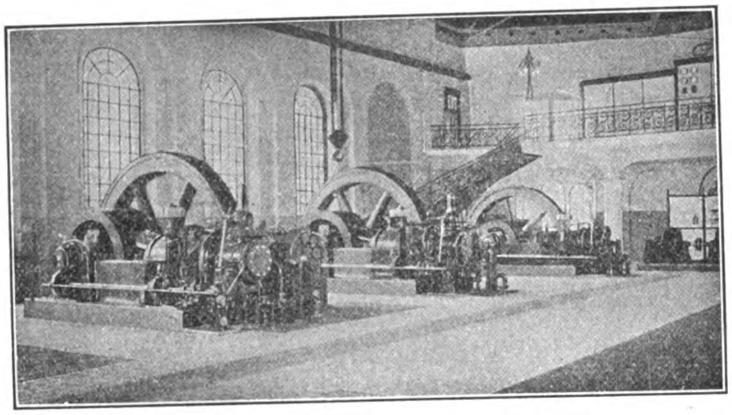

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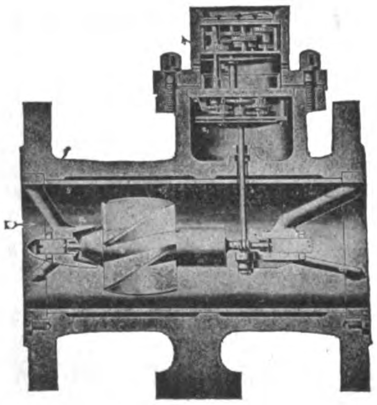

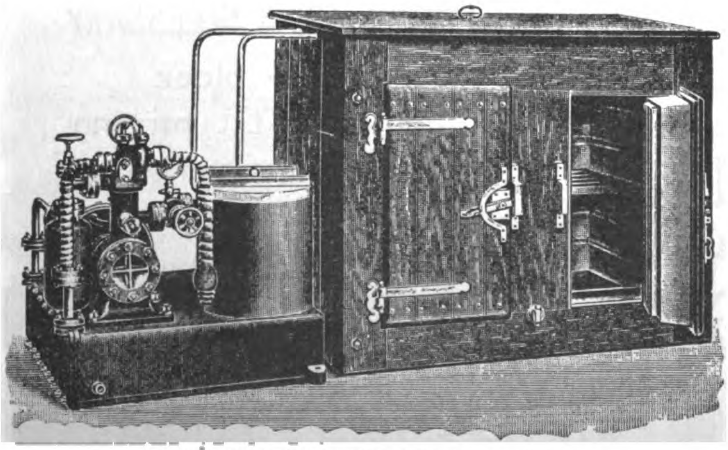

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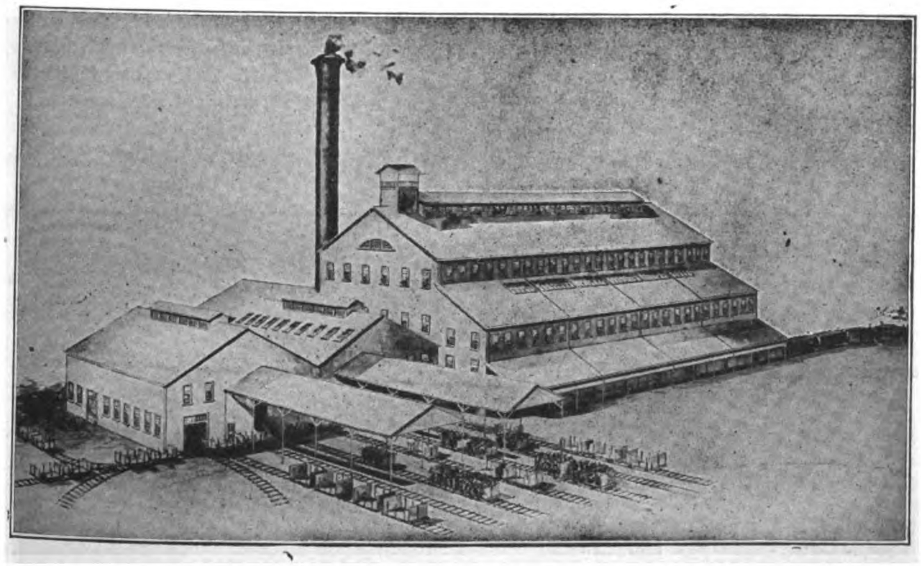

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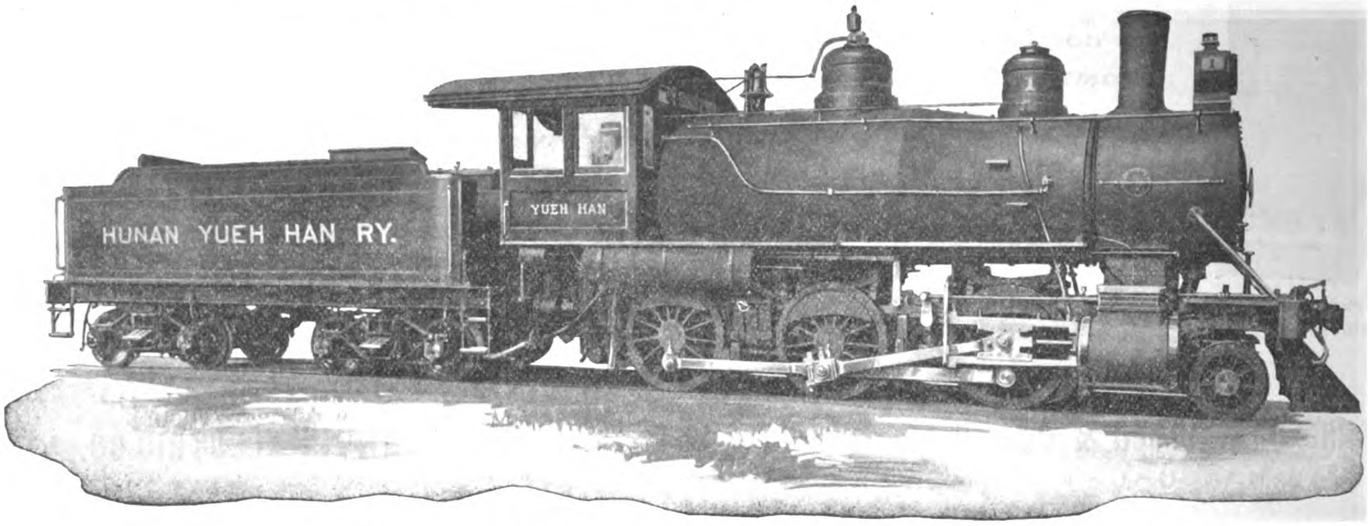

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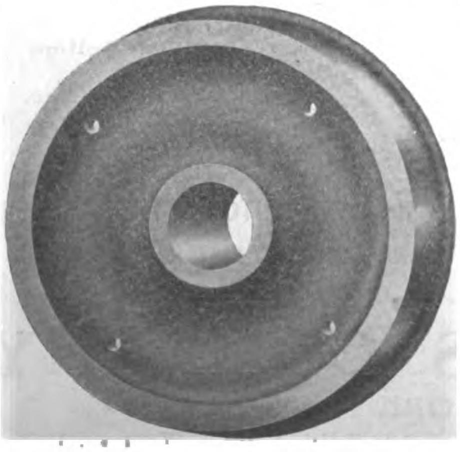

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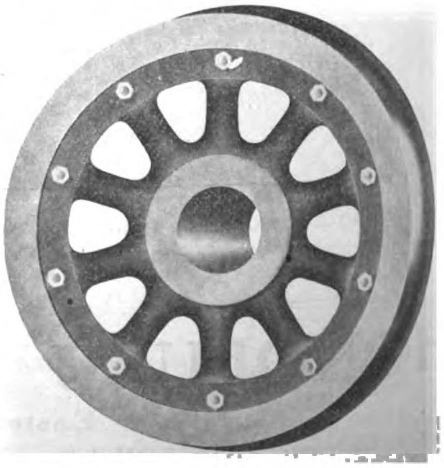

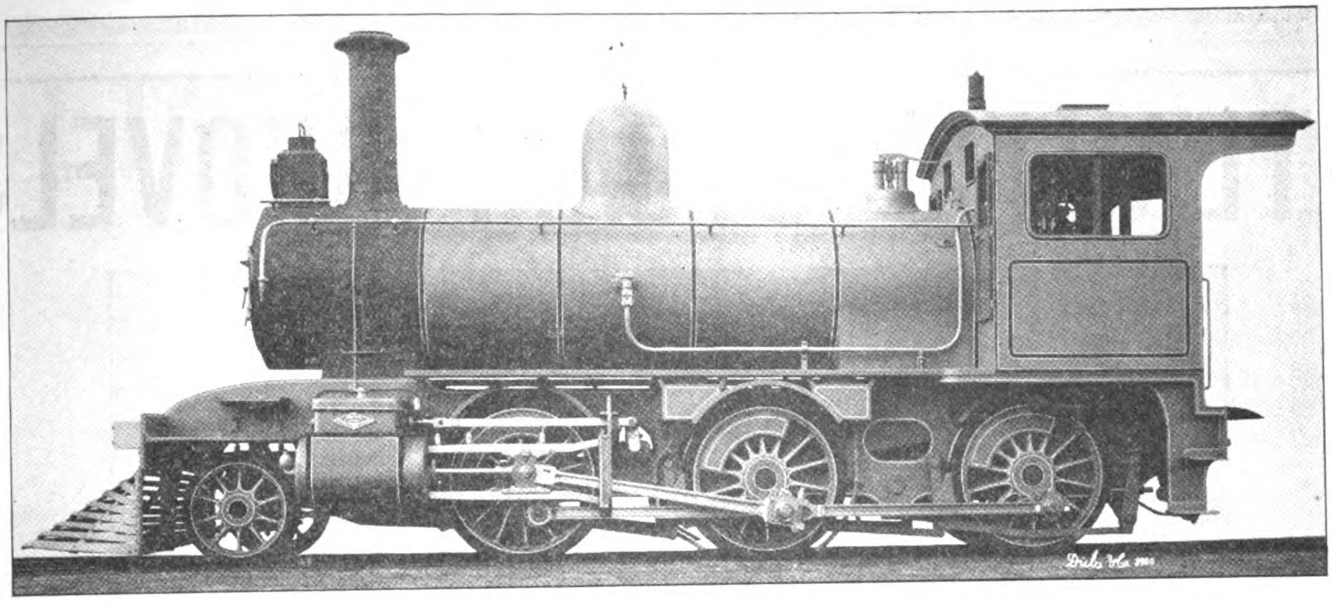

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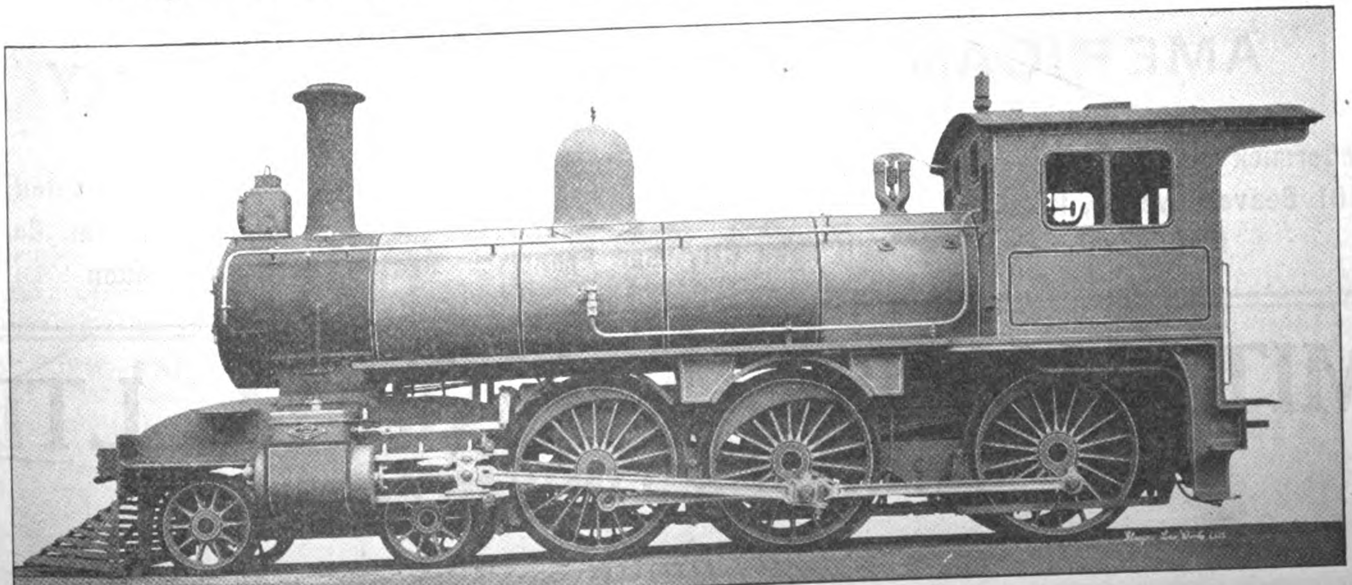

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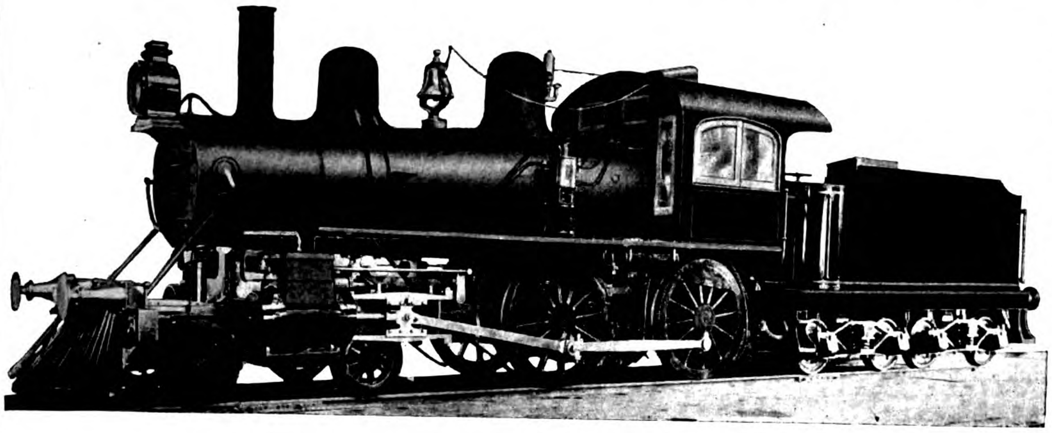

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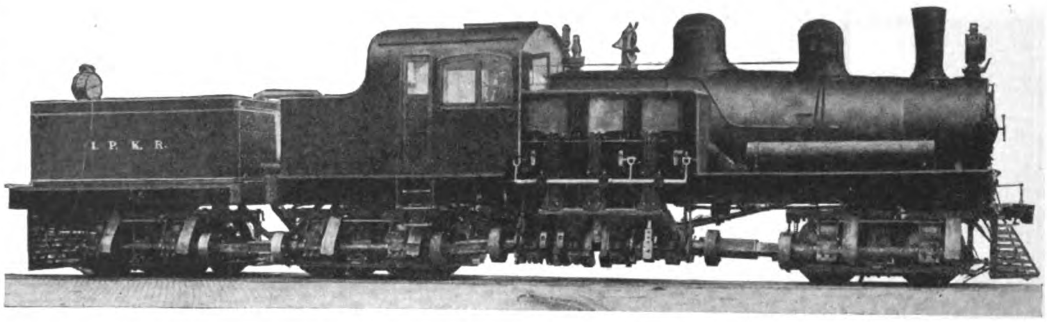

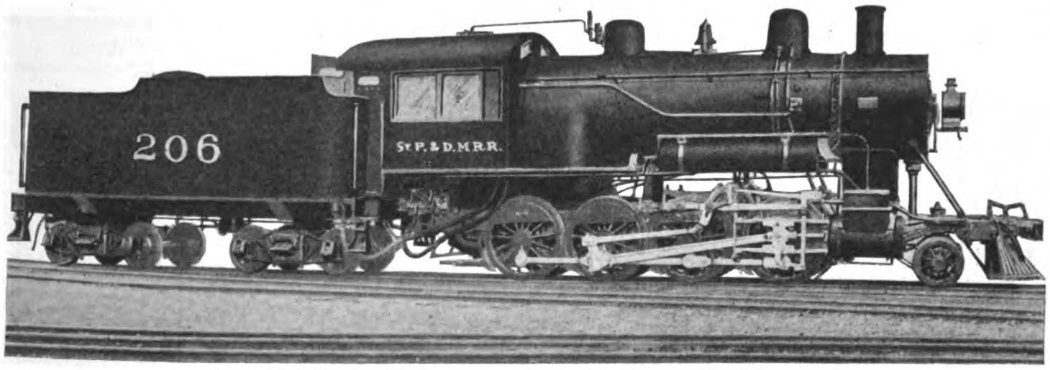

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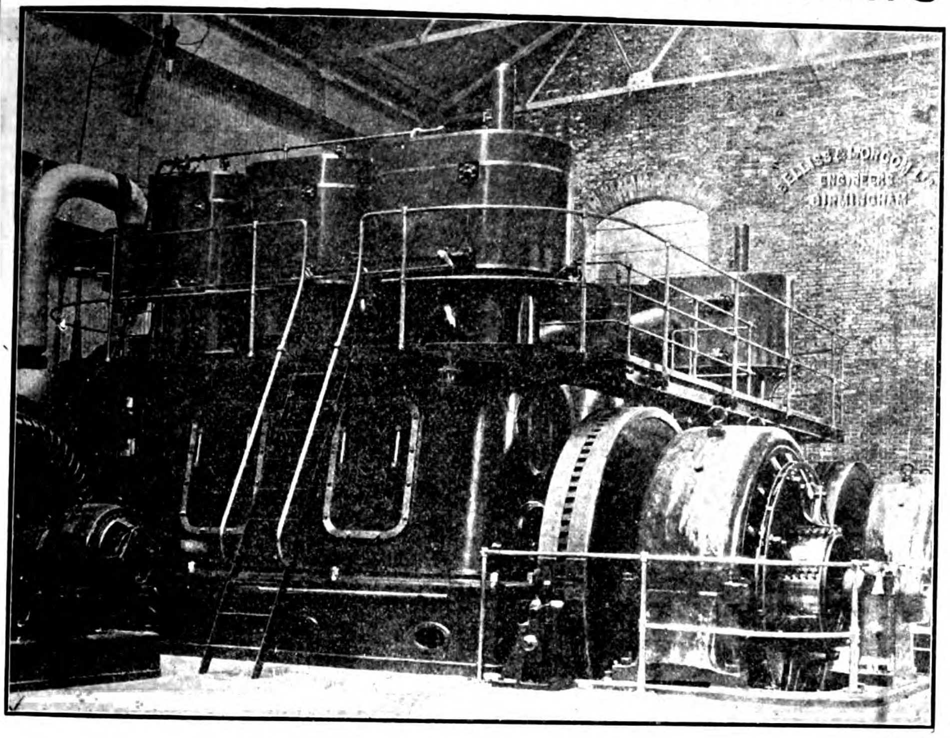

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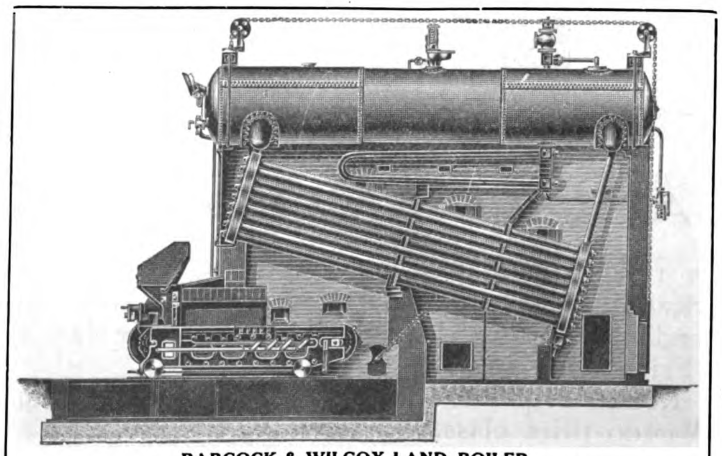

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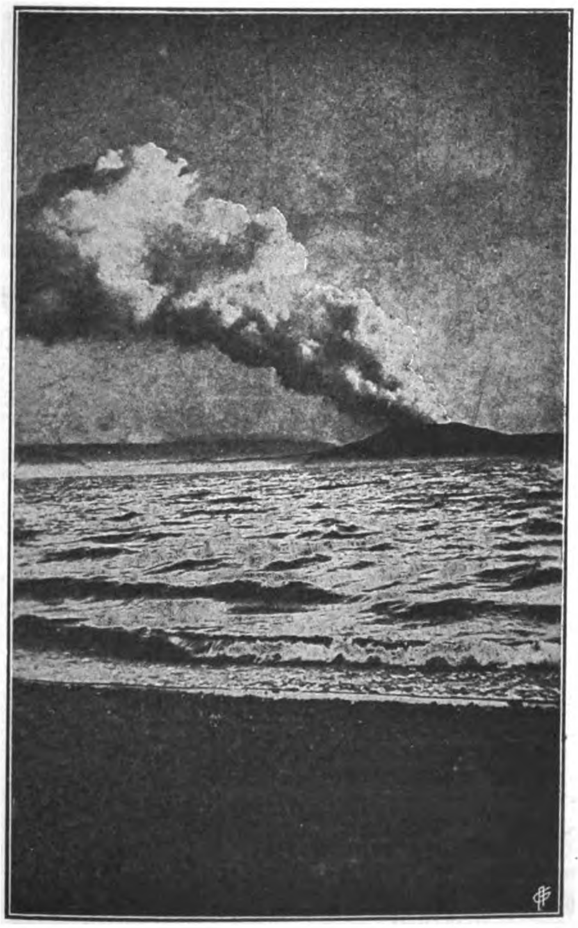

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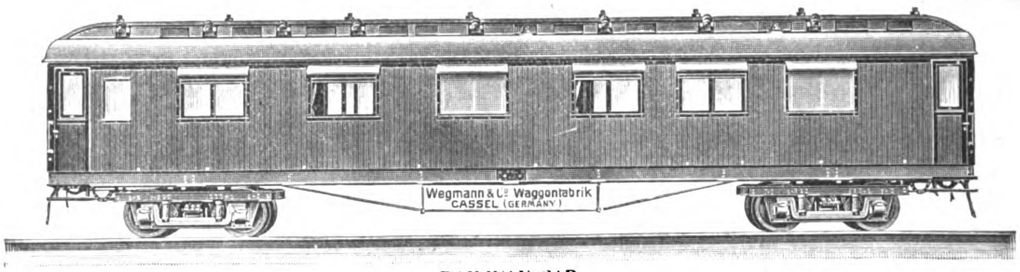

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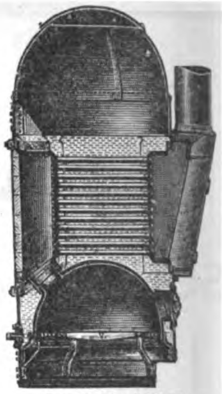

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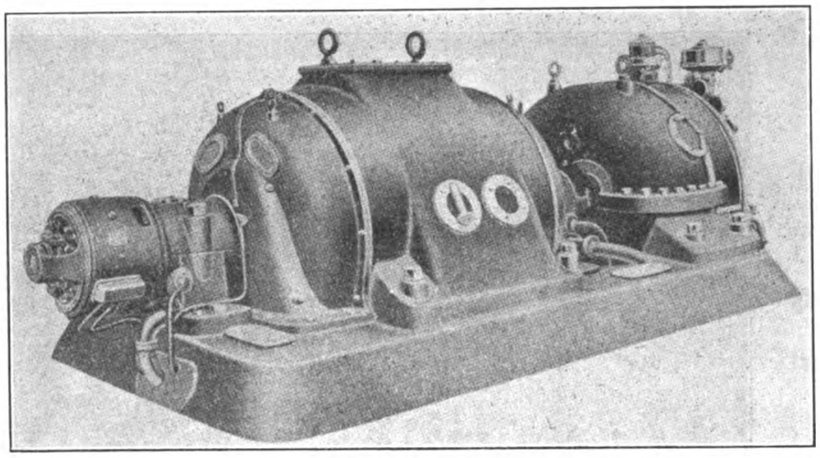

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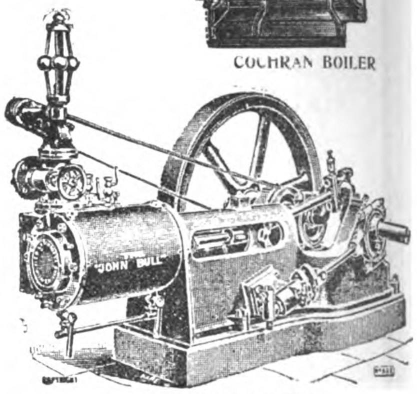

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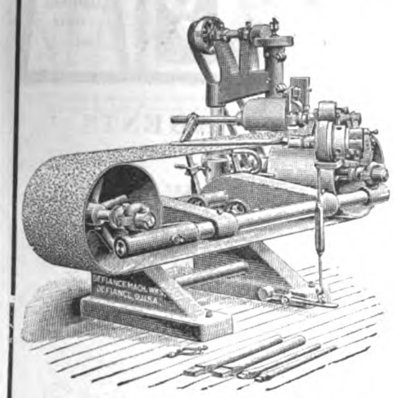

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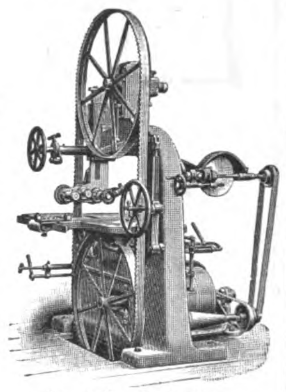

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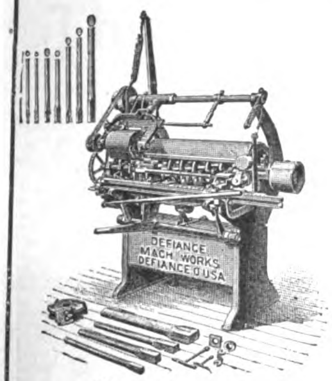

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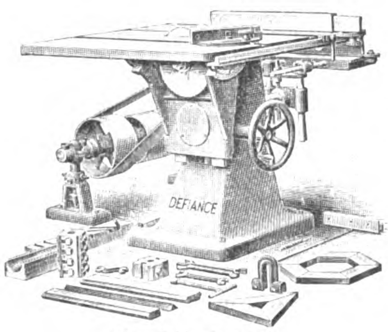

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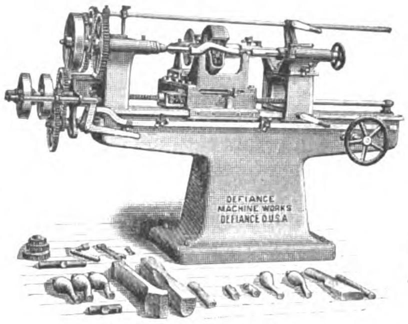

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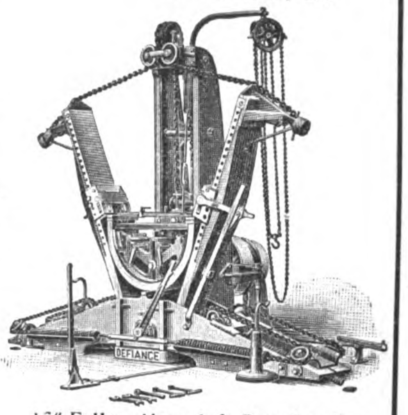

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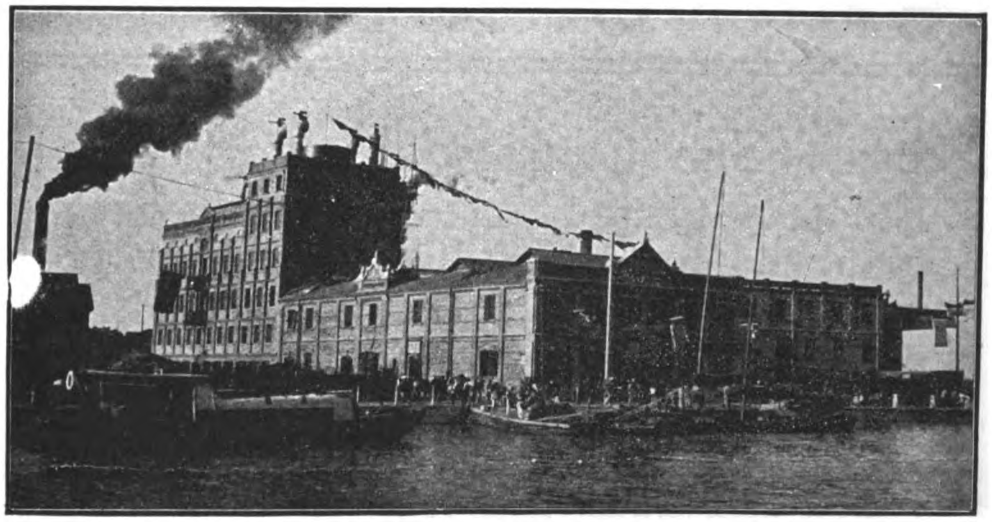

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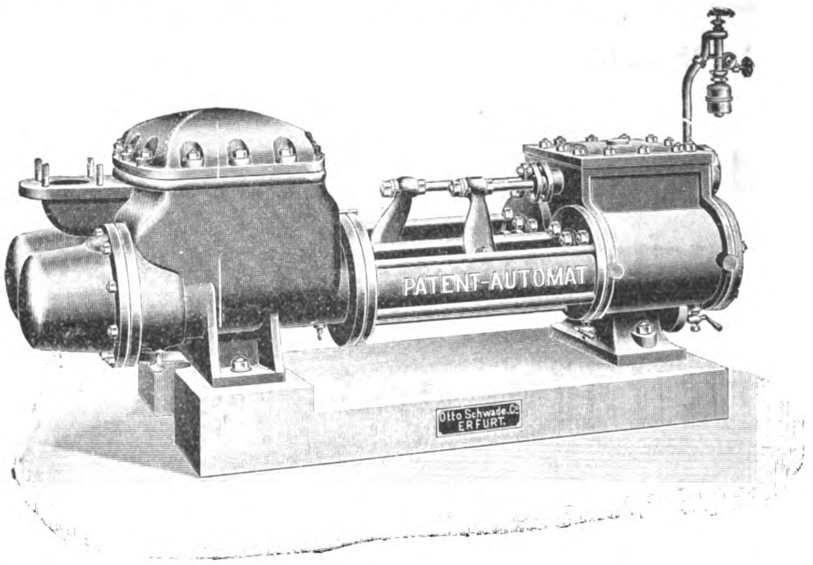

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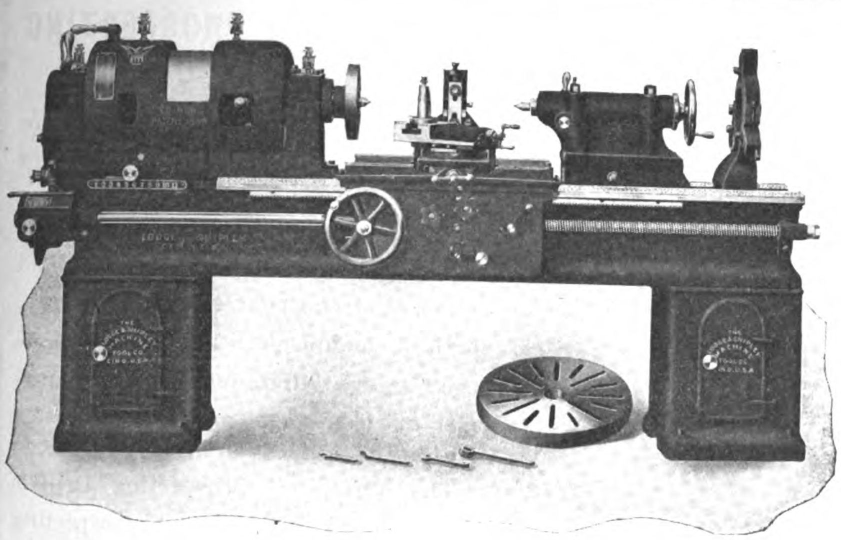

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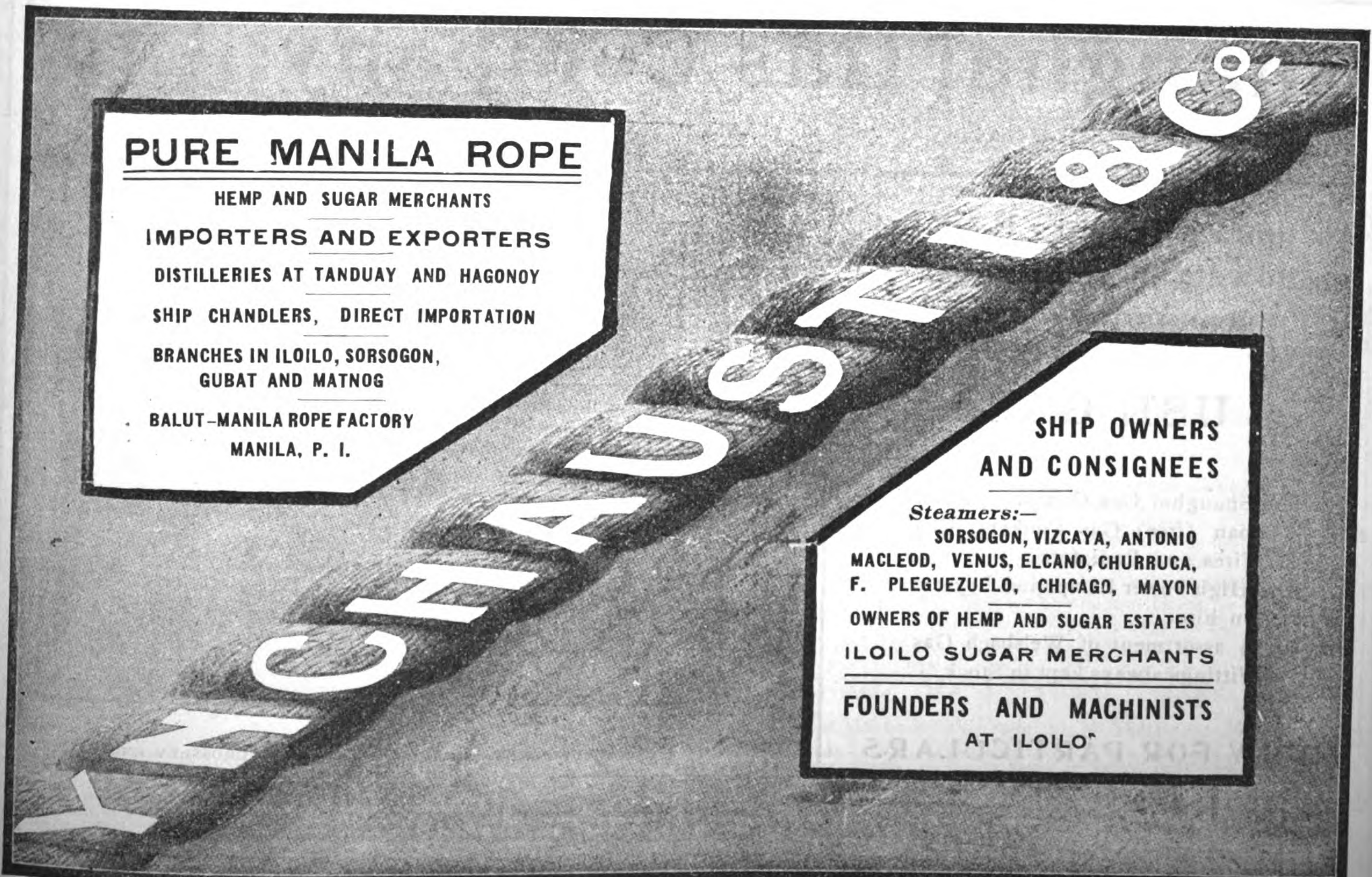

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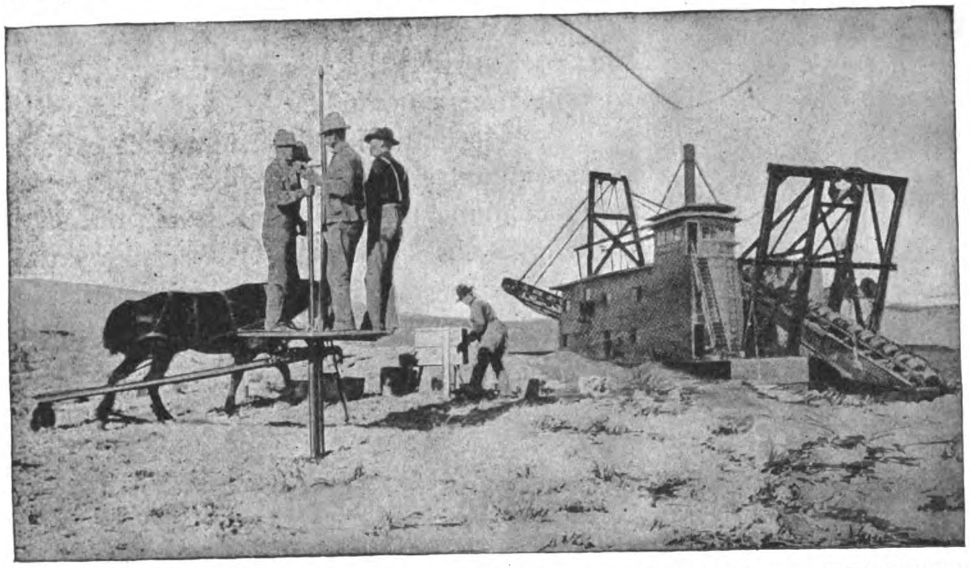

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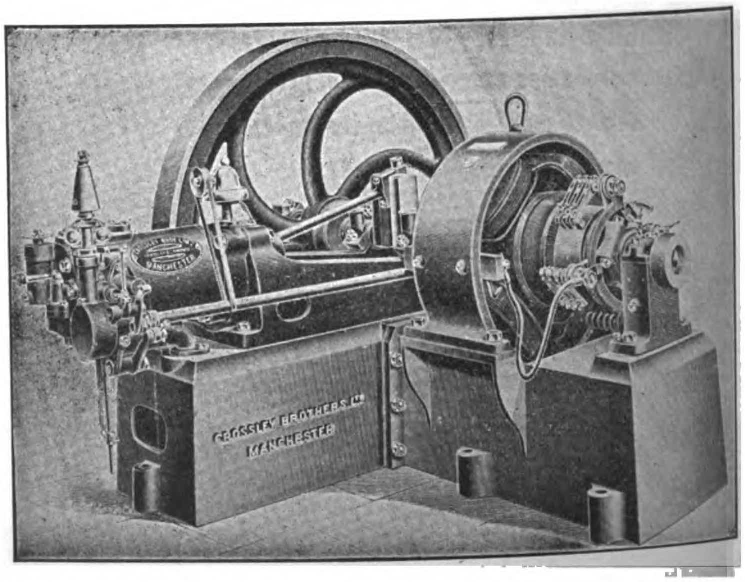

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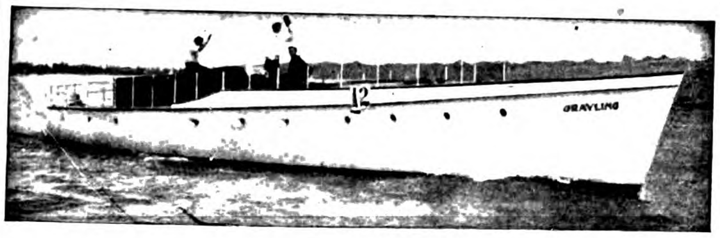

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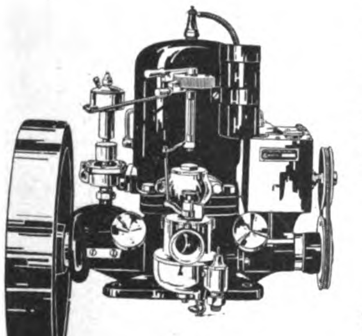

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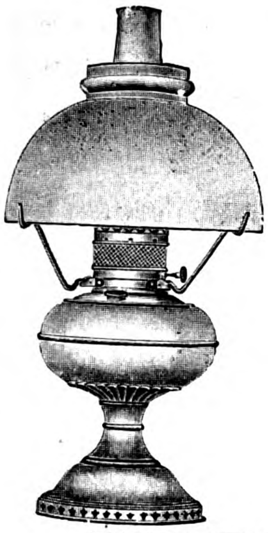

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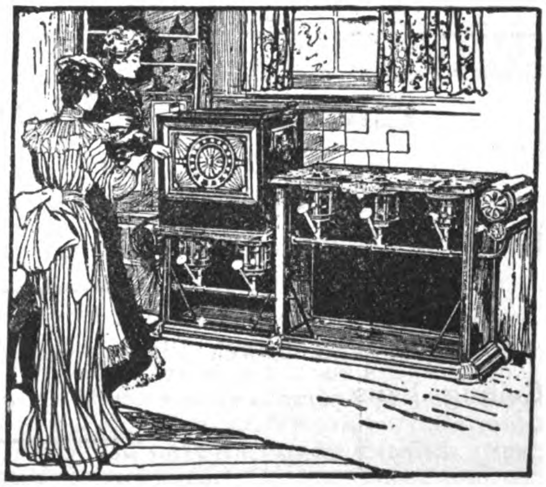

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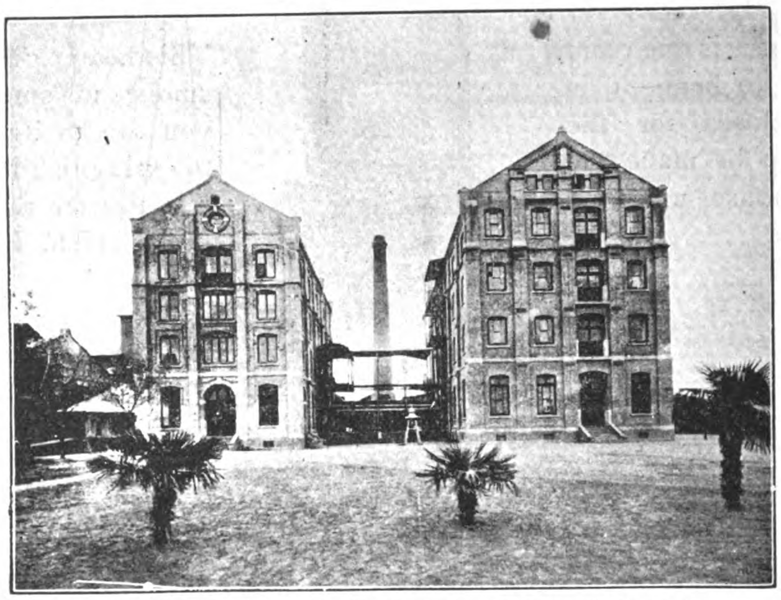

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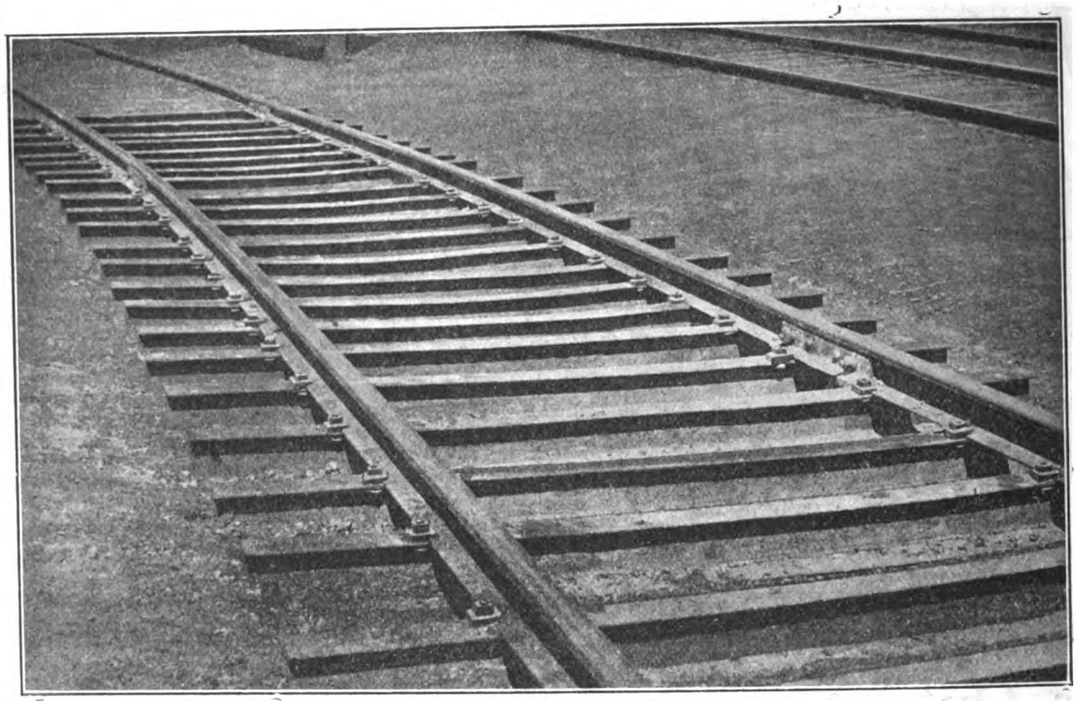

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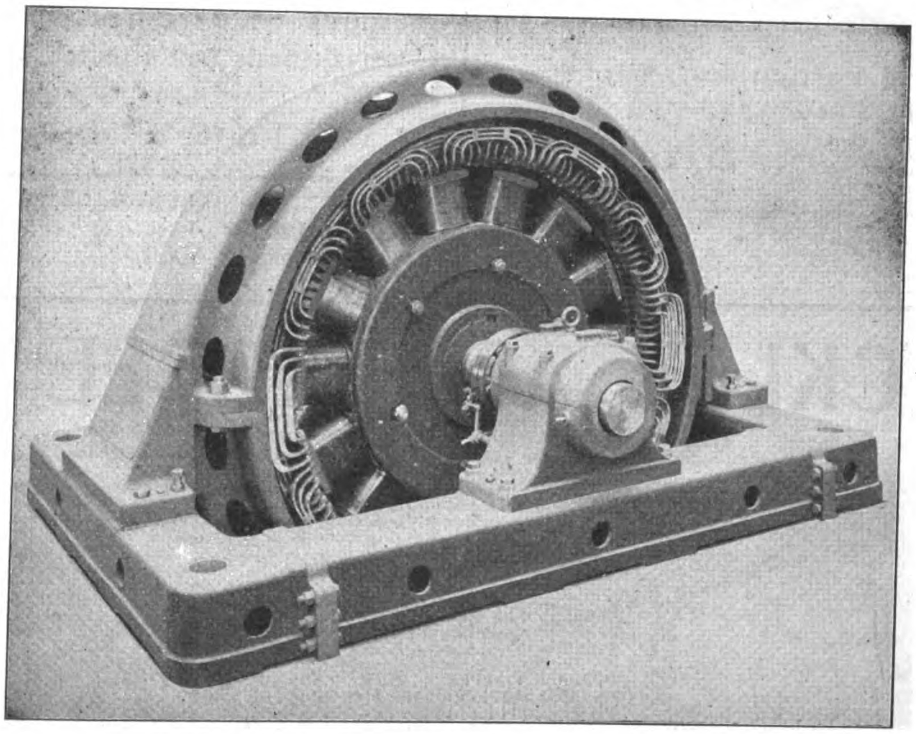

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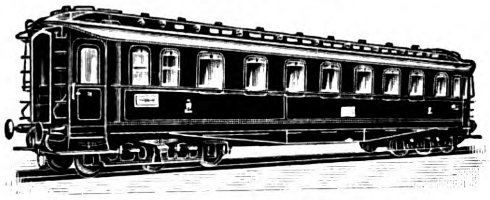

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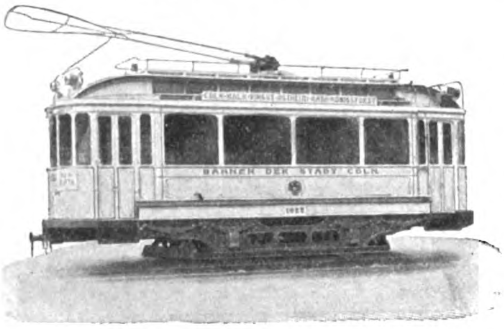

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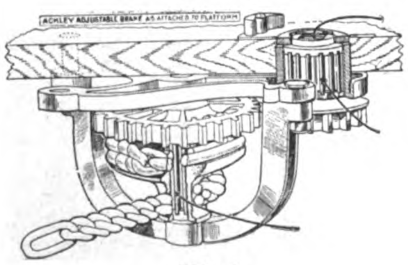

FIG. I

FIG. 3

The ACKLEY ADJUSTABLE is the only gear brake that can be attached to the platform at any angle, owing to the adjustable yoke.

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It is the only gear brake which has no staff bearing in the frame. The journaling of the pinion (Fig. 4), in the frame (Fig. 3 at D), independently of the staff (Fig. 2), places the gears at a fixed position, preventing BINDING, which occurs to gear brakes having staff bearings in frame. (See THE OLD—Figs. 5 and 6, G and I.)

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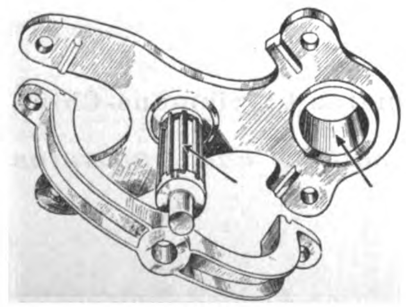

FIG. 2

FIG. 4

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THE DEVELOPMENT OF THE SOUTH MANCHURIA RAILWAY Co.

In August, 1905, the Japanese Government, by virtue of Art. 6 of the Treaty of Peace between Russia and Japan, acquired the Railway main line from Changchun to Port Arthur, together with its branch lines and all the rights, privileges, and properties attaching thereto, including the coal mines formerly owned by the Chinese Eastern Railway. On June 7, 1906, an Imperial Ordinance was issued concerning the establishment of the South Manchuria Railway Company; and on July 13 of the same year General Viscount G. Kodama was appointed President of the Organization Committee, composed of 81 members. But in consequence of the death of Viscount Kodama, which occurred on July 24, Viscount Terauchi, Minister for War, assumed the presidency on July 25. On August 1 the Government forwarded to the Committee the conditions pertaining to the establishment of the South Manchuria Railway Company; and after the formation of the company had been prepared by the committee on the basis of the Imperial Ordinance and in accordance with the conditions of the Government, the Articles of Association were approved by the Government on August 18. The subscription for shares took place from September 10 to October 15; and the establishment of the Company was finally sanctioned by the Minister of Communications on November 1.

The Board of Directors is composed of the following officials: 1 President, 1 Vice-President, and at least 4 Directors; besides whom the Company has from 3 to 5 Auditors.

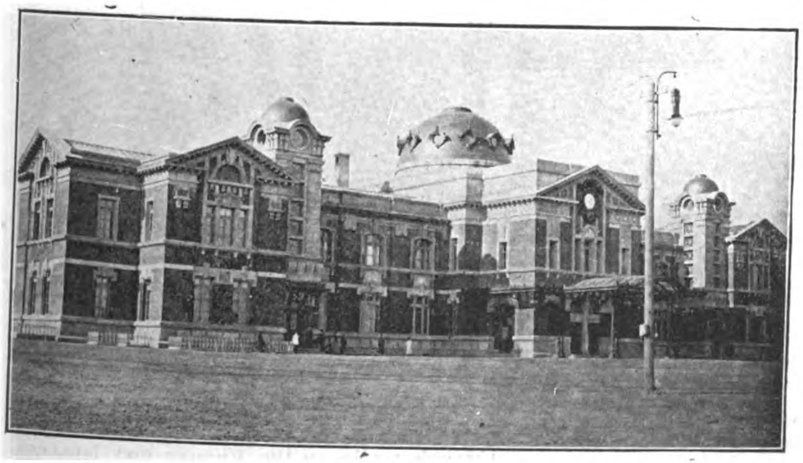
Both the President and the Vice-President are appointed by the Government with Imperial sanction; the Directors are also appointed by the Government from amongst shareholders owning at least 50 shares; whilst the Auditors are elected at the General Meeting of Shareholders.

In accordance with these regulations, on November 13, 1906, Baron S. Goto was appointed President; Mr. Z. Nakamura, Vice President; and Mr. S. Kunisawa and five other gentlemen, Directors of the Company. At the General Meeting, which took place on the same day, Mr. T. Nakahashi and four other shareholders were elected Auditors. On November 27 the President of the Organization Committee handed over all matters connected with the establishment of the Company to the newly-appointed President of the Company; and the registration of the Company was effected on December 7 of the same year. In consequence, however, of the appointment of the President, Baron Goto, to be Minister of Communications, which took place on December 19 following, the Vice-President, Mr. Nakamura, was appointed President, whilst Director Kunisawa was raised to the position of Vice-President.

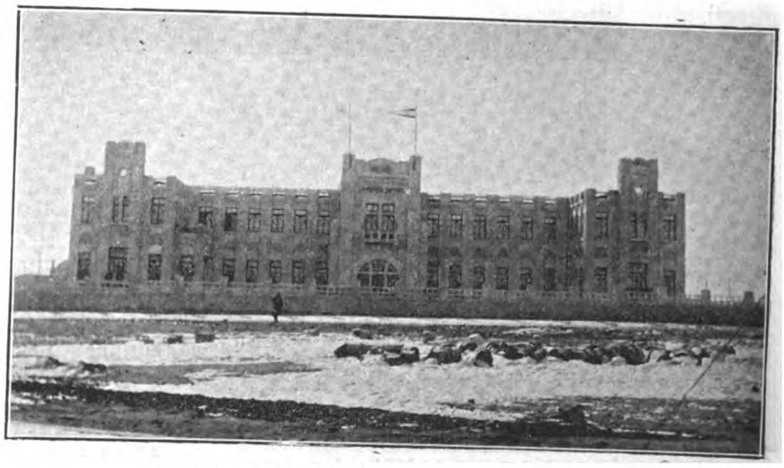
The Board of Directors at the present time is composed of the following members:—President, Mr. Z. Nakamura; Vice-President, Mr. S. Kunisawa; Directors, Messrs. C. Seino, K. Kubota, N. Inuzuka, S. Tanaka, M. Kubota, Prof. S. Okamatsu, LL. D., and Mr. K. Nonomura; Auditors, Messrs. T. Nakahashi, K. Kawakami, H. Taki, K. Magoshi, and S. Iwashita.

The authorized capital of the Company is two hundred million yen, which is divided into one million shares of 200 yen (about £20) each. The Japanese Government owns half of the total authorized capital, viz., 100 million yen, which is its share for the handing over to the Company of the complete

S. M. R. YAMATO HOTEL AT STAR BEACH

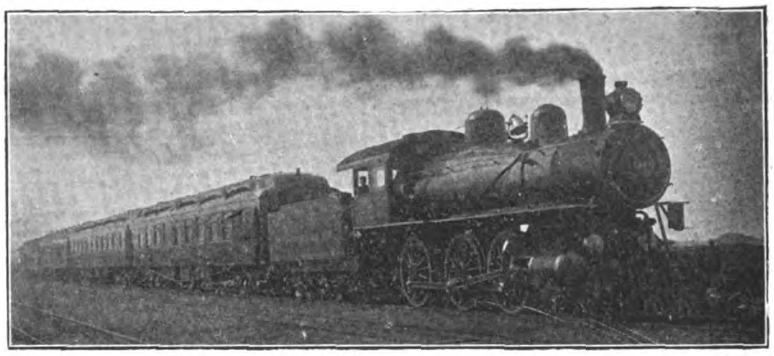


S. M. RY. YAMATO HOTEL AND STATION AT MUKDEN



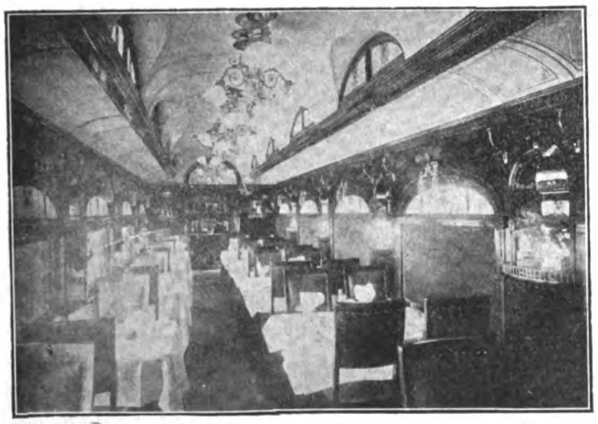
S. M. RY. YAMATO HOTEL AT CHANGCHUN

railway lines in Manchuria with the properties attaching thereto (except the rolling stock and the rails and accessory materials on the Antung-Mukden line) and the coal mines of Fushun and Yentai—altogether of an assessed total value of 100 million yen.

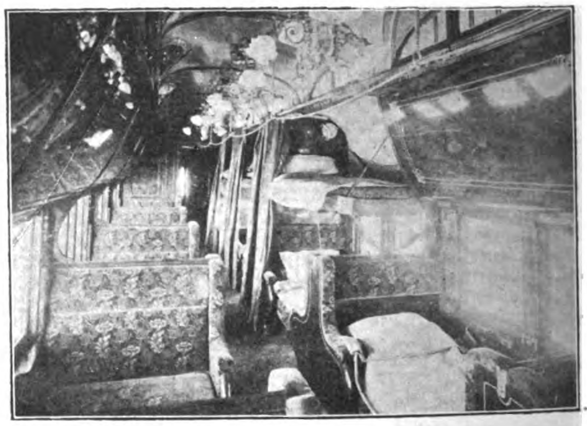


S. M. R. EXPRESS
COMPLETE PULLMAN VESTIBULE TRAIN

The other half, viz., 100 million yen, was made available for subscription to and taken up by Japanese and Chinese subjects only; and the shareholders are guaranteed a dividend of 6 per cent. per annum by the Japanese Government. Owing to the economic conditions in Japan at the time of the establishment of the Company, however, the first issue of shares was limited to the amount



PULLMAN DINING CAR
S. M. RY.



PULLMAN SLEEPING CAR
S. M. RY.

of 20 million yen, of which only one-tenth was called up. Hence the shares not yet issued amount to 80 million yen, whilst the share capital subscribed but not yet paid up is 18 million yen.

On April 1, 1907, the Company took possession of, and commenced operations on, the following properties, which constitute the investment of the Government:—

1.) The railway lines between Dairen and Changchun; Nankuanling and Port Arthur; Tashihchiao and Yingkou; Yentai on the main line and the Yentai coal mine; Suchiatun and Fushun; and Antung and Mukden.

2.) The machinery, implements, and other material actually in use on the above railways and mines, and also on the railway line between Mukden and Hsinmintun.

3.) The properties in land, buildings, and other establishments, both within and without the Kwantung Leased Territory, belonging to the above railways and mines.

The Mukden-Hsinmintun Railway, with all its appurtenances, was ceded to the Chinese Government by reason of an agreement entered into on April 15, 1907, its actual transfer taking place on June 1 of the same year; and in fulfilment of an agreement entered into in June, 1907, with the Russian Government at St. Petersburg, the railway lines and properties to the south of Kwanchengtzu Station, together with the coal mines of Shihpailing and Taochiatun and their appurtenances, were formally transferred to the South Manchuria Railway Company between July 15 and July 18, 1907.

With the object of raising, largely through debentures, the funds required for the reconstruction of these railways, as well as for the subsidiary undertakings described below, the Company has up to the present time issued in London three separate issues of debentures of a total amount of eight million pounds sterling at the uniform rate of interest of 5 per cent., both capital and interest being guaranteed by the Japanese Government. The following is a list of the debentures issued:—

1st Issue: 4 million pounds sterling, issued on July 19, 1907, redeemable within 25 years.

2nd Issue: 2 million pounds sterling, issued on June 1, 1908, redeemable within three years.

3rd Issue: 2 million pounds sterling, issued on December 16, 1908, redeemable on July 23, 1932.

The Industries and Enterprises of the Company. The Railways.—The Railways acquired from the Government on April 1, 1907, are as follows:—

The main line between Dairen and Changchun (437½ miles); the Port Arthur branch line (39 miles); the Liushutun branch line (3½ miles); the Yingkou branch line (13 miles); The Yentai branch line (9¾ miles); the Fushun branch line (39 miles); the Antung-Mukden line (189 miles).

The gauge of the whole of the above railways when acquired from the Government was 3 feet 6 inches, with the exception of that of the Antung-Mukden line, which was only 2 feet 6 inches. This, however, does not include the line from Mukden to Hsinmintun, which though originally included in the system, acquired by the Company, was ceded to China, as before mentioned.

Immediately after the acquisition of the above railways, the Company commenced, and without the slightest interruption of traffic, executed their reconstruction to the standard gauge of 4 feet 8½ inches—except the Antung-Mukden line—and also the doubling of the track between Dairen and Suchiatun, a distance of 238⅓ miles. So expeditiously was this performed that as early as November, 1907, traffic on the standard gauge was opened on the Port Arthur line, and on June 1, 1908, the entire main line, as well as the Fushun and Yingkou branch lines, had been rebuilt and completed. It was a source of great satisfaction to the Company to have been able to express its hearty approbation of the work done by its engineers on that occasion, for within the short time of one year, and in spite of many adverse circumstances and difficulties of every kind consequent upon the great war, they had succeeded in widening the gauge on more than 500 miles of railway line, at the same time erecting more than 200 locomotives and 2,500 cars newly received, thus making it possible for the Company to effect the change to standard gauge practically without interruption of traffic for a single day and without the slightest obstruction.

In order to improve the through traffic between Europe and the Far East, the Company inaugurated in October, 1908, an express service between Dairen and Changchun, consisting of Pullman sleeping and dining cars of the latest type. The express trains run three times a week, and connect at Changchun with the Siberian trains of the International Sleeping Car & Express Train Co. and Russian State Express, and at Dairen with the steamship service operated by the Company between Dairen and Shanghai twice a week. In accordance with the terms of a provisional convention concluded by the Russian and Japanese Governments on June 13, 1907, respecting the through traffic on the Russian and Japanese Railways in Manchuria, this Company entered into an agreement with the Chinese Eastern Railway Company respecting the passenger and baggage through traffic, which was approved by the Japanese Government on December 1, 1909.

An agreement has also been made with the Imperial Japanese Government Railways, the Osaka Shosen Kaisha (Osaka Mercantile S. S. Co.), and the Nippon Yusen Kaisha (Japan Mail S. S. Co.) regarding through transportation of cargo. This was put into effect from the 1st of January, 1911, simultaneously with through goods traffic between Shanghai and the principal stations on this Railway.

By virtue of these arrangements, immense facilities are now obtainable in through cargo transportation at this Company's principal stations with many ports in the East, as well as in Europe, Australia, and the United States of America, regularly touched by the Nippon Yusen Kaisha and Osaka Shosen Kaisha steamers.

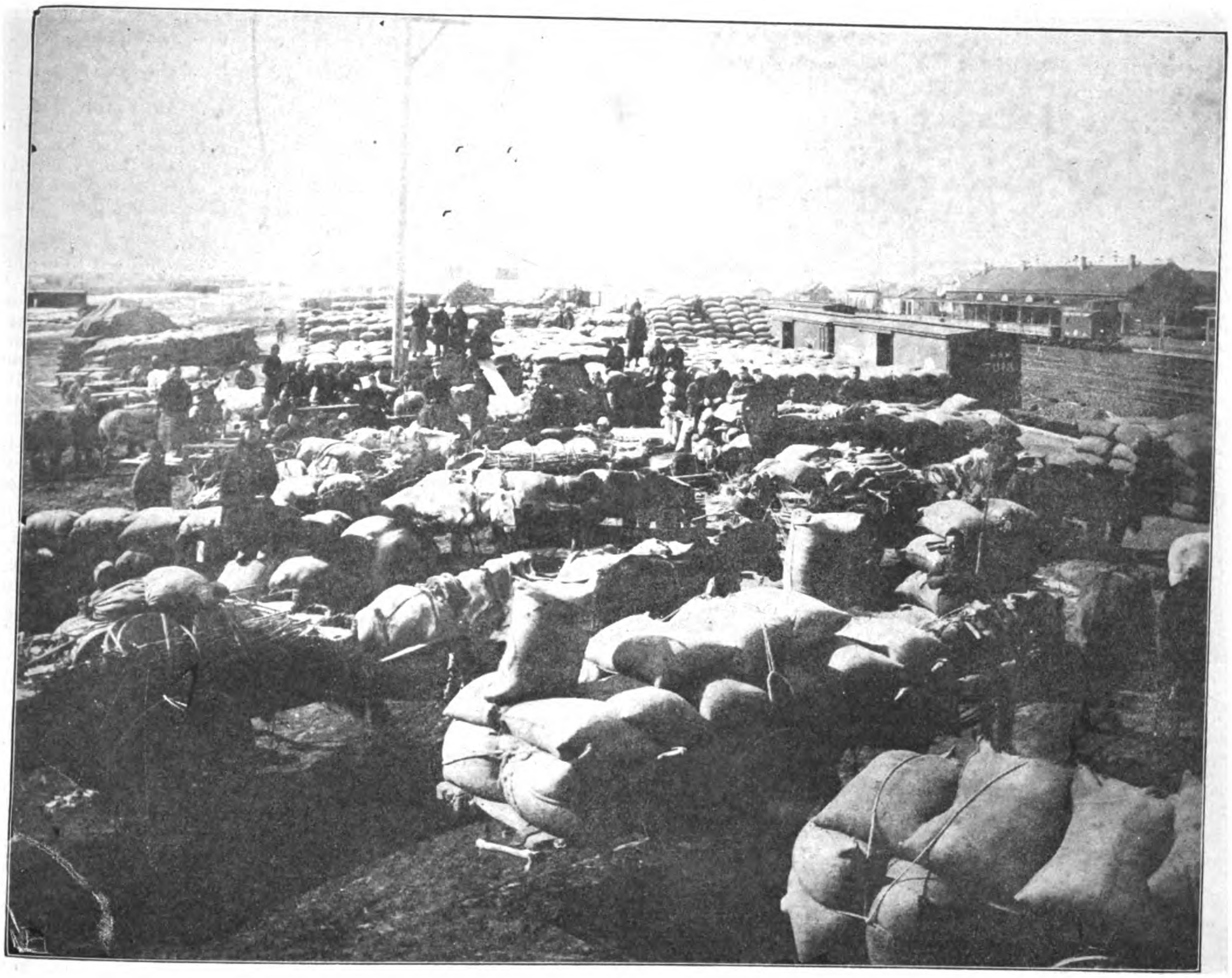
The doubling of the railway track on the section between Dairen and Suchiatun also progressed rapidly, and the double line was opened for traffic in its entire length on October 27, 1909.

The reconstruction of the Antung-Mukden narrow-gauge line to standard gauge was ber, 1909, and the old station is being utilized as a goods office.

The reconstruction of the Yentai branch line, which became necessary in consequence of the increased output of the Yentai coal mine, was also completed; and on March 1, 1910, goods trains commenced to run between Liaoyang and the Yentai coal mine.

The Liushutun branch line, though at present not in operation, has also been reconstructed to standard gauge in accordance with an order from the Home Government.

The reconstruction of all the railways enabled the Company to dispense with the rolling stock of narrow gauge, which was therefore sent back to Japan in 1908. This com- and implements were established in Liaoyang, Kungchuling, and Antung. However, as these workshops soon proved to be altogether too small and insufficiently equipped to cope with the ever-increasing demand, it was decided to erect a new and in every respect modernly equipped workshop on an extensive scale at Shahokou near Dairen; and this is now fast nearing completion. When completed, this workshop will be able to execute repairs at once on 20 locomotives and 46 goods cars of 30 tons each, and at the same time construct and repair other railway materials, mining machinery, etc. The Company also intends to gradually enlarge and improve the other workshops.



MOUNTAINS OF BEANS AWAITING SHIPMENT AT DAIREN

commenced in August, 1909, and proceeded so rapidly that the Mukden-Shihchiaotsu section (35 miles) was opened for traffic on November 3 of the same year; the Antung-Chikuanshan section on November 3, 1910; and the Shihchiaotsu-Penhsihu section by the end of December, 1910. With regard to the remaining section, from Penhsihu to Chikuanshan (73 miles), notwithstanding considerable engineering difficulties that are almost constantly being met with, so remarkable a progress is being made that it is expected the work will be completed by March, 1912.

The Yingkou branch line, which formerly had its terminus at Niuchiatun, has been extended as far as the new Japanese town of Yingkou, where a new station was built and opened for passenger traffic in Novem- prised 217 locomotives, 3,727 goods cars, and 157 passenger cars.

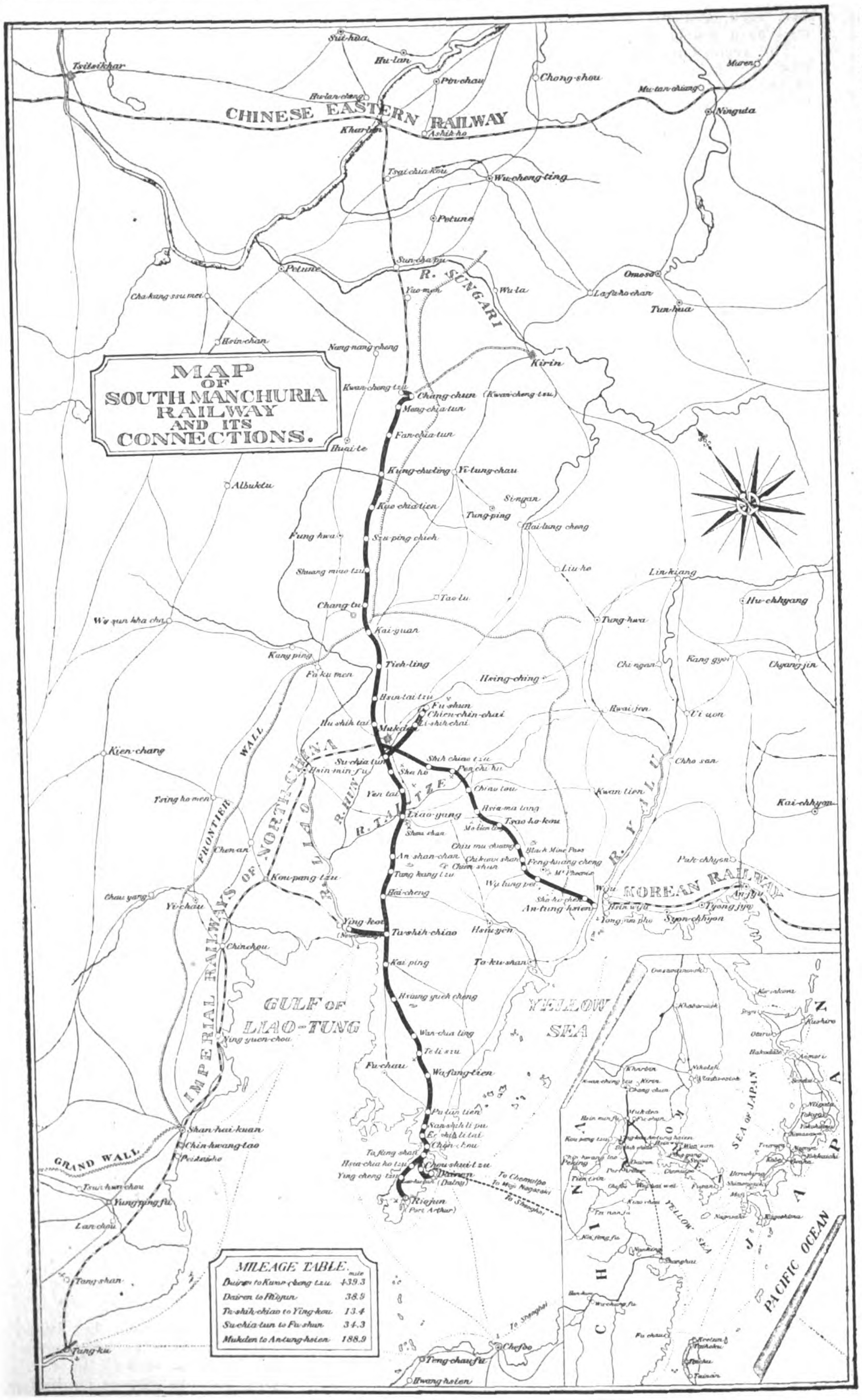
The rolling stock in use at the end of the first half of the working year 1910 was as follows:—

On the main and branch lines of standard gauge: 216 locomotives, 2,315 goods cars (2,190 thirty-ton cars and 125 fifty-ton coal cars), and 125 passenger cars.

On the Antung-Mukden light rail line: 82 locomotives, 650 goods cars, and 54 passenger cars.

Originally, a central railway workshop had been erected in Dairen for the construction of rolling stock, repairs, and other works, not only to meet the requirements of the company but also those from outside. Besides this central workshop, small workshops for the repair of rolling stock, machinery,

The passenger and goods traffic has been steadily increasing since the commencement of the Company's business, as will be seen from the following business returns for half-years. (In this connection, however, it must be observed that beans and bean cakes form by far the greater portion of the goods traffic, and since the transportation of this produce from the interior to the railway and from the railway to the ports must of necessity be mainly done during the winter season it naturally follows that the revenue during the second half of each working year must be greater than that of the first half. In order, therefore, to arrive at a proper conclusion with regard to the financial progress achieved so far, it is necessary to compare winter and summer half-years between themselves).



Working year.	Term.	Passengers.	Tonnage of goods. (American Tons)	Receipts in yen.	Expenditure in yen
1907	1st Half	704,300	533,283	4,093,425	2,757,446
	2nd Half	807,981	953,151	5,675,462	3,344,168
1908	1st Half	910,946	1,083,064	4,372,751	2,547,589
	2nd Half	937,194	1,525,972	8,164,391	2,573,818
1909	1st Half	1,029,418	1,756,225	5,858,158	2,609,968
	2nd Half	1,149,644	1,812,302	9,158,040	3,208,365
1910	1st Half	1.324,952	1,670,271	5,594,767	8,015,832

Shipping.—The increasing through traffic from Europe to the Far East, as a result of the reconstruction of the railways, induced the Company to institute a regular steamship service between Dairen and Shanghai by chartering the steamer "Kobe Maru" from the Nippon Yusen Kaisha; and this service was opened on August 10, 1908.

This steamship line connects the shortest and quickest route from Europe to Shanghai, and as an annex to the South Manchuria Railway line is equally important for passenger and goods traffic as well as for mails. As the advantages of this route have become to be generally recognised, this steamship service has gradually expanded, so that it became necessary to charter another steamer from the same steamship company; and the "Saikio Maru" chartered in May, 1909, now runs alternately with the "Kobe Maru" on this twice-weekly service.

The following figures give the results of the passenger and goods traffic during the last five half-years:—

Working year.	Term.	Passengers.	Freight tonnage (American Tons)	Receipts in yen.	Expenditure in yen.
1908	1st Half	190	495	5,831	39,553
	2nd Half	1,536	10,264	66,750	164,646
1909	1st Half	1,985	13,735	90,163	230,722
	2nd Half	2,340	17,821	101,075	215,574
1910	1st Half	2,368	20,170	1,7,377	225,418

The Harbour.—As regards the construction of Dairen Harbour, it is intended mainly to follow the plan originated by the Russians, and to complete the works left unfinished. The principal construction works taken over and executed so far by the Company are as follows:—

(1). The construction of the East Breakwater, which stretches out from the northern end of the East Quay towards the north-east, and is 1,221 feet long, 20 feet wide at the top, and 19 feet above water at low tide. Between the East and the North Breakwaters a sea passage 1,200 feet wide is left open. About 70 per cent. of all the construction works have been completed up to date (January, 1911).

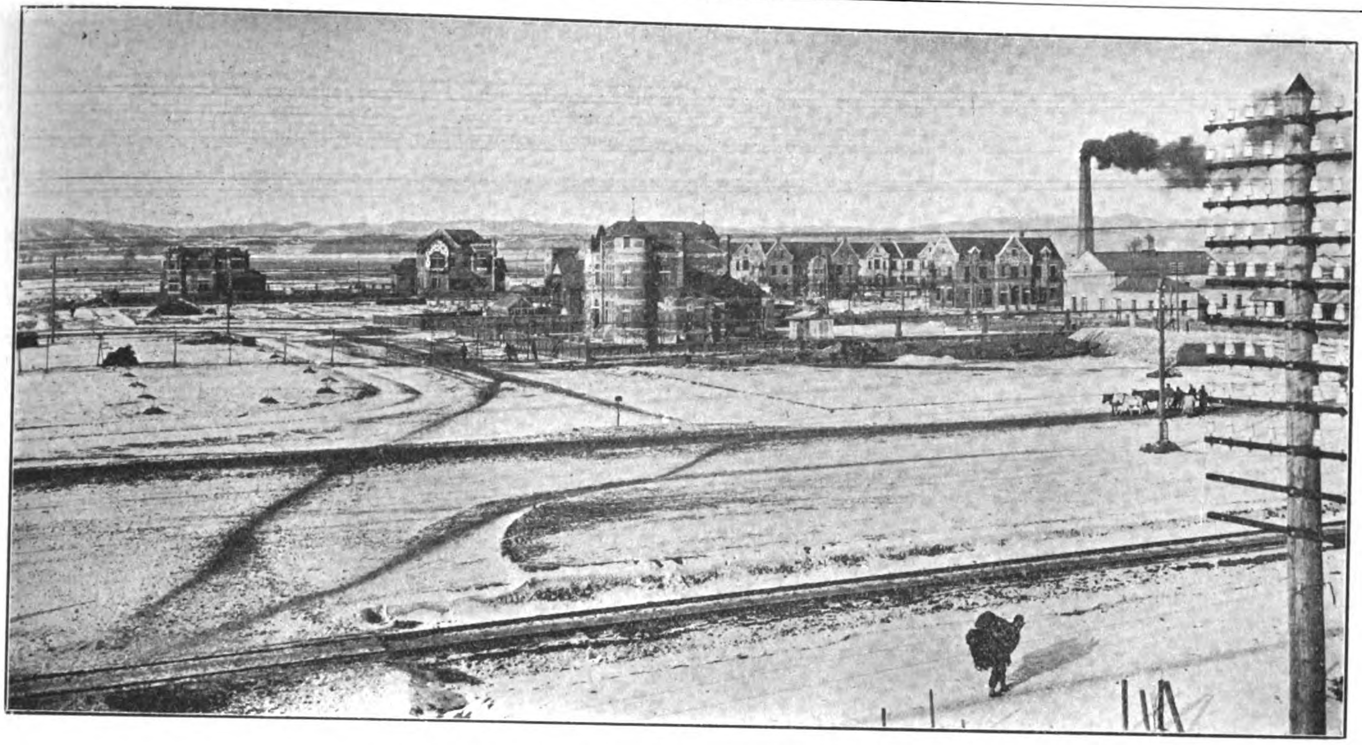
(2). The wall of the East Quay. The southern part of the quay had been completed and the construction of the northern part commenced by the Russians. It was decided to take down the uncompleted part, and construct in its stead another wall extending from north to south and from east to west. This quay wall is 909 feet long, 540 feet wide, and 30 feet above low water. More than 57 per cent of this work has been completed.

(3). The Northwest Breakwater. Stretching from a point about 1,200 feet distant from the end of the East Breakwater towards northwest, this breakwater is to be 12,500 feet long, from 10 to 20 feet wide at its crest, and from 17 to 19 feet above low water. So far, 16 per cent. of this work has been completed.

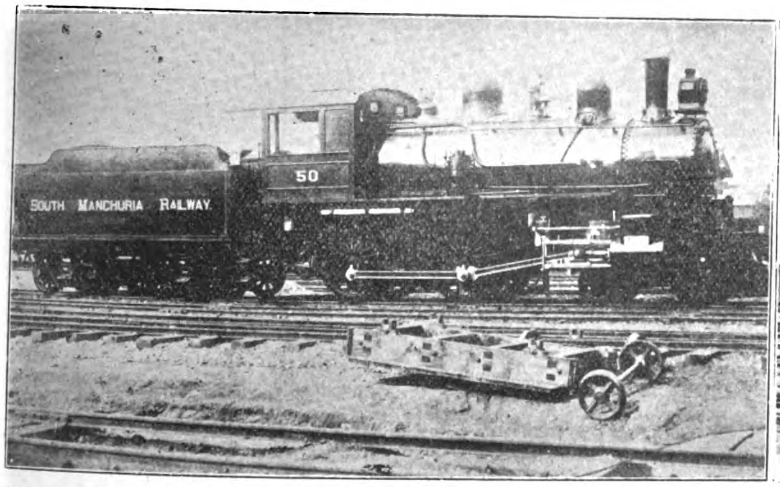
(4). The dredging of the port. The total quantity of mud to be dredged is estimated at 15 million tons, of which at present only 20 per cent has been removed. But the steam dredger, "Heito Maru," of 573 tons, constructed on the latest plan by Messrs. Ferguson Bros., of Glasgow, at a cost of about £30,000, is now on her way from Europe to Dairen, where she is expected to arrive in April next. The work of dredging the port will then be taken in hand with much greater celerity and thoroughness.

Reclamation work on the east coast of the city of Dairen is also shortly to be commenced; and besides the repair and construction work on the east quay-wall, the construction of an embankment at the Public Wharf (Junk Wharf) on the northern coast of the city is being steadily pushed forward.

The facilities of the harbour have been improved by the introduction of steam launches, warehouses, sheds and several other accommodations calculated to further the convenience of the passenger and goods traffic. The loading and discharging of goods at the port, which had hitherto been entrusted to numerous forwarding agents, was in October, 1907, brought under the direct management of the Company; and this step has been entirely justified by the subsequent improvement in the method and work of transportation. The amount of goods entering and leaving the port of Dairen increases

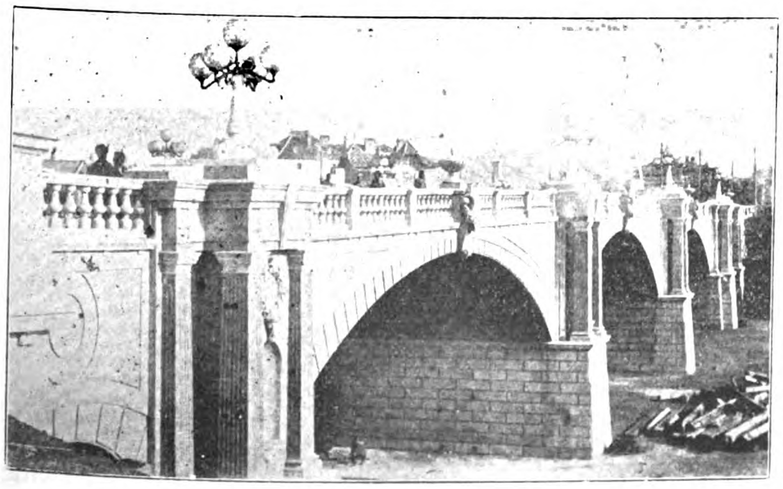


FUSHUN COAL MINES, SOUTH MANCHURIA RAILWAY



SOUTH MANCHURIA RAILWAY—AMERICAN LOCOMOTIVE

LIOYANG STATION



NIPPON BRIDGE, DAIREN

JAPANESE LABORATORY AT DAIREN

year by year, and during the winter season especially the pressure in the port is enormous, making it utterly impossible for manual labour (the only labour up till now used in the p rt) to satisfactorily cope with the traffic. With a view to obviate this difficulty, the introduction of grain-elevators is now under consideration. Moreover, attention is also being paid to the introduction of especial loading devices for coal cargoes.

The following are the financial results of the harbour administration since coming under the direct management of the Company:—

Working year.	Term.	Number of ships arrived at wharf.	Tonnage of goods loaded and discharged (American Tons).	Receipts in yen.	Expenditure in yen.
1907	2nd Half	633	417,315	425,644	496,526
1908	1st Half	659	340,737	319,795	328,2[illegible]6
	2nd Half	738	729,393	701,083	518,470
1909	1st Half	673	610,171	637,166	533,590
	2nd Half	703	756,428	743,565	599,702
1910	1st Half	772	604,161	474,080	417,796

On April 1, 1910, the Company was granted a concession by the Government authorizing it to make use of the port of Port Arthur to erect there a pier for the loading of coal, and to dredge part of the port. Th. completion of these works will constitute an important step towards the expansion of the coal export trade.

Coal Mines.—The Fushun Colliery is situated about 22 miles east of Mukden as the crow flies. The coal field, running for about 12 miles parallel with the river Hun, shows an average gradient of about 30 degrees in the direction of the river. The coal deposits are from 80 to 175 feet in thickness, an average of about 130 feet, and contain at least 800 million tons. At the time of the acquisition of the Colliery by the Company, the mining arrangements were of a temporary nature, with a daily output of 360 tons, which was all expended to meet the military requirements only. In consequence, however, of the extensive introduction of machinery and other improvements, the total daily output of the seven pits now in operation has been increased to 3,000 tons.

Work has also been taken in hand to sink a pair of shafts about 1,100 feet deep in Chienchinchai and Yangpaipu, of which one is to have an open diameter of 18 feet and the other of 21 feet. The shaft in Chienchinchai has been named Oyama Pit, and the one in Yangpaipu Togo Pit. At the first pit, on which the work of sinking was commenced in November, 1907, the coal bed was reached on December 1, 1909, at a depth of 1,160 feet, whilst at the latter pit sinking operations were started on November 19, 1908, and the coal seam was reached at a depth of 1,102 feet. When Oyama and Togo Pits are completed the daily output is expected to reach 2,500 tons per day from each pit.

The following figures show the total output mined during the several business periods:—

Working year.	Term.	Tons (English)
1907	1st Half	94 893
	2nd Half	138,432
1908	1st Half	204,529
	2nd Half	386,191
1909	1st Half	335,467
	2nd Half	370,575
1910	1st Half	415,047

Besides mining operations at Fushun, the building of the new Japanese town of Chienchinchai, electricity, gas, and water works, school and hospital, etc., call for special notice. The construction of the new town is making satisfactory headway. The electricity works commenced the supply for lighting and industrial power in December 1908, and the consumption reached 957,451 kilowatts in the first half of year 1910. The distribution of gas and water has also been commenced, and nearly five million cubic feet of gas have already been supplied. The school has now an attendance of 1,380 children, whilst the hospital during the first half-year of 1910 gave treatment to 8,975 cases. It has also been decided to establish a technical school in Fushun, which is to be opened in April, 1911.

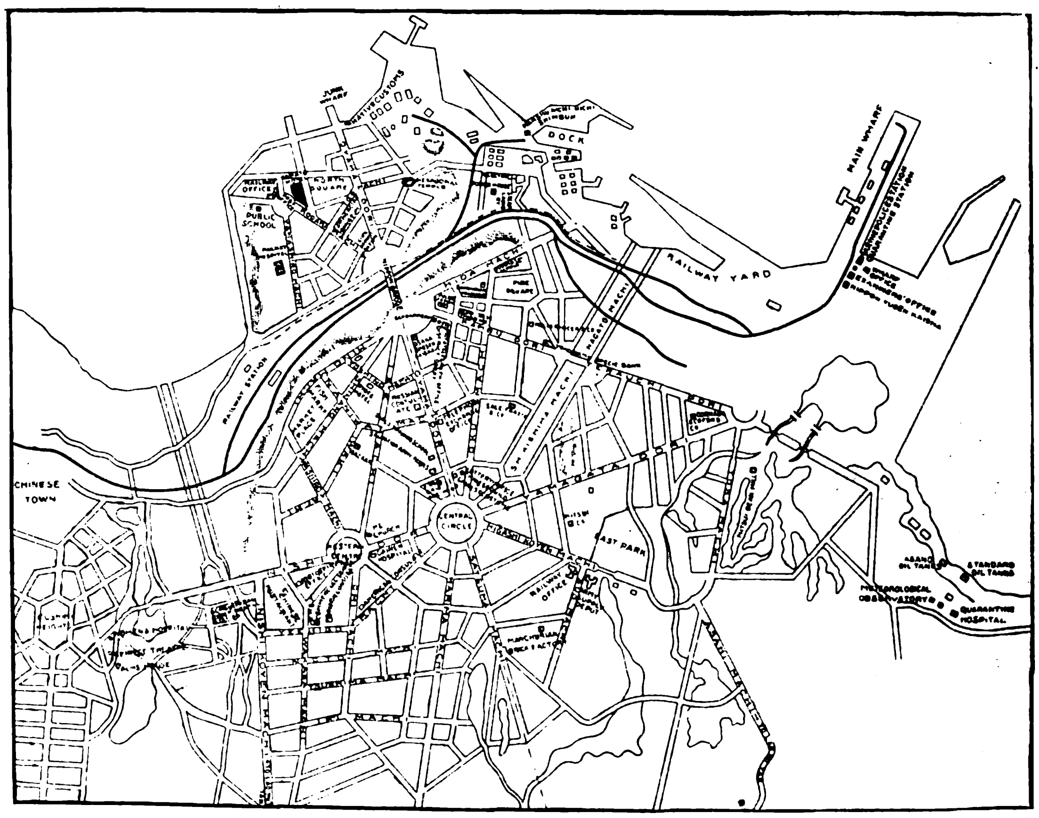
The demand for coal in Manchuria shows an increasing tendency. As a result of the efforts made by the Company to promote the introduction and adoption of the use of coal in bean mills and other factories, the total sale of coal during the first half of the working year 1910 amounted to 111,123 tons, whilst the total exported to Shanghai, Canton, Hongkong, Singapore, Tientsin, Hankow, Chefoo, Harbin, Korea (Chosen), and other parts of the world amounted to 182,601 tons. A first trial shipment of coal to Shanghai, made in the second half-year of 1907, met with such success that the Company has since extended the experiment to other places. Since April 27, 1910, the steamer "Buyo Maru" (1,813 net registered tons) has been chartered for the transport of coal chiefly to Hongkong, and another steamer, the "Omuro Maru" (1779 net registered tons) for the transport chiefly to Canton.

The following figures show the various quantities sold, and the business results of the mining operations:—

Working year.	Term.	Sale of coal in tons.	Mining: Receipts in yen.	Mining: Outlay in yen
1907	1st Half....	76,949	647,066	848,251
	2nd Half....	125,871	887,184	682,968
1908	1st Half....	211,808	1,322,508	816 144
	2nd Half....	231,705	1,390,119	869,189
1909	1st Half ...	844,457	1,983,227	1,366,672
	2nd Half....	869,593	2,042,538	1,440,098
1910	1st Half....	419,248	2,217,807	1,593,570

Electricity.—The Russians had made but a small and crude beginning towards furnishing the city of Dairen with the uses and advantages of electricity. When taken over by the company from the Japanese Government, the plant was merely an imperfect means of telegraphic and telephonic communication; but thanks to the zealous efforts made by the company's management a supply of power for lighting and industrial purposes was commenced as early as October, 1907; and as the demand soon exceeded the supply, it was decided to increase the power to 3,000 kilowatts. The work of extension was put in hand in the second half of 1908, and two motor engines with accessory plants of a productive power of 1,000 kilowatts were shortly afterwards put in operation.

The company also resolved upon the construction of electric tramways through the streets of Dairen to an aggregate length of 13 miles, the larger portion of which has been completed and is in use. The tram fares are uniform for the city lines, and are priced on the time limit basis. The cars are divided into first-class and second-class compartments, and the fares are 5 sen (1¼d.) for half-an-hour and 6 sen (1½d.) for an hour for first-class passengers, and a sen (or



MAP OF DAIREN (DALNY)

farthing) cheaper for second-class passengers. The tickets are punched at the time limit by reference to a clock in the car, and are available for any number of rides on any line within the half-hour or hour as the case may be. The erection by the Company of large railway workshops at Shahokou and of a sea-side hotel at Hoshigaura (Star Beach), one of the finest seaside resorts in North China, rendered it necessary to lay a suburban line, which connects with the city lines. The running on the suburban line was commenced on January 1, 1911, the single fare for the whole route being 2½ d. and 2 d. for first and second classes respectively.

Furthermore, as an accessory to the electrical enterprises, an electric park was laid out and opened for public amusement on September 25, 1909. Though the park management was at first undertaken by a private resident, it is now controlled by the Company itself.

The following table shows the growth of the electricity undertakings in Dairen, Mukden, and Changchun:—

Working year.	Term	Dairen: Aggregate quantity produced in kilowatts.	Dairen: Receipts in yen.	Dairen: Outlay in yen.	Mukden: Aggregate quantity produced in kilowatts.	Mukden: Receipts in yen.	Mukden: Outlay in yen.	Changchun: Aggregate quantity produced in kilowatts.	Changchun: Receipts in yen.	Changchun: Outlay in yen.
1907	1st Half......	297,965	5,674	39,307	—	—	—	—	—	—
	2nd Half......	627,549	59,247	61,930	—	—	—	—	—	—
1908	1st Half.....	735,581	90,905	73,186	61,678	5,825	8,149	—	—	—
	2nd Half......	1,060,333	114,553	106,584	150,258	14,119	16,137	—	—	—
1909	1st Half......	1,105,229	140,124	124,358	131,506	16,175	15,812	—	—	—
	2nd Half......	2,204.639	197,058	213,292	186,045	15,081	15,350	58,305	2,715	5,845
1910	1st Half......	2,541,135	283,656	207,821	157,859	14,964	15,752	220,311	21,542	18,679

Gas.—In order to meet the demand for gas for lighting, heating, and industrial purposes, the Company decided to establish gas works in Dairen with a productive power of 280,000 cubic feet. The installation, including all building construction and laying of pipes, has almost entirely been completed, and gas has been supplied since March, 1910, the total amount produced during the first half of that year being 7,176,400 cubic feet. The coal consumed in the production of the same was 625 English tons. In addition, 434 tons of coke, 8,786 gallons of tar, and 2,251 lbs. of sulphate of ammonia were produced as subsidiaries, thus averaging 10,483 cubic feet of gas, 14 cwt. of coke, and 14 gallons of tar per ton of coal.

MR. Z. NAKAMURA, PRESIDENT OF THE SOUTH MANCHURIA RAILWAY COMPANY.

Hotels.—The Yamato Hotel in Dairen was opened by the Company on August 1, 1908, after having been in course of preparation since the preceding April. But as a result of the largely increased tourist traffic, consequent upon the opening of the Company's steamer service between Dairen and Shanghai and the growing popularity of the Trans-Siberian route as the quickest journey between the Far East and Europe, the original hotel establishment was quickly found to be unable to meet the requirements. In order to obviate this difficulty, it was decided to begin at once with the construction of a new e tablishment on a large scale. The new hotel, in process of erection with other palatial public buildings around the Central Circle of the city, will, it is said, be one of the finest hotels in the Far East.

On March 21, 1908, the Yamato Hotel in Port Arthur was opened.

In 1907 the construction of a new hotel in Changchun was taken in hand, and at the same time the club-house belonging to the Company was converted into a temporary hotel to make up for the deficiency for the time being. This provisional hotel was thrown open on October 1, 1908. The new hotel was opened on February 1, 1910, on which day it give hospitality to the Imperial Chinese Prince Tsai Hsun (just returning from a tour in Europe) as its first guest.

The new hotel in Mukden, which forms part of the railway station, was opened on October 1. 1910.

The following figures represent the number of daily guests accommodated by the various Yamato Hotels (visitors who stayed more than one day being counted for as many days as they stayed):—

Working year.	Term.	Dairen.	Port Arthur.	Changchun.
1907	1st Half	338	—	—
	2nd Half	1,136	40	—
1908	1st Half	1,542	791	—
	2nd Half	2,014	505	1,144
1909	1st Half	3,337	886	877
	2nd Half	3,321	497	1,589
1910	1st Half	3,573	702	1,767

With a view to providing seaside resorts for residents and visitors during summer, it was decided by the Company to establish a pleasantly situated and well equippel hotel, on a point of the sea shore about 5 miles to the south-west of Dairen called Ho higaura (Star Beach), noted for its charming scenery and invigorating climate. In addition, t ere has been built a number of bungalows and villas, in both Japanese and European styles, which are let furnished at moderate rent. These accommodations were opened for use on August 8, 1910; and bathing, boating and sporting facilities have also been generally introduced.

This favourite resort can be reached in about 45 minutes by a direct tram car service operated from Dairen at intervals of about half an hour. Other arrangements to make the place attractive are now in rapid progress.

The Management of the Railway Area.—By virtue of the powers delegated to the Company by the Japanese Government to collect rates and fees from the residents in the railway area, as contribut ons toward the cost of management of the district, the

Company has published an agreement concerning residence in the Railway Area and regulations concerning the rates and fees. According to these regulations, the outlay for buildings and improvements of public utility within the railway area is borne by the Company, whilst the current expenses in connection therewith are paid out of the rates and fees from the residents, the Company making good any deficit.

The following figures show the amounts the Company has defrayed for the management of the Railway Area:—

Working year.	Term.	Deficit in yen.
1907	2nd Half..................	885
1908	1st Half..................	18,577
	2nd Half..................	21,982
1909	1st Half..................	36,818
	2nd Half..................	47,453
1910	1st Half........	74,247

The Company's land management comprises the following branches:—

1.—Building and Management of Railway Towns.—The population and housing in the railway area is steadily on the increase. At the end of 1907 there were 8,647 houses and 29,524 residents, while at the end of 1910 there were 14,162 houses and 57,632 residents. Plans of building on up-to-date lines of town-planning have been prepared for the following fifteen places, viz., Wafangtien, Hsiungyuehcheng, Kaiping, Tashihchiao, Haicheng, Liaoyang, Mukden, Tiehling, Kaiyuan, Changtu, Shuangmiaotzu, Szupingchieh, Kungchuling, Fanchiatun and Changchun. In the following places the works taken in hand for the construction of roads and drains have already been completed to allow of their utilization in part, viz., Wafangtien, Tashihchiao, Liaoyang, Mukden, Tiehling, Kaiyuan, Szupingchieh, Kungchuling, and Changchun. Waterworks have been constructed at Wafangtien, Liaoyang, Tiehling, and Kungchuling on a scale sufficient to meet the present requirements. Plans for the construction of waterworks on a larger scale in Mukden and Changchun are still in course of preparation. Parks have been created in Dairen, Wafangtien, Tashihchiao, and Changchun; and agricultural experimental stations established in Dairen, where plants, flowers, and vegetables of various kinds are cultivated. Markets have been established in Liaoyang, Kungchuling, and Changchun; and in Kungchuling there is a slaughter-house under the management of the Company. Cemeteries and crematoriums have been established in Wafangtien, Hsiungyuehcheng, Tashihchiao, Liaoyang, Mukden, Tiehling, Kungchuling, and Changchun. The sanitary and fire-extinguishing arrangements also form part of this department.

2.—The Lease of the Land and Buildings within the Railway Area.—The total area of the land belonging to the Railway amounts to 55,638,000 tsubo (or about 46,000 acres), and all this land, together with the house property erected thereon, is offered by the Company on lease, with the exception of that occupied by the military and civil departments of the Kwantung Government. The rent per tsubo for building land is from 5 rin to 10 sen per month, while the rent per tsubo for agricultural purposes is from 1 rin to 3 sen per month (or at the rate of from £1 10s. od. to £45 per acre per annum). The amount of rent is fixed according to the situation and surroundings.

The following is the proportion of the Railway Area already rented:—

Working year.	Term.	Area.	Rent.
1907	1st Half...	7,420,000 tsubo (including 51,000 tsubo of building land).	24,205 yen
1910	1st Half...	15,317,490 tsubo (including 414,986 tsubo of building land).	66,000 yen

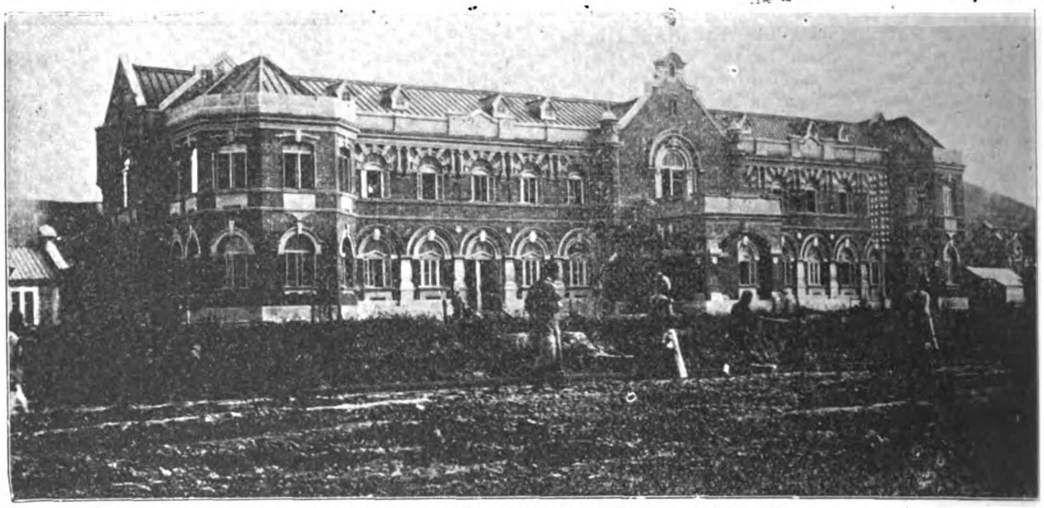
The buildings rented were as follows:—

Working year.	Term.	Number.	Rent.
1907	1st Half...........	391 (embracing 8,790 tsubo of building land).	6,185 yen
1910	1st Half......... ..	445 (embracing 9,776 tsubo of building land).	11,720 yen

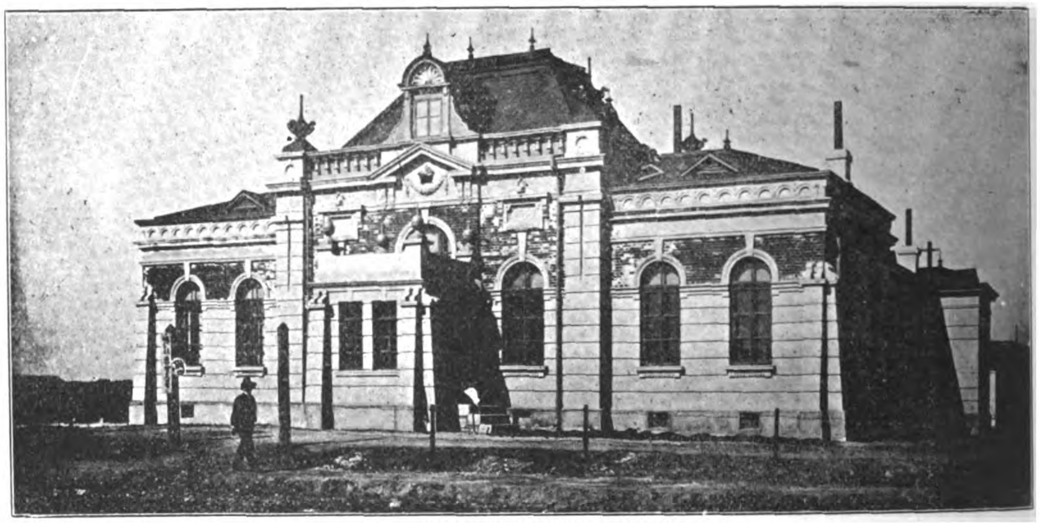
The above figures show the steady development of the Railway Area.

NOTE—1 tsubo is about 36 square feet, 1,224 "tsubo" is qual to 1 acre; 10 rin make 1 sen; and 2 sen are equivalent to 1 cent in American money and 1 halfpenny in English money.

3.—Hospitals.—Before coming under the management of the Company there existed in Dairen a central military hospital, as well as branch hospitals or stations in Wafangtien, Tashihchiao, Liaoyang, Mukden, Tiehling, Kungchuling, Chienchinchai, Tsaohokou, and Antung, all of which were for military purposes. After the acquisition of the hospitals, the Company made special efforts to expedite the completion of the Hospital Department, with the result that there are now central hospitals in Dairen and Chienchinchai (Fushun), with branch hospitals in Wafangtien, Tashihchiao, Liaoyang, Mukden, Tiehling, Kungchuling, and Changchun, and branch stations in Changtu, Chiaotou, Penchihu, Tsaohokou, Chikuanshan, and Antung, and medical stations in Hsiungyuehcheng, Kaiyuan, Szupingchieh, Haicheng, Shihchiaotzu, and Yentai. The treatment in these institutions is not confined to the officer and employees of the Company, but is extended alike to all the residents. Above all, the hospital in Dairen has been made a central institute, comprising the following 9 departments, viz., Interclinique, Surgery, Rhino-laryngo-otology, Dentistry, Dermatology, Ginecology and Tocology, Ophthalmology, Kinderclinique and Bacteriology. The hospital has beds for about 150 patients which are almost always occupied, besides a daily consultation attendance of about 700 persons.



GENERAL OFFICE OF THE FUSHUN COLLIERY



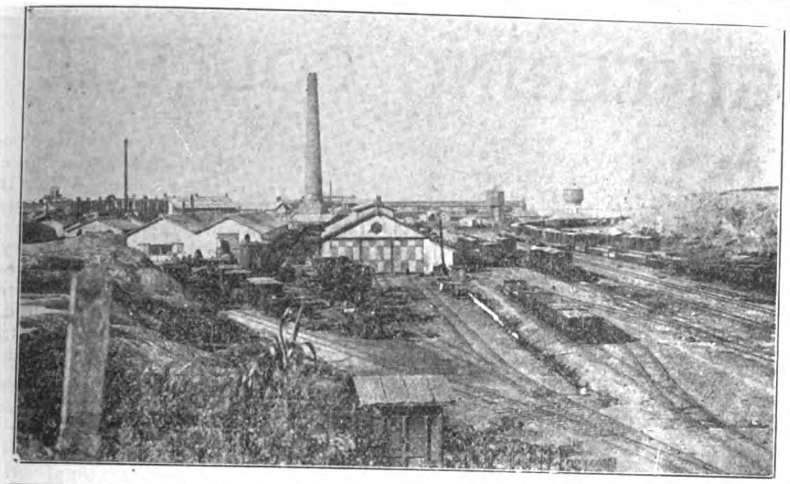
FUSHUN POLICE STATION

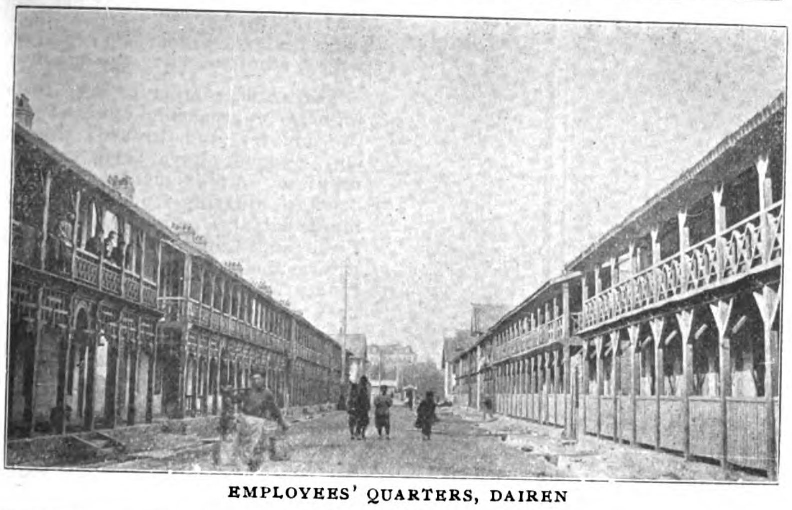
The number of patients and the financial results of the working of the hospitals during the several half-years may be seen from the following table:—

Working year.	Term.	In-door patients.	Out-door Patients.	Receipts in yen.	Outlay in yen.
1907	1st Half	10,526	117,852	2,880	66,469
	2nd Half	20,878	112,985	38,472	119,003
1908	1st Half	42,561	200,822	73,227	126,899
	2nd Half	44,785	167,795	72,291	123 850
1909	1st Half	58,428	253,456	94,690	145,154
	2nd Half	59,878	213,560	89,577	183,072
1910	1st Half	79,680	352,351	123,992	233,047

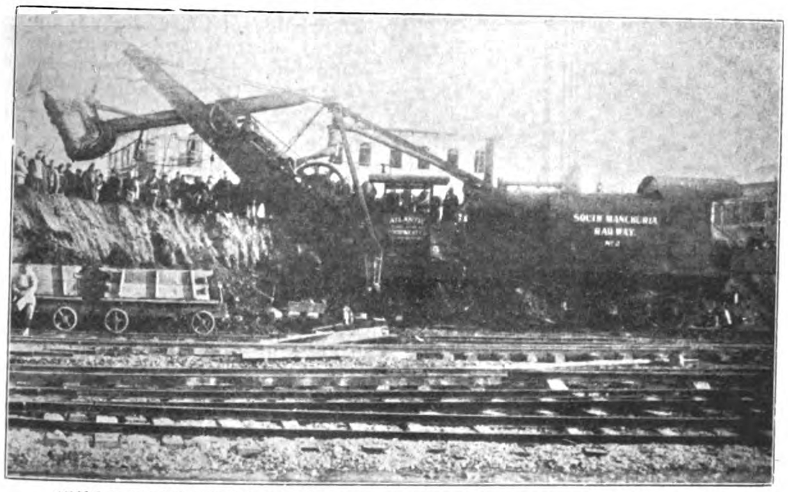
NOTE.—The above table does not include the figures of the Fushun Colliery Hospital.

4.—Education.—The Company has established primary schools at Wafangtien, Tashihchiao, Liaoyang, Mukden, Changtu, Kungchuling, Changchun, and Fushun, and branch schools at Szupingchieh, Haicheng, Chiaotou, Penchihu, and Chikuanshan, Hsiungyuehcheng, and Tsaohokou. There are no schools established by the Company up to the present time at Tiehling, Antung, and Yingkou, but the children in these places are, by special arrangement, attending Japanese schools outside the railway area. In July, 1909, a public school for Chinese children was established at Kaiping, and special classes for the education of Chinese children have recently been attached to the schools at Liaoyang and Hsiungyuehcheng. At most of the above schools continuation classes for technical and industrial education has been instituted. Dormitories





EMPLOYEES' QUARTERS, DAIREN



SOUTH MANCHURIA RAILWAY—AMERICAN EXCAVATOR AT WORK

have also been added at many of these places. Libraries, playgrounds, and other facilities that are calculated to promote general education have been introduced at several places along the railway line.

The following figures show the increase of school children in the railway area:—

Period.	Number attending School.
At the end of 1907	256
,, March, 1909	919
,, March, 1910	970
,, September, 1910	1,380

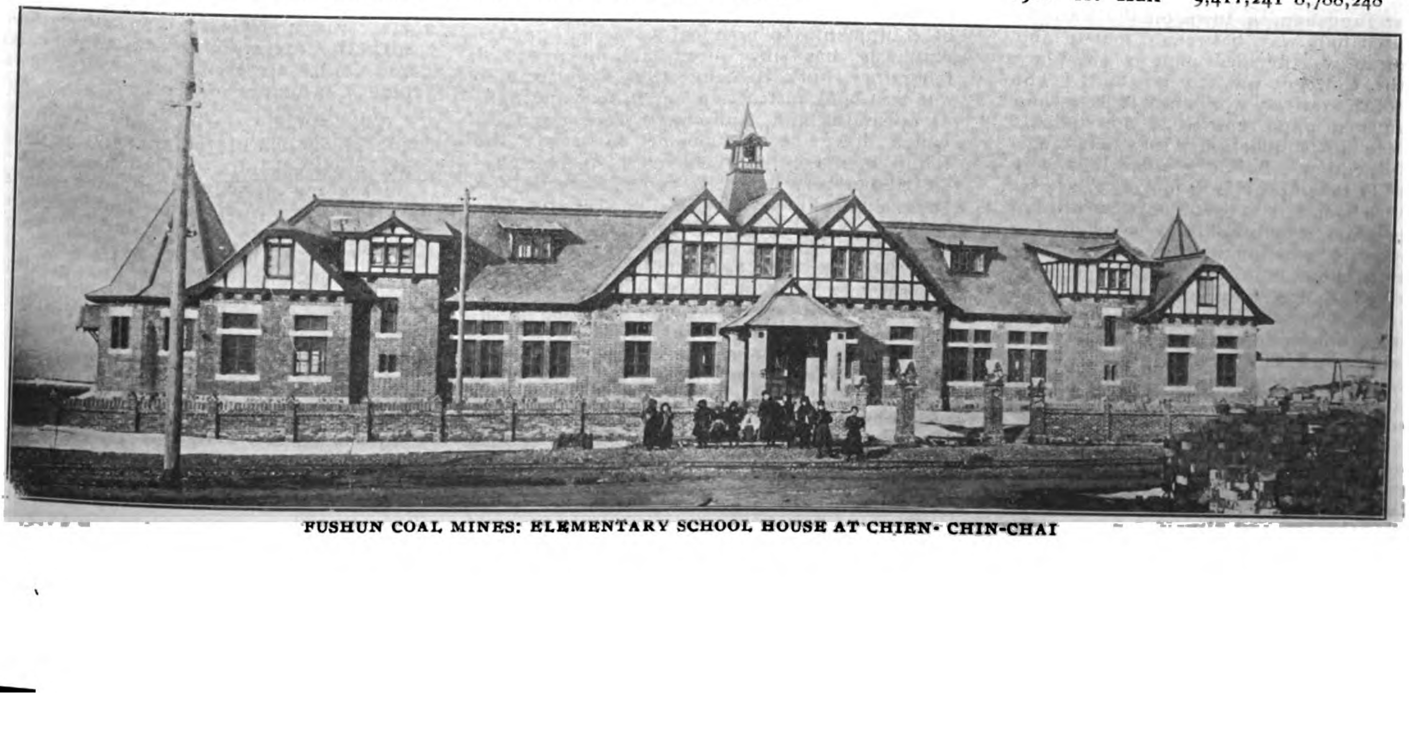
Experimental Laboratories.—There are two laboratories under the management of the Company: the Central Laboratory and the Geological Laboratory. The Central Laboratory was formerly under the control of the Kwantung Government, and was taken over by the Company on May 1, 1910. It is intended principally to conduct industrial and sanitary experiments and investigations. The Geological Laboratory originally belonged to the Mining Department of the Company, but was created into an independent institution under the control of the Company on May 1, 1910. This laboratory has charge of the geological investigations in the whole of Manchuria.

Financial Statistics.—The following gives the Company's capital expenditure up to September 30, 1910:—

Railway	46,970,237
Electricity	3,390,707
Gas	705,160
Harbour and Wharves	5,320,238
Mines	6,830,286
Hotels	804,309
Land Improvements	5,696,675
Buildings	8,564,698
Total	78,282,310

The following is the Company's aggregate receipts and expenditure in yen for the working half years up to September 30, 1910.

Working year.	Term.	Receipts.	Expenditure.	Net Profit.
1907	1st Half	5,002.459	4,073,863	928,496
	2nd Half	7,540,657	6,452,668	1,087,989
1908	1st Half	6,959,342	6,187,549	771,793
	2nd Half	10,656,340	9,314,553	1,341,787
1909	1st Half	9,892,575	8,206,709	1,685,866
	2nd Half	13,221,358	9,135,525	4,085,833
1910	1st Half	9,411,241	8,788,248	632,993



FUSHUN COAL MINES: ELEMENTARY SCHOOL HOUSE AT CHIEN-CHIN-CHAI

TANGSHAN ENGINEERING COLLEGE

The College, Tangshan Engineering College, was established by the Imperial Chinese Railways in 1905. In May of that year instructions were received by the Directors of the Railways from Their Excellencies Yuan Shih-kai and Hu Yen-mei, Directors-General of Imperial Chinese Railways, to draw up plans for an engineering college to be established at some point along the railway line where Chinese engineers were to be trained for

DR. S. S. YOUNG, A. B., A. M., PRESIDENT OF THE TANGSHAN ENGINEERING COLLEGE.

service in the Railways. In August of the same year Tangshan, a town on the Railway line situated half way between Tientsin and Shanhaikwan, was decided upon as the place where the College was to be built. The presence of the railway workshops in Tangshan offered unusual opportunities to the students for practice in connection with their engineering education. Building operations were begun in October providing dormitories for one hundred and sixty students, a dining hall, two class room buildings, a swimming bath, and residences for the president and the professors. These buildings were completed and ready for the reception of students in August, 1906. For the first class students with a working knowledge of English, elementary mathematics, and Chinese literature, history and geography were examined in Hongkong, Shanghai and Tientsin in December and 120 were chosen. Regular class work, however, did not begin until March, 1907, when the students were divided in two sections of sixty members each.

The two class room buildings originally provided soon proved insufficient for the accommodation of the several departments, and a larger lecture hall containing drawing offices, laboratories and lecture theaters was further added. This building, now known as East Hall, was begun in May, 1907, and was ready for occupation at the end of the year. At the same time a hospital for the special care of sick students was built on a lot adjoining the college compound. Beside the hospital was also built a house for the medical officer.

During the first two years of the College's existence, the classes were handicapped by lack of equipment for practical work, but greater emphasis has since been laid on practical laboratory work in connection with lectures and text-book instruction, and in 1909 additional apparatus and equipment were acquired, which have been sufficient to satisfy the requirements of the present classes. The physical laboratory has been extended as well as the chemical laboratory, and new quarters are being provided for the latter in the new west hall, which is now in course of construction and which will be ready for occupation after the summer holidays. To provide the advanced classes with more room for practical work, a large workshop and engineering laboratories building is also being constructed and will be fully equipped by the time the students return to their classes in the fall. In this building a mechanical laboratory, a hydraulics laboratory, workshops, calorimetry room, power house boiler house, electrical engineering laboratory, photometric room and heat laboratory have been provided.

The original plan of the Directors-General of Imperial Chinese Railways was to train Chinese engineers for railway construction work only, and a course in civil engineering was offered in the college. When the Imperial Chinese Railways became the Imperial Railways of North China and came under the control of the Imperial Ministry of Posts and Communications, the College also came under direct control of the Ministry, and this year courses in Mechanical and Electrical Engineering are being added to train men in these branches of engineering as well.

In order to secure for the College Department students thoroughly grounded in the fundamental subjects, a preparatory department has been added to the college, offering a three year course. Accommodations for 150 students have been provided for this department in a new dormitory, and new students will be admitted after the summer vacation.

The college aims to offer to students the highest engineering education obtainable in the country and towards this end no pains and expense have been spared in making necessary improvements and extensions. Students graduating from the collegiate department will be employed by the Ministry of Posts and Communications and drafted into the various Government railways to serve as cadets for a term of two or three years before they are given definite appointments on the engineering staff. The first railway engineering class will graduate in July, 1911.

Entrance Requirements.—Candidates for admission to the first year of the preparatory department must have attained to the age of thirteen years. They must submit to examinations in English showing a study of the language for at least three years, and in arithmetic in English, and must show a fair knowledge of the Chinese language and literature, history and geography. Successful candidates must also pass a physical examination before they are admitted to the college.

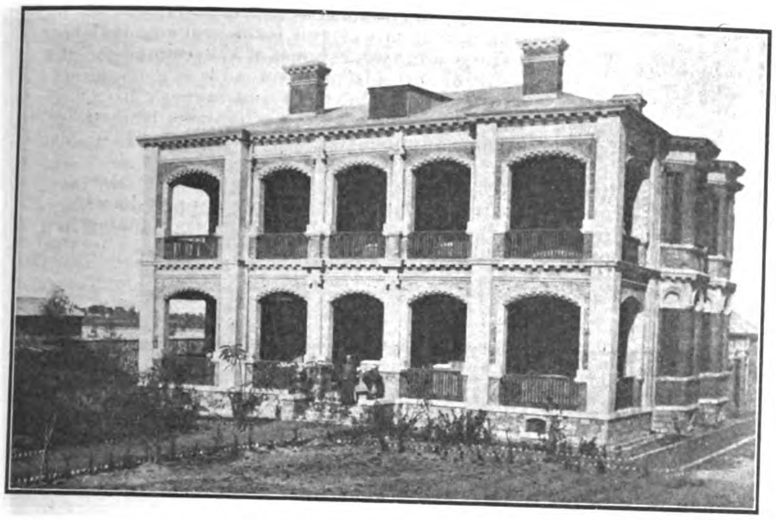
To be admitted as regular students in the freshman class the candidates must have attained to the age of sixteen years, must have passed a medical examination and examinations in the following subjects:

Elementary Algebra through quadratic equations; *plane and solid geometry:* the ordinary definitions, demonstrations and constructions; *elementary physics:* a knowledge of the fundamental principles of physics; *elementary chemistry:* a knowledge of the chemistry of the drafting instruments; *Mechanical drawing:* a knowledge of the use of drafting instruments; *English composition and conversation:* proficiency in grammar, ability to speak, read, write and translate English correctly; *history and geography:* the candidate should show a general knowledge of world history and of the geography of the world; *Chinese literature:* familiarity with the literature in the Chinese language and ability to write an essay of average length in correct style.

The students who have completed the course offered in the preparatory department are admitted into the freshman class without undergoing the regular entrance examinations.

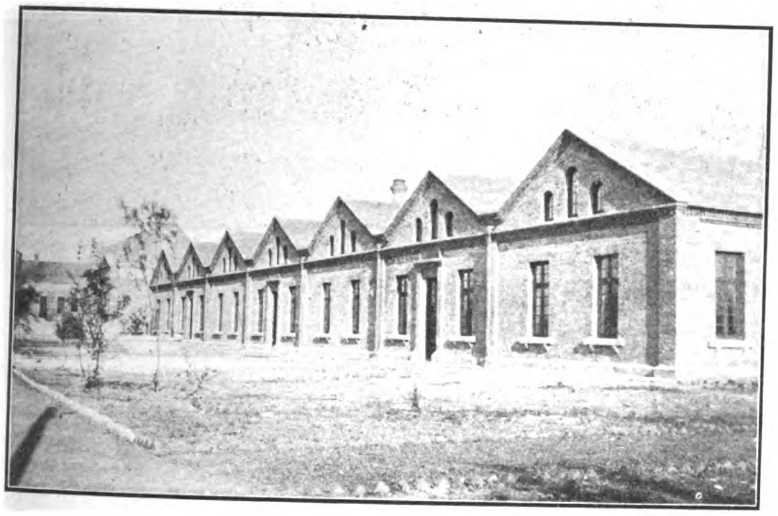
Advanced Standing.—Candidates may be admitted to advanced standing in any class by showing that they have completed all the subjects required in the previous year or years of the preparatory or collegiate course which they desire to enter. Candidates for advanced standing may enter the regular final examinations in June of the class which they wish to join.

Time and place of examinations.—This year entrance examinations will be held during the summer vacation in July or August in Canton or HongKong, Shanghai, and Tientsin, at such time and in such places as will be announced in the local newspapers when the time approaches for the examinations.

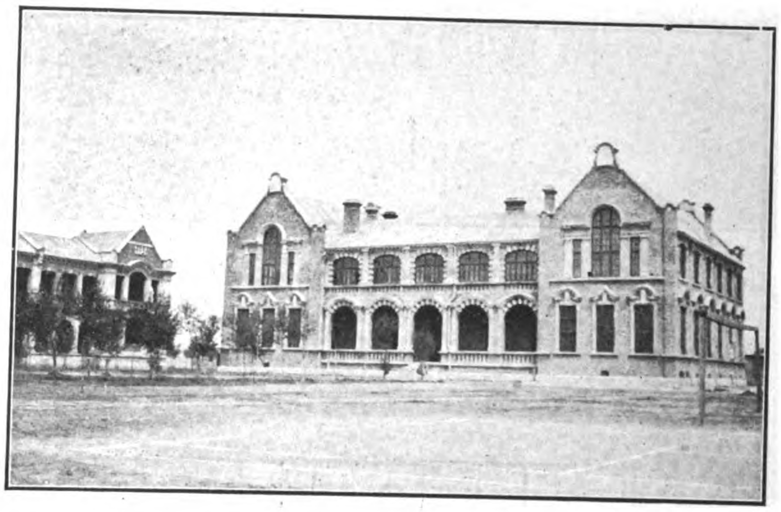


THE PRESIDENT'S HOUSE

ONE OF THE RESIDENCES OF THE PROFESSORS



ENGINEERING LABORATORIES AND WORKSHOPS CONTAINING MECHANICAL AND HYDRAULIC LABORATORIES, WOOD AND METAL WORKSHOPS, POWER HOUSE, HEAT ENGINE LABORATORY, ELECTRICAL TESTING LABORATORY AND BOILER HOUSE AND BATTERY ROOM



EAST HALL, THE UPPER FLOOR OF WHICH IS OCCUPIED BY SPACIOUS DRAWING OFFICES.—THE ROOMS OF THE LOWER FLOOR ARE USED AS GENERAL LECTURE ROOMS

Plans of Instruction.—In all engineering colleges difficulties arise in justly proportioning the theoretical and practical parts of the tuition. It must at the outset be realized that the practical work done in a college is in no sense to be regarded as replacing that which executed by a pupil in works or offices. It is only introductory thereto, and enables the student on leaving the college to appreciate the details of his practical work so that he finally becomes efficient in this much sooner than he would without such preparation. There will therefore be found in the curriculum certain periods alloted to workshop practice, drawing office work, and field work of amount sufficient to thoroughly exemplify the theoretical training but not adequate in either time or subject to fully qualify the student who completes the course to independently undertake any piece of work. The environment of works and offices is quite different from that of a college and the trained student must become acquainted with the values and proportions of things in actual practice before he can be considered a real engineer.

With regard to the theoretical courses, engineering must be regarded as the application of physical science. Physical science depends on two things: (1) mathematics and (2) experiment. The mathematical training proceeds continuously from the first year of the preparatory course up to the sophomore year, after which it does not appear as a separate subject, but is specialized in the various technical subjects. It is not so essential that an engineer shall be a first class mathematician as that he shall have a sound knowledge of the principles and applications of mathematics to simple problems, including those which involve continuous change in time and space.

Experimental science is gradually developed from the very beginning of the courses. Chemistry, physics, and geology are studied in lecture room and laboratory up to the Junior year when they give way to their applications of engineering practice.

The technical work is gradually introduced, displacing one by one the mathematical and purely scientific subjects upon which it wholly depends and is after the Sophomore year specialized in three directions according to the type of engineering training required by the student. The three types are: (1) civil, (2) mechanical and (3) electrical. It is not possible to rigidly separate the types and in many subjects the lectures, laboratories and drawing office work overlap and are common to two of the types, but wherever there are distinct subjects to be studied special courses of lectures are arranged.

In the last year of the student's course he is required to write a thesis, i.e., a special study of or attempt to solve a certain engineering problem. The exact nature of the work to be done will be decided by the respective professors, some choice, however, being allowed to the student. The execution of this thesis will as far as possible involve the application of all the theoretical and practical knowledge the students acquired.

In connection with all the subjects of the courses it should be particularly observed that the subjects are only separated for convenience, and are in actual fact all dependent on each other, forming an organic whole and not a number of rigidly distinct parts.

Accommodations.—The buildings of the College may be divided into two classes: (1) educational and (2) residential. The educational buildings are: The east hall, the west hall, the central lecture rooms and the engineering laboratory building.

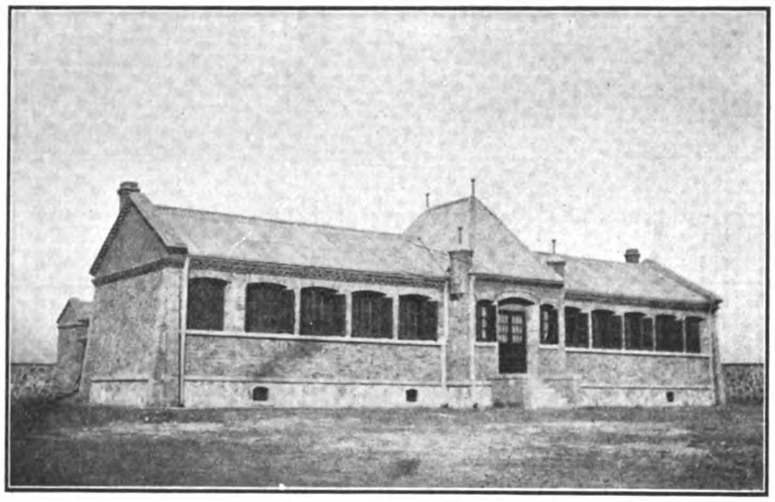
East Hall is a two-storied building, 130′ by 60′, running north and south and facing to the west. It was erected in 1907 and includes on the ground floor three lecture rooms and physical laboratory. This floor is occupied by the physical and mathematical departments and there are three offices for professors and instructors. There is also a room for the storing of Physical apparatus adjoining the Physical laboratory. On the first floor there are two large drawing offices and a lecture theater. This floor is occupied by the mechanical engineering department and contains an office for the professor. There is also a dark room for photoprinting and another similar room on the mezzanine floor.

West Hall is a two storied building, 129′ 6 by 76′ 0″, symmetrically placed with and facing the East Hall. It was erected in the spring of 1910, and includes on the ground floor four large lecture theaters, a store room for surveying instruments and two offices. This floor is partly occupied by the civil engineering department. The upper floor includes two chemical laboratories, a geological laboratory and lecture room, two lecture rooms, a chemical store room, a balance room and office for the professor of chemistry and geology.

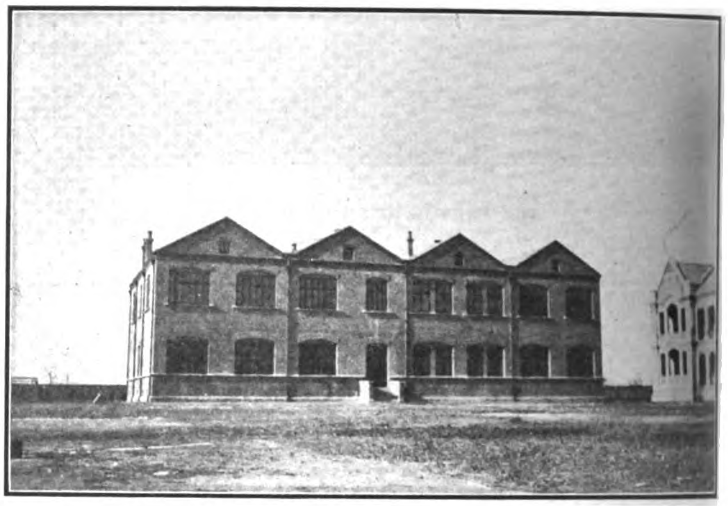
The central lecture rooms are two single storied buildings, each containing two lecture rooms. These buildings are now being occupied by the preparatory department.

The engineering laboratory building is a long single storied building about 220′ by 70′ running east and west. It is divided by cross walls into seven bays. Commencing from the east end the first bay includes electrical engineering laboratory. South of this bay is a coal store and boiler house which latter is continued across the end of the second bay. The second bay is subdivided into three parts, viz., engine room, photometric room, and electrical instruments testing room. The third, fourth and fifth bays communicate by arched openings and form heat engines laboratory and workshops, with sections for the storing of instruments and a room for calorimetry. The sixth and seventh bays form the hydraulics and mechanical laboratories. The equipment of these laboratories is described below.

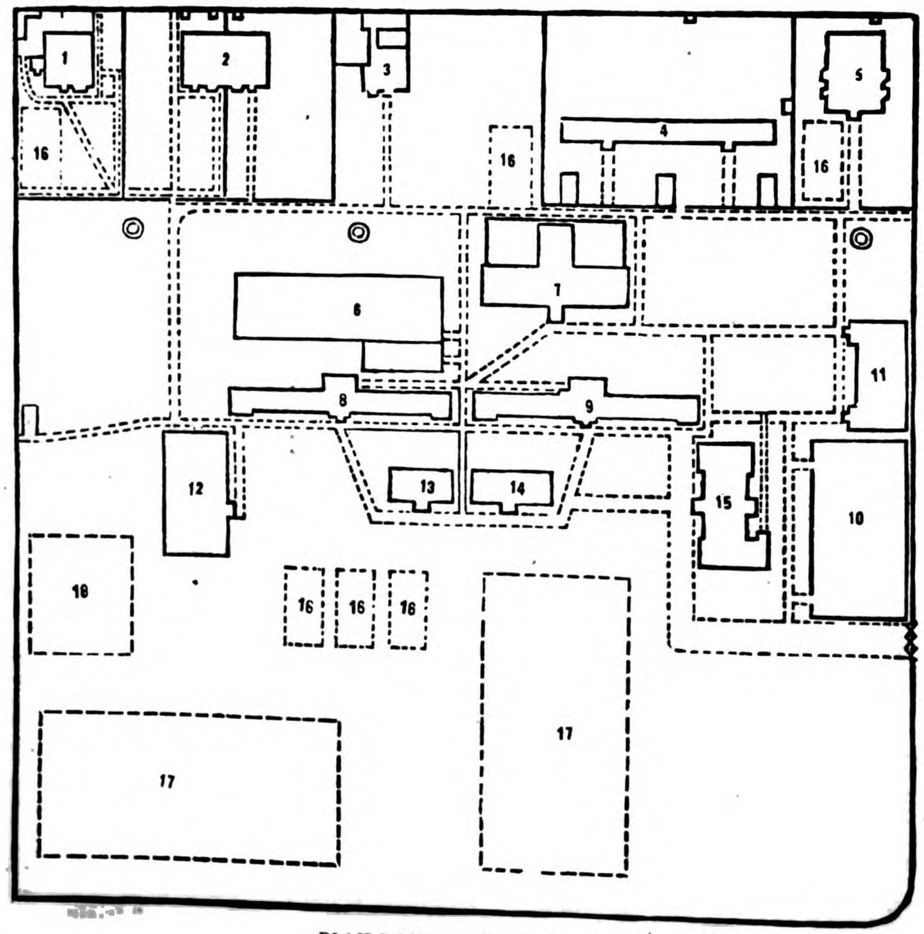
The residential buildings are: (1) east dormitory, (2) west dormitory, (3) new dormitory, (4) hospital and dispensary, (5) dining hall and library, officers' residences.



THE COLLEGE HOSPITAL CONTAINING FOUR WARDS, A DISPENSARY AND DOCTORS' CONSULTING ROOM



WEST HALL HOUSING THE CIVIL ENGINEERING, PHYSICAL AND CHEMICAL DEPARTMENTS



1, 2, 3, 4 Staff Residences
5 President's House
6 Engineering Laboratory Building
7 Dining Hall
8, 9, 10 Dormitories
11 Swimming Bath
12 West Hall
13 Lecture Rooms
14 Lecture Rooms
15 East Hall
16 Tennis Courts
17 Football Fields
18 Garden

PLAN OF THE COLLEGE GROUNDS

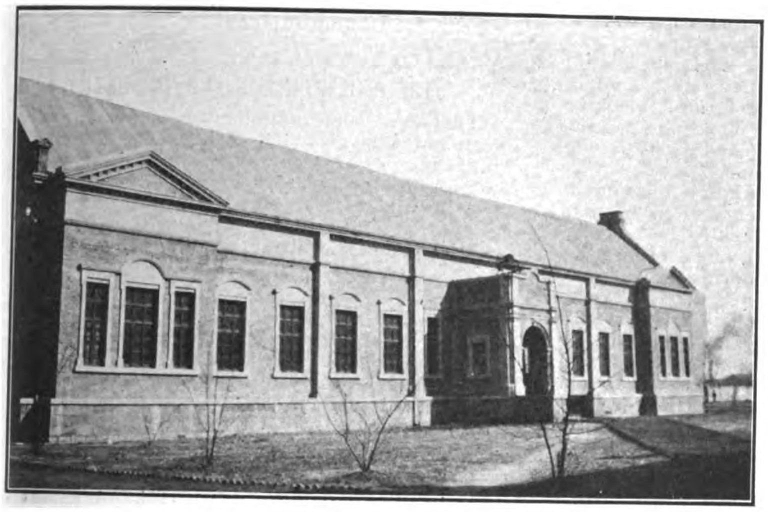
The east and west dormitories were erected in 1906 and accommodate 160 students. They are long two storied buildings facing south. Each building contains forty rooms (each for 2 students), in front of which are wide verandahs. There is an annex to each building including bath rooms and sanitary accommodations. The new dormitory near the east wall, erected in the spring of 1910, is a single storied building consisting of two rectangular enclosures surrounded with rooms. There are accommodations for 128 students in 32 rooms. Additional servants' rooms, stores, and bath rooms are provided.

The hospital is a single-storied building situated in a separate compound adjoining the college grounds, and contains four bright and airy wards, a dispensary, and operation room, a consultation room and servants' quarters. The dispensary and operating room are stocked with all the ordinary drugs and instruments.

The dining hall is a large building with fine open hammer beam roof, situated to the north of the east dormitory. It is divided into two parts, the western room containing the college library and the eastern room serving as dining hall. Kitchen and servants' quarters are attached to this part of the building.

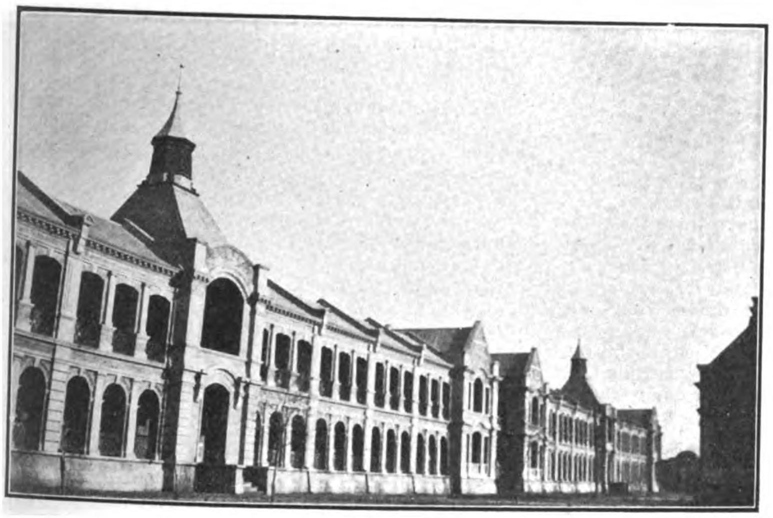
There are foreign residences situated along the north wall of the compound for the president, professors and officers of administration. The residence of the college medical officers adjoins the hospital.

The southern part of the college compound is used as an athletic field. There is an oval

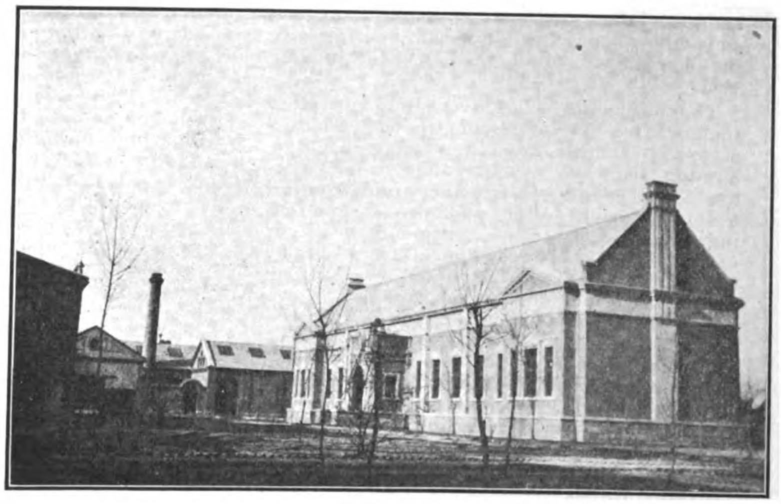


FRONT VIEW OF DINING HALL

WEST HALL AND THE LIBRARY BUILDINGS



LOOKING ALONG THE FRONTAGE OF THE DORMITORIES



THE POWER HOUSE AND DINING HALL

THE INTERIOR OF THE GENERAL READING ROOM

FACING THE LIBRARY AND THE DORMITORIES

cinder track a quarter of a mile long, enclosing a football field, tennis court, cricket pitch and spaces for jumps, vaults and weight throwing.

Equipment.—The equipment of the laboratories and workshops of the college is of as varied and extensive a character as possible. It has not so much been desired to possess large machines of impressive appearance as to obtain the greatest possible variety in the representative types. The apparatus can be briefly classified as follows: (1) east engines laboratory; (2) mechanical and hydraulic laboratory; (3) electrical laboratory; (4) engineering workshop; (5) phsyical laboratory; (6) chemical and geological laboratories; (7) demonstration apparatus for civil engineering, including surveying.

The main feature of the heat engines laboratory is the 40 H. P. generator set. This consists of a double expansion condensing Howden engine (marine double) direct coupled to Crompton four-pole D. C. dynamo. The steam for the boiler is produced in a Babcock and Wilcox water tube boiler fitted with Green's Fuel Economiser. A petrol motor pump set supplies the water for the engine room, drawing the same from a large well in the center of the north end of the college enclosure. The water is stored in a large underground tank extending between the engine room and hydraulic laboratory, which latter room is also supplied from it. The lighting of the buildings and the power for the motors attached to the various machines is obtained from the generator set mentioned above. The main switchboard is divided into three panels serving respectively the generator and battery control, lighting and power, and a small generator set. A battery of accumulators serves for the maintenance of the current during the night. The heat engines laboratory also contains indicators and other apparatus for experimenting with the machines, and on applied heat in general.

The mechanical and hydraulics laboratory includes several interesting items. There is a 30-ton Riehle automatic testing machine, a 2-ton Bailey wire and gauge tester, a 2-ton Avery bending tester, Avery impact tester, a small torsion tester, and also an oscillating torsion tester for experiments on fatigue of metals. The bench apparatus is chiefly on the Cusson's steel tripod and block system and aims principally at developing a knowledge of stress and strain, statics, friction and especially the dynamics of rolling stock and rotating bodies. In the hydraulic section there are experimental tanks, pressure pumps, hydraulic press, accumulator, centrifugal pump, Vortex turbine, Pelton wheel, and an experimental main with meters and gauges.

The electrical engineering laboratory is well provided with galvanometers of various types, resistance boxes and the usual electrical instruments as well as motors for testing and demonstration.

The engineering workshops include wood lathes, screw-cutting lathes, drilling machines, small shaping machine, and benches for metal and wood working A forge and cupola are provided in the foundry.

The physical laboratory is well provided with balances and full equipment for experiments in the properties of matter, heat, light, sound, magnetism and electricity. A spectroscope, photometric apparatus and optical bench should specially be noted. There is a special room for photometry including a pentane standard lamp in the engineering laboratory building.

The chemical laboratory is supplied with apparatus and materials for elementary experiments and volumetric and gravimetric analysis of an ordinary type. A geological laboratory including several hundred specimens of rocks, minerals and fossils is attached, and all necessary instruments are provided for their examination, including microscope, goniometer, etc.

The apparatus in the civil engineering department includes theodolites and telescopic levels, tacheometer, sextants, plane tables of different makes, sufficient to equip a railway reconnaissance party for a large survey.

Models of constructional plants for lecture purposes should also be mentioned in this connection.

Division of the college year.—The college year begins in August and consists of about forty weeks, which are divided into four quarters of nine weeks each of class-room work. The last week of each quarter is devoted to quarterly examinations.

There is a summer vacation of forty days and a New Year vacation of thirty days, besides holidays on the occasion of the dragon boat festival, the mid-autumn-festival, anniversary of the birthday of Confucius, and the winter solstice. About three weeks of the summer vacation are devoted to summer practice in railroad construction, machine work or electrical work. Whenever practicable part of the New Year vacation are also given to practical work.

Expenses.—In the preparatory department the fee for tuition is twenty four dollars per year, payable semi-annually in advance before the students are admitted to classes. The fee for board and room is twelve taels per quarter, payable quarterly in advance. Physical culture and military uniforms will be supplied by the college at cost price.

In the collegiate department students admitted from the preparatory department are exempted from the payment of tuition and board fees. Intrants from other schools pay a tuition fee of four taels, and board and room fee of four taels each month during the first quarter of their freshman year, these fees being payable for three months in advance. They are exempted from payment of tuition fee after the first quarterly examination in which they shall have attained to a general average of fifty per cent. and are further exempted from payment of board and room fee after the second quarterly examination in which they shall have passed above a general average of fifty per cent. These students then become government scholars and are furnished tuition, board and room by the government free of charge. Books. stationery, and uniforms are. however, to be supplied by the students themselves.

A deposit of five dollars per course per half year is required of all students taking courses in physics and chemistry. They are charged for breakage of apparatus and for damages, for which deductions will be made from the deposit. Those whose breakages amount to over five dollars will be charged accordingly.

Examinations.—Written examinations as well as examinations in practical courses are held at the end of each quarter. A general average of fifty per cent. and at least thirty per cent. in every subject are required for a pass mark. No student failing to attain to this standard will be promoted to a higher class. The final marks for a college year are obtained by taking the average in every subject of the marks given in the four quarterly examinations.

There are at present in the college a total number of 170 students divided into 5 classes, 4 of the collegiate department and 1 of the preparatory department. The first class of 28 students will graduate from the college this summer and after graduation will be employed by the Board of Communications on the various railways under its control.

List of Professors and Officers for 1911.—Samuel S. Young, A. B. (California), A. M. (Columbia), Ltt. D. (Imperial Chinese Government), president; James A. Cormack, B. Sc., C. E. (Glasgow University), professor of mechanical engineering; David Thomas, B. E. (Sydney University), professor of chemistry and geology; Charles J. Adderley, B. A., B. A. I. (Trinity College, Dublin); professor of physics and civil engineering; Herbert Chatley, B. Sc. (London), professor of civil engineering; Frank A. Foster, B. S. (Worcester Institute of Technology), assistant professor of mechanical engineering; Fred C. Eaton, B. S. (Cornell), acting professor of mathematics; Alfred C. B. Fletcher, B. S. (California, acting professor of English; Luther McLean Jee, B. S. (California), A. M. (Harvard), professor of economics and history; Pond Mooar Jee, B. S., M. D. (California), medical officer and director of physical culture; Ho Hou wei, B. S. (Yale), A. M. (Pennsylvania), professor of mathematics; Tang Dien-san, M. A. (Chinese), professor of Chinese literature; Ch'en Ying-chung, M. A. (Chinese), reader in Chinese composition; Su Wen-ching, assistant in drawing.

Ch'en Hung-chi, head proctor and accountant; Chang Tseng-ching, general supervisor and secretary; Li Cho-chun, proctor; Wei Shang-chi, proctor; Hsu Shu-pei, storekeeper; Chin Cheng-chu, recorder; Chang Li-hsun, clerk; Lu Chung-lin, clerk.

THE PHILIPPINE SOAP INDUSTRY

That local soap manufacture has been neglected was largely due to the fact that foreign initiative was lacking. The importation of foreign soaps offered handsome returns and the advantages of industrial adventure in this department of industry in the islands did not prove of sufficient attraction.

Since American occupation, however, the demand for better quality of soap, formerly confined to foreigners and the better class of natives, increased by leaps and bounds Importations of soaps increased yearly and especially in 1910 when the total importation was valued at ₱231,516 as against ₱136,348 in 1909

The Philippines offers the greatest natural inducements for the growth of this industry due to the availability of cocoanut oil, a most desirable ingredient, and the climate. But notwithstanding all the favorable conditions, the export of copra to Marseilles and the import of the foreign article continued until recently when the Philippine Soap Co. was organized with a capital of ₱100,000 for the purpose of developing this important industry. The officers of the company are Thomas J. Wolff, president; L. F. Goodale, vice-president; and J. Will amson, secretary-treasurer. Ramon Rius, a Spanish soap expert, has been engaged as manager.

President Wolff is also head of the Sanitary Steam Laundry Co. that has met with a large measure of success in building up a thriving business.

Manager Rius has been connected with the leading soap manufacturing concerns in Spain, France and Italy. He served his apprenticeship in Reus, Spain, studied all the different branches of manufacture in Marseilles and perfected his knowledge of the adaptation of the different oils and greases to the most economical means of producing the best returns in quality. After becoming conversant with French manufacture, he proceeded to Italy where he spent a number of years in study of Italian methods. In all Mr. Rius has had over 15 years' experience in different capacities up to the management of factories and is thoroughly conversant with the most approved modern methods of manufacture of all grades.

The new company has established itself in the building now occupied by the laundry but has arranged for a new site upon which a large reinforced concrete building is being constructed and will be occupied in a few months.

Machinery was installed early in June and the factory began operations June 15. Its capacity is 200,000 pounds a month and several units will be added as the entire increases. At the present time the new output has been contracted for and machinery to increase the capacity of the plant has been ordered.

It is the purpose of the company to cater to Far Eastern trade as soon as facilities are increased to take care of it. From present indications it will be some time before the local demand will be covered, but President Wolff proposes expanding until he has his share of Oriental business. He believes he can compete successfully with European and American products in point of quality and price in any market.

IMPERIAL TAIWAN RAILWAYS

Over thirty years ago in 1877, while China was bitterly opposing the introduction of the steam railway into her territory, there was a wide awake and progressive Governor in Formosa by the name of Ting who foresaw the advantages of the new means of travel, and urged upon Peking a program for the construction of railways. But the wise old mandarins at Peking refused to sanction the proposition and when the little Woosung line was torn up, and the Chinese were looking for some secluded spot to relegate the wreck, the Island of Formosa was chosen, and the materials were dumped there probably as an object lesson to the progressive Governor, and to emphasize the antiprogressive attitude of the Government,

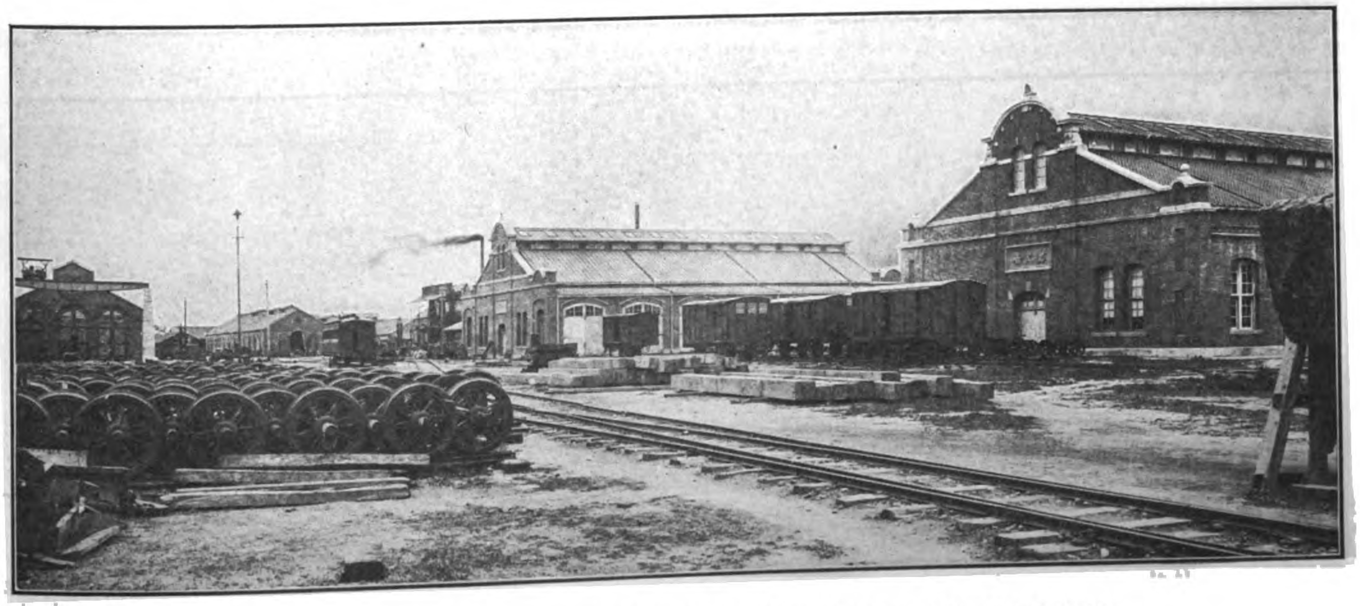
The removal of the capital of Formosa from Tainanfu on the coast to Taipeh on account of the danger from invasion served Governor Liu Ming Chuan, who had succeeded Ting, as an excuse for the construction of a railway connecting the capital with the coast. He managed to build twelve miles connecting Tuatutia and Saitingka, and this section was opened to traffic in 1889. Even this small section was evidence of the te-

Mr. KATICHI UCHIDA

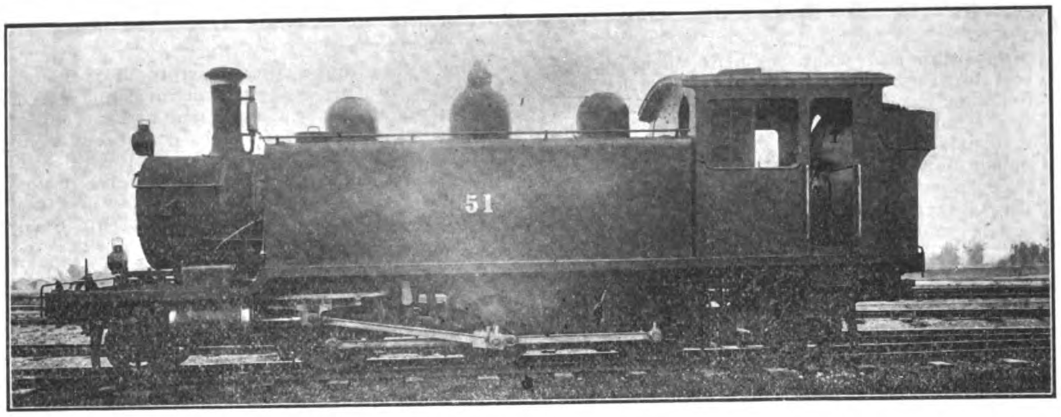
CHIEF OF CIVIL ADMINISTRATION AND DIRECTOR OF THE IMPERIAL TAIWAN RAILWAYS.

Mr. SHIKANOSUKE NIIMOTO

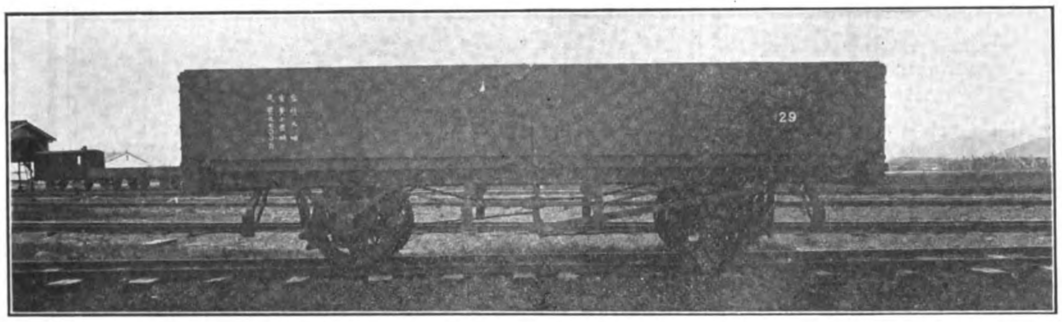
CHIEF ENGINEER OF THE IMPERIAL TAIWAN RAILWAYS.



THE EXTENSIVE RAILWAY SHOPS AT DAIHOKU ON THE IMPERIAL TAIWAN RAILWAYS



LOCOMOTIVE (2-6-2) BUILT BY THE OSAKA KISHA SEIZO KAISHA FOR THE IMPERIAL TAIWAN RAILWAYS. GROSS WEIGHT 48 TONS



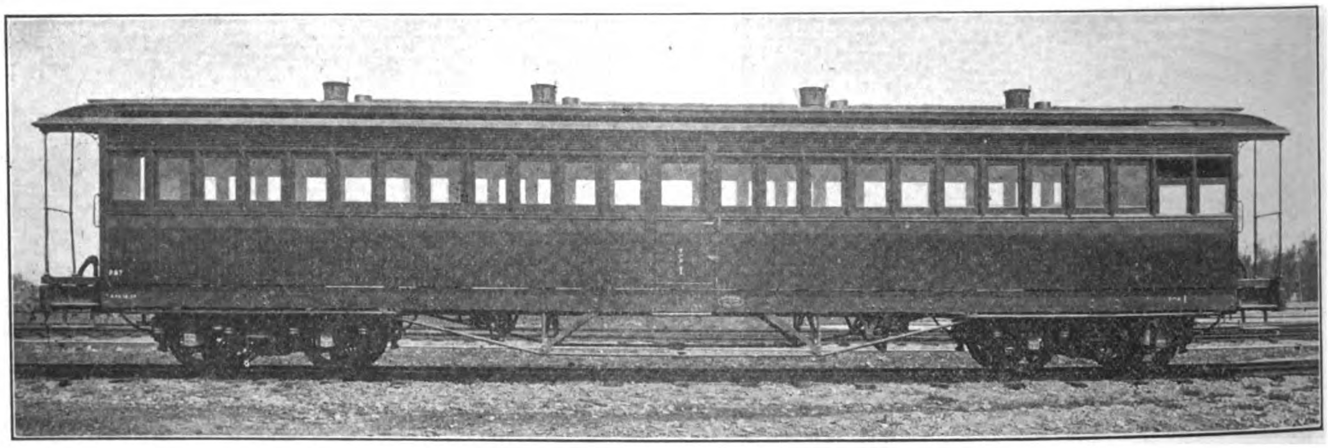
FREIGHT CAR BUILT BY THE OSAKA KISHA SEIZO KAISHA. WEIGHT 12 TONS

nacity of Governor Liu Ming Chuan in battling with the prejudice at Peking against the innovation. The work was continued until 1893 at which time the line was completed and opened to traffic for a distance of 62 miles connecting Hsinchu with the Northern Port of Keelung. At this period of railway construction the Peking government issued an order to suspend further operations, the proposal to improve the Port of Keelung was not encouraged and trade fell off. In fact all the collieries were closed and, with the exception of passenger traffic, there was little activity in transportation.

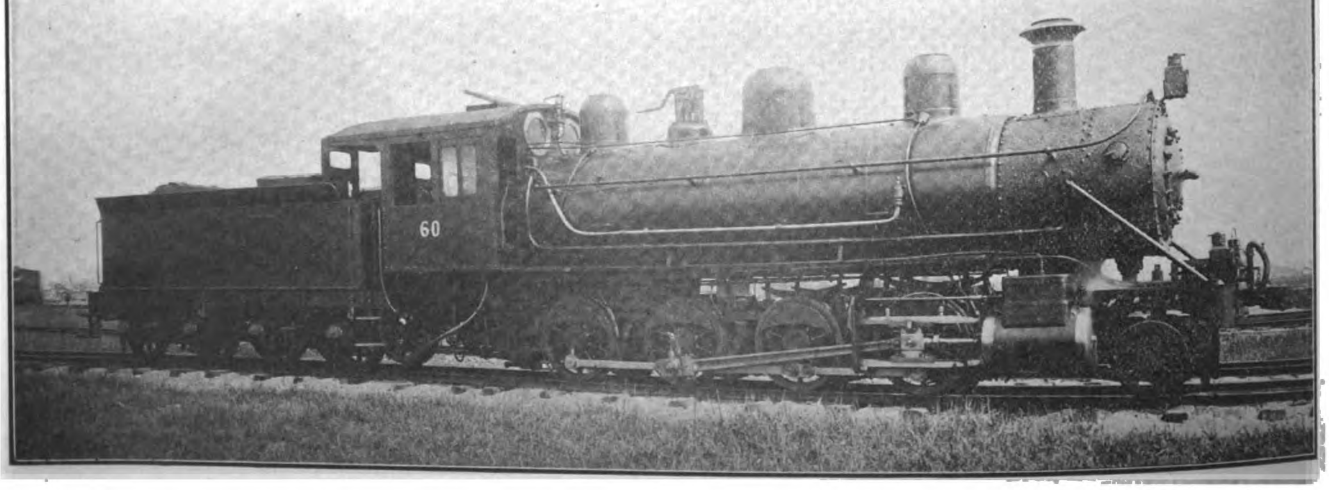
When the Japanese assumed control of the island after the Chino-Japanese War they found the 62 miles of railway built by the Chinese Government in operation joining Keelung and Shinchiki. This line represented a cost to the Chinese administration of approximately 1,295,960 taels, and through lack of encouragement by the Peking Government it had not been properly maintained, although Governor Liu Ming Chuan, the progressive executive, used every influence to extend the line and keep it in good shape. His resignation in 1891 concluded all progress in any direction and when the Japanese assumed control in 1895 and decided to extend the railway it became necessary to reconstruct the 62 miles to which they fell heir.

After the Japanese occupation of the Island in 1895, a special survey was made for the extension of the existing railways under the supervision of the Civil Affairs Department which controlled for three years the Tem-

(Continued on page 127)



IMPERIAL TAIWAN RAILWAYS.—PASSENGER COACH BUILT AT THE DAIHOKU SHOPS



IMPERIAL TAIWAN RAILWAYS.—LOCOMOTIVE (2-8-0) BUILT BY THE BALDWIN LOCOMOTIVE WORKS.—GROSS WEIGHT 73 TONS

THE FAR EASTERN REVIEW

GEO. BRONSON REA, M. E.
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RECIPROCITY AND THE PHILIPPINE ISLANDS

A brochure under the caption "Reciprocity and the Philippine Islands", by Harold M. Pitt of Manila, recently issued for distribution jointly by the Philippine Government and the Manila Merchants' Association, contains a comprehensive review of the beneficial results of the Payne Bill and urges upon the commercial interests of the United States the opportunities for investment in creative insular enterprises and the promise of large return in legitimate expansion of American trade in American territory.

A foreword is offered by the Hon. Chas. B. Elliott, Secretary of Commerce and Police, as follows:

"The Philippine Islands have now reached a point in their economic development when the attention of the public should be called to the business opportunities which are here presented. Questions of a political nature may be regarded as substantially settled. The business and working people are as a whole contented and willing to do their part toward bringing about a condition of economic prosperity.

"Believing that the dissemination of accurate information as to present conditions will be of advantage to the people of the United States and of the Philippine Islands, the Government, in connection with the Manila Merchants' Association, publishes this pamphlet."

The pamphlet has been given wide distribution throughout the United States, and is an unanswerable argument in favor of greater participation in insular enterprise by American capital especially in the production of such tropical supplies as may be successfully cultivated in the Philippines and which America now purchases in foreign lands. On this subject Mr. Pitt writes:

"*In the list comprising nineteen of the more important tropical and sub-tropical commodities imported that last year reached a total value of five hundred and ninety seven million dollars, there are none that the Philippines are not adapted to produce in quantities sufficient to meet the demands of the United States and, too, without having to employhot house methods in their production.*"

What a sum to squander abroad that might make for prosperity in America's insular territory?

Mr. Pitt continues:

"*The Philippines will consume of imported commodities what they are able to pay for. Their purchasing capacity will always be measured by their production of export commodities. There is nothing that they produce or are adapted to produce that the United States is not at present under the necessity of buying from foreign countries whose import trade it does not and never will control. Thus it cannot hope for advantages in other fields yielding tropical products that it already possesses in these islands.*"

The author points to the reciprocal advantages to America and Porto Rico following American activity there in the last decade. In 1901 the internal trade of Porto Rico was $17,950,197 and in 1910 it had reached $68,553,745. In this is represented an increase of $26,000,000 in America's export trade. Of activity of American capital in industries there and returns in trade he says:

"*And the United States is profited by this development as much or more than Porto Rico for not only do American manufacturers and producers gain directly by the increased commerce, but American capital is receiving the cream of the profits of new industries and of old ones extended and enlarged.*"

There is no reason why this experience may not be duplicated in the Philippines.

In concluding his review Mr. Pitt calls attention to the commanding position occupied by Manila as a distributing center for America's Far Eastern trade. He says:

"The proposition of control bv the United States of the trade of China through development of the resources and control of the trade of the Philippines, is entirely logical and should appeal to the reason of every practical person.

"As business in these islands increases with the growth of industry, and the people attain a consuming capacity consonant with their capacity to produce, the requirements of this market, which the United States will undoubtedly control, will necessitate the carrying of permanent stocks in Manila which also can be drawn upon to supply the trade of China. United States manufacturers will then have an advantage in the competition for the Chinese trade that cannot be secured by those of other countries for the reason that no European country has a base in the Orient with contiguous territory of any considerable extent whose trade it can be assured of in a measure that will warrant it in carrying stocks to supply. The great ports of China are but a few days' voyage from Manila, and with stocks here upon which to draw, American goods would be made available to merchants of China as readily as they now are to dealers in the United States itself.

"Under the present status of trade in China several months must pass from the time goods are ordered in Europe or America before they are received. Nearly all purchases are made through brokers by Chinese jobbers and distributors, for future delivery and the elements that determine the source of supply are the daily price and rate of exchange. But the long period of time intervening between the date of purchase of goods and their delivery injects into business a very serious element of hazard, besides involving the investment of an unusual amount of capital as compared with the volume of business transacted. Now, the Chinese, although pretty tightly wedded to custom, are, at the same time, keen business men and quick to take advantage of favorable opportunity. It would not be long ere they would come to see the advantage of buying in a market so close as Manila even at a slight increase in original cost for they would realize that the necessity of buying heavily and carrying abnormal stocks can thereby be eliminated; that requirements can be more accurately anticipated and that a tremendous saving can be effected by the great reduction that would result in the amount of capital necessary to conduct their business. I firmly believe that through the agency of the Philippines the United States will come to control the trade of China.

"And China is a big market, with imports already ranging upwards of $300,000,000 annually. And she is destined to grow bigger and more important with each succeeding year, for she is developing rapidly; the building of railroads is giving a strong impetus to industry throughout the empire and a spirit of progress prevails there that is bringing that wonderful country and its people into more intimate relations, commercially as well as politically, with the outside world."

He then covers in detail the products of the Philippine Islands and the opportunities for increasing their production besides providing abundant statistics which in themselves offer a valuable source of reliable information.

This pamphlet is a credit to the author and will certainly serve to counteract in large measure false impressions abroad regarding the archipelago while it is a direct appeal to the intelligence of the American people for greater reciprocity of interest between continental and insular America.

THE FILIPINO AS A LABORER

THE FAR EASTERN REVIEW has secured from Mr. Wickham Quinan, President of the Atlantic, Gulf and Pacific Company of Manila, an authoritative and timely express on on the subject of Filipino labor which we feel certain will serve as a comprehensive presentation of the methods employed in its successful development. His conclusions are significant in view of extensive operations of the Atlantic, Gulf and Pacific Company as contractors of large public works and as proprietors of machine shops in Manila. His experience covers a period of ten years with the result that he has developed an adequate force of efficient labor in all the departments of activity in which his company is interested. President Quinan said:

"Will the Filipino work? Most assuredly. Is he a first class laborer? To answer this question intelligently requires some explanation. I regard the great mass of the laboring element of the islands, from the standpoint of development, as children. They have never had an opportunity to develop qualities inherent in them, which go to make a first class laborer. I say that these qualities are inherent in them, and I speak from ten years' experience in handling native labor. The natives in the city of Manila who have had an opportunity to learn how to use their hands and heads are giving a good account of themselves. There has been a steady improvement in the quality of native labor since we first started to use same, ten years ago, until the present time. At no time since we have been in these islands have we gotten as satisfactory results from native labor as at present, and we attribute this unquestionably to the fact that the natives who are now serving us best on our pile drivers, derricks, in our machine shops, and elsewhere, have been going to school with us, so to speak, for the past ten years. Therefore if you ask me: are Filipinos, speaking collectively, a first class laboring element?, my answer is emphatically, No. But on the other hand, if you refer to that class of native labor which has been brought into contact since American occupation with Occidental methods and under American supervision, has been taught how to do things, then my answer is, most unequivocally, Yes.

"Every individual or corporation engaged in the development of any enterprise in these islands is necessarily dependent upon native labor to accomplish his or its task, and success or failure will depend very largely upon the persons to whose task it falls to supervise the operation of the native labor. If by nature and temperament he is tactful, patient, in other words, a good schoolmaster, using the ruler when necessary, for he is dealing with children, he will succeed. You know, as some one has said, there are more balky drivers than balky horses.

"The laborer in the provinces has not had the advantages of his city cousin. Nature has been very lavish with these islands, and it is not to be expected that the provincial native who has an unlimited credit at a better bank than the Bank of England, i. e. Nature, should be looking for work when he has but to shake a few coconuts from the trees, levy an assessment on the banana trees in the hills back of his casa, or draw fish from the river to supply his needs. Why should he work? You or I under similar conditions would take life as easy as he does. But there are inherent in the provincial native the same qualities that have made the Manila native a first class workman, and as time goes on the horizon of the provincial native will broaden, he too, coming in contact with Occidental methods and ideas, will develop a taste for the better things of life, for the gratification of which he too will be glad to labor, as do the natives of Manila and other places in these islands who have had proper training.

THE BEST CONSTRUCTION OF LOCOMOTIVE FRAMES.

Extracts from a report which was presented to the American Master Mechanics Association by a Committee of leading railroad engineers, June 1911. This report is the result of over a year's investigation covering conditions both in the United States and European countries and may be safely taken to represent the most advanced ideas in regard to locomotive frame construction.

"A more or less vague impression appears to exist in this country that plate frames are freer from breakage than bar frames. Plate frames are more readily repaired than bar construction, with the possible exception of thermit welds, because a plate on one or both sides can be bolted or riveted which will usually reinforce the broken section. On account of their relatively thin sections, plate frames in some instances are also repaired by means of oxy-acetylene blow pipe welds. The general tendency in the design of railway rolling-stock is towards simplicity and the elimination of bolted parts, making or casting pieces together and working away as much as possible from built-up construction. Compared with the bar frame, which is used exclusively in the United States at present, plate frames are essentially a built-up construction, and in the erecting of an engine using such frames the alignment is much more difficult, involving more care and time, so that the erection engine is a longer process than when bar frames are used. This and other causes render plate frame construction undesirable, as a possible substitute for bar frames.

"Furthermore, it is a fact that the one-piece, integral-bar frame construction, when made of suitable material, is as free, if not freer, from defects or breakages than plate frames. From personal observation of a great many locomotives in the principal European countries and from reports obtained from railway men abroad, the fact seems to be that plate frames often break, especially on the older classes of engines, and that unless made exceptionally heavy above the pedestal they may be expected to show partial or complete fractures after a certain period of service.

One English railway reports that the frequency of broken plate frames is almost exactly ten per cent. per year.

It may be interesting to give extracts from an article written by Mr. I. Valenziani, of the Italian State Railways, published in l'Ingegneria Ferroviaria for November 1, 1910, which has a bearing on the subject. He says:

"Many European railways have purchased American locomotives and among the details which were largely appreciated in Europe must be included the bar frames which have two great advantages over the plate frames; namely, the very much greater ease of examination and adjustment of parts lying between the frames, and the greater ease and rapidity with which the various parts can be attached to the frames during the construction of the locomotives.

In Europe bar frames are rather more expensive than plate frames to construct, and no extension of their use is attributable rather to this than to any technical reason.

As an interesting addition to the data contained in this paper, we herewith submit extracts from a report that was made by a representative of a locomotive company, who had been specially detailed to look into the subject of frame failure, but as a committee we do not agree with all of his deductions.

"The number of frame failures which occur in the operation of locomotives in service is the cause of very serious delays......... A comparison of the types of locomotives in service which were built prior to the past three or four years, shows that the bracing of the frames has not been carried out as we now believe to be necessary for good service. In an effort to overcome the number of failures, the sections of frames have been made heavier and splices increased in section and bolting power, but with several exceptions the bracing of frames seems to have received less attention than it deserves. Experience shows that many engines with increased frame sections fail almost as much as they did with lighter frames.

"The first conclusion is that a good design of bracing is more important than heavy frame sections. Another factor is the condition in which the engine is maintained, as shown by several of the detail reports by roads having engines of exactly the same design on different divisions, some of which give little or no trouble, while other divisions report trouble constantly.

"An investigation carried out on one road several years ago proved that the frame at the first pedestal vibrated 1/16 inch both vertically and horizontally, and that in rounding a curve the bottom of the frame was deflected more than the top, which is the natural conclusion when we consider that the frames are usually braced only to the guide yoke and knees at the top rail, and a light wrought-iron brace at the bottom rail. It is this twisting action on the frame which causes so many failures in the front leg of the first pedestal, and in the lower rails of the splice connections in consolidation engines, where the distance from the cylinder saddle to the pedestal is short. It seems to make no difference how heavy the frame rails are made, because if no other changes are made the frame will break just the same."

The committee then submit conclusions and recommendations regarding bar frames, as follows:

"1. That frame breakage is even more general and serious than was first believed, very few roads being free from this trouble. The longer the wheel base of engine, ordinarily, in combination with a roadbed having comparatively short curves, and with frames poorly designed or of inferior metal, or engines not properly kept up, the greater the trouble will be with frames breaking. This latter factor may not be reflected until after the engine has been put in good condition, and then a frame may finally break as a result of the previous poor condition of the engine.

"2. The committee believes that with frames properly designed, if made of a good quality of cast steel, thoroughly annealed, with suitable cross bracing, and engines kept up in reasonably good shape, breakage will practically be overcome.

"3. That a cast-steel, one-piece frame, properly designed, of good material and thoroughly annealed, is better than a wrought-iron frame, because of the difficulty in welding up the large section in a perfectly satisfactory manner, and also because, in casting, bosses, lugs, etc., can be added without the necessity of bolts and studs.

"4. That a bar frame is better than a plate frame, this being the opinion of people who have used both; the plate frame causing about as much trouble with breakage in Europe as bar frames do in this country.

"5. The strap binder appears to be the favorite form of tying frame jaws together, although the cast-steel box binder, with adjustable wedges, has a number of friends, on account of its simplicity and ease with which it can be handled. The toes at base of jaws should be of sufficient depth and size to give plenty of metal to anchor to, whichever binder is used.

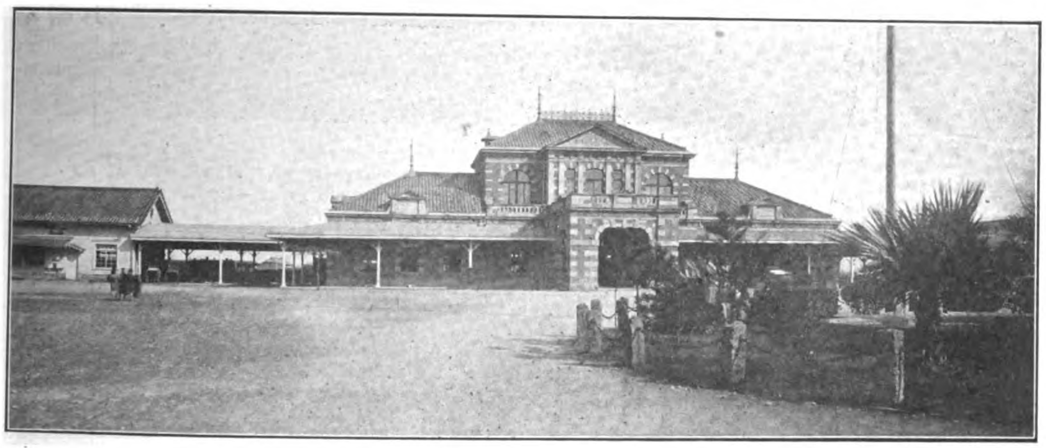
"6. Cases have been reported where frame breakage was directly traceable to expansion of boiler not being properly taken care of by the use of sliding shoes; these shoes, if too tightly fitted or cramped in bolting, or if not lubricated, may prove unsatisfactory. Supporting a boiler by means of vertical plates, if of sufficient strength, provides a satisfactory means of taking care of expansion without imposing undue strains upon the frames.

"7. The committee recommends to steel manufacturers the necessity of making a study of locomotive-frame casting, and its proper annealing, as a number of roads are using wrought iron, but would prefer steel if they could secure reliable castings.

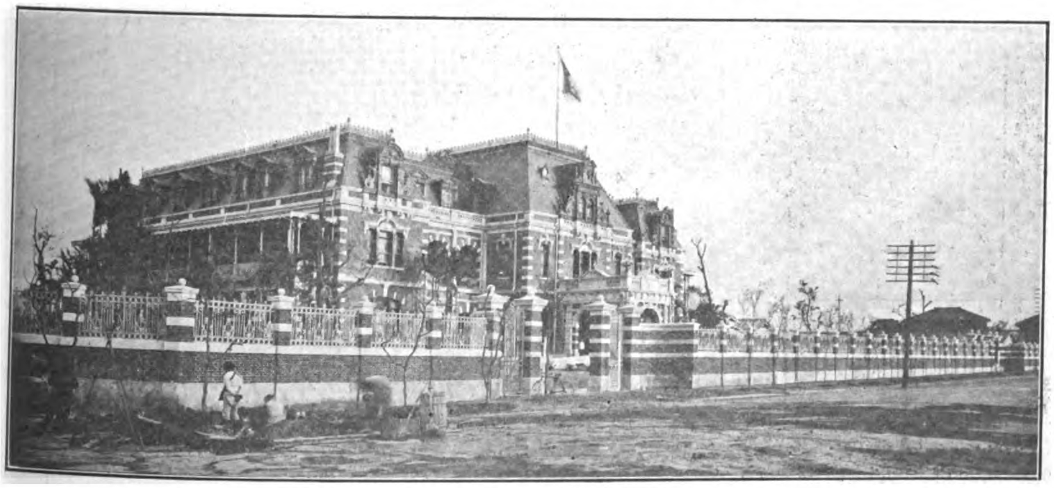
"8. As a general proposition, frame breakage does not ordinarily occur until the engine has been in service two years or more, the older the engine the greater the trouble; they have broken earlier than this, however, on account of flaws, poor welds, or other defects."

(Continued to page 130.)

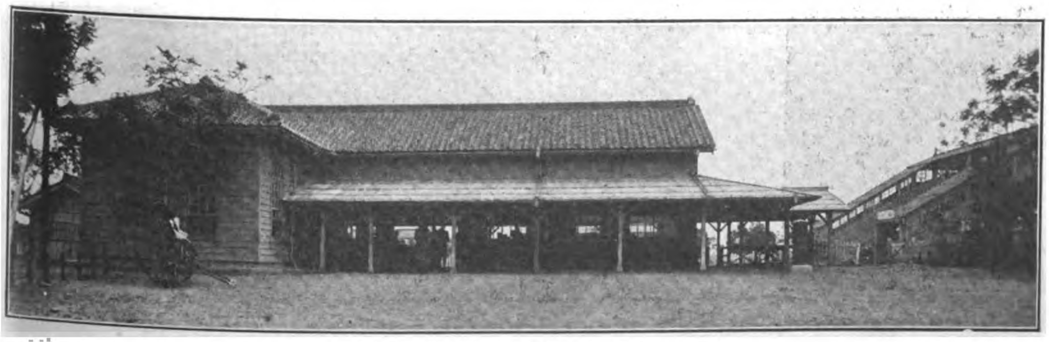
KURUN STATION ON THE IMPERIAL TAIWAN RAILWAYS.



RAILWAY HOTEL AT DAIHOKU IMPERIAL TAIWAN RAILWAYS.



DAIHOKU STATION ON THE IMPERIAL TAIWAN RAILWAYS.



DAICHU STATION LOCATED IN THE CENTER OF FORMOSA, 118 MILES FROM KURUN ON THE IMPERIAL TAIWAN RAILWAYS.

IMPERIAL TAIWAN RAILWAYS

(Continued from page 124.)

porary Railway Bureau. In 1899 the present Formosan Government Railway Department was organized, and the program for the construction of the trans insular line entered into. The estimated expenditure for the new line was Y28,800,000 spread out over a period of ten years. This was included in the general development budget, and the funds raised formed part of the Imperial Japanese Government Taiwan Public Works Loan which was issued for the purpose of carrying out various works necessary for the development of the island and the construction of the railways. This loan, which was to be issued as the funds were required and was not to exceed Y73,500,000, reached at the end of March 1909 the sum of Y34,508,535, of which Y28,800,000 was applied to railway construction and improvements. Of this sum at least Y300,000 were expended in constructing modern railway hotels along the line.

The actual cost of construction was much lower than the estimate, owing to the fall of wages and other favorable conditions and a slight modification of the original route.

The main lines and branches comprise 18 tunnels aggregating 4 miles 56 chains, 28 bridges of over 300 feet long, totalling 6 miles 25 chains. Much of the route lay in mountainous country presenting many difficult engineering problems.

The estimate of Y28,800,000 was reduced Y1,250,000, besides the Y300,000 for hotel construction. This gives a rough average cost of Y100,000 ($49,000) per mile for the 271 miles of narrow gauge line.

The program initiated in August 1899 was to have covered a period of ten years, but such satisfactory progress was made that the main trunk line between Shinchiku and Taokow, a distance of 246.8 miles, was completed by April 1908, together with a branch line between Daitoku and Tamsui, 13.7 miles, and another connecting Taokan with Kukiyodo 10.6 miles, a grand total of 271 3 miles.

On October 24th, 1908, the line was officially opened by H. I. H. Prince Kanin amid great enthusiasm.

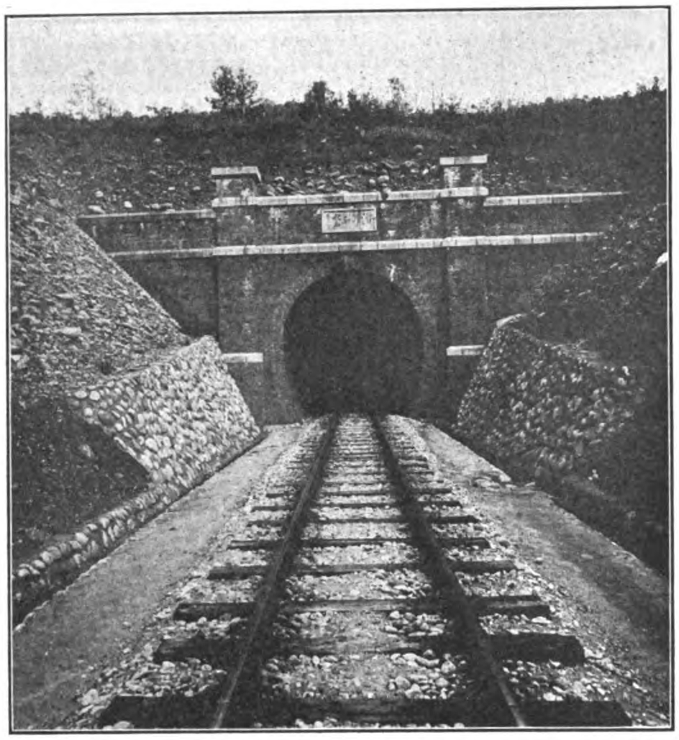
The results for the first year of operation, 1908-09, were most satisfactory and gratifying to the Japanese government who guaranteed the bonds to the extent of $12,901,686 for the roads.

The report showed the general affairs in good condition with a balance of $653,695 (gold) for just a little over a year's operation. Total mileage, 271.3; value of rolling stock, $1,319,670 consisting of 54 engines, of which eight are American made, 112 carriages and 826 wagons. Revenue: Passengers, $615,119; freight, $755,867; miscellaneous receipts $4,424; total revenue, $1,375,410. Expenditures, $721,-715; excess of revenue $653,695. The number of passengers carried during the year was 2,691,034, and the freight carried amounted to 711,930 tons. Persons employed on the line, 2,756; salaries and wages paid during the year, $281,840.

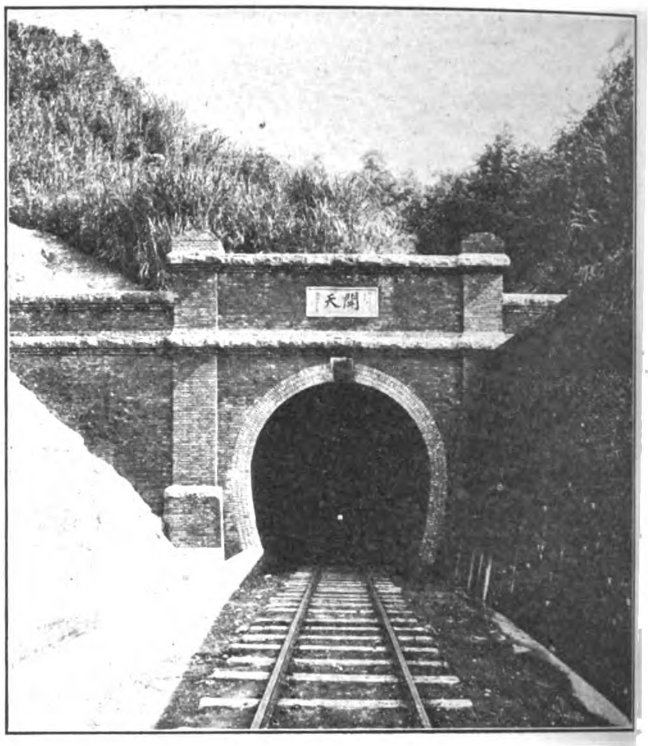
By the end of March 1910, the total revenue amounted to Y3,360,000 and the expenditures to Y1,550,000 leaving a profit of Y1,810.000. The earnings per day per mile averaged Y34.00 against an expenditure of Y15.00. The equipment has been increased to 63 locomotives, 124 passenger coaches and 986 freight cars.

Plans have been made and adopted for the extension of the railway system by two branches, 60 and 41 miles, respectively, in the eastern and southern parts of Formosa.

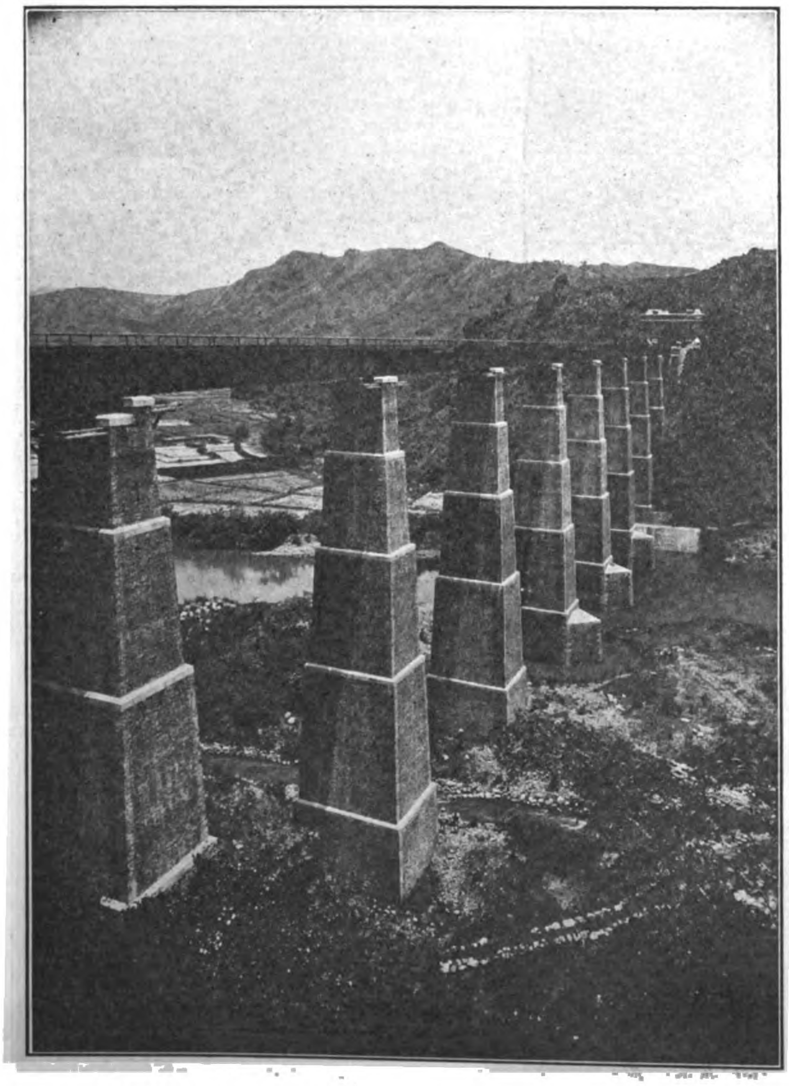
The Taito line, 60 miles in length, will run along the southeastern coast, following the river, and will pass through what is known as savage territory. The road will connect Taito and Karenko, important coast towns, having populations of 4,000 and 2,500 respectively. A public tramway now covers about a third of the distance from Karenko to Taito. The estimated cost of this line is $2,119,986, and the work was started in January, 1910.



NO. 9 TUNNEL IMPERIAL TAIWAN RAILWAYS—LENGTH 4162 FEET—LOCATED 106 MILES FROM KURUN—COMPLETED, MARCH 1908



NO. 2 TUNNEL, IMPERIAL TAIWAN RAILWAYS—98 MILES FROM KURUN—LENGTH 2378 FEET—COMPLETED AUGUST, 1907



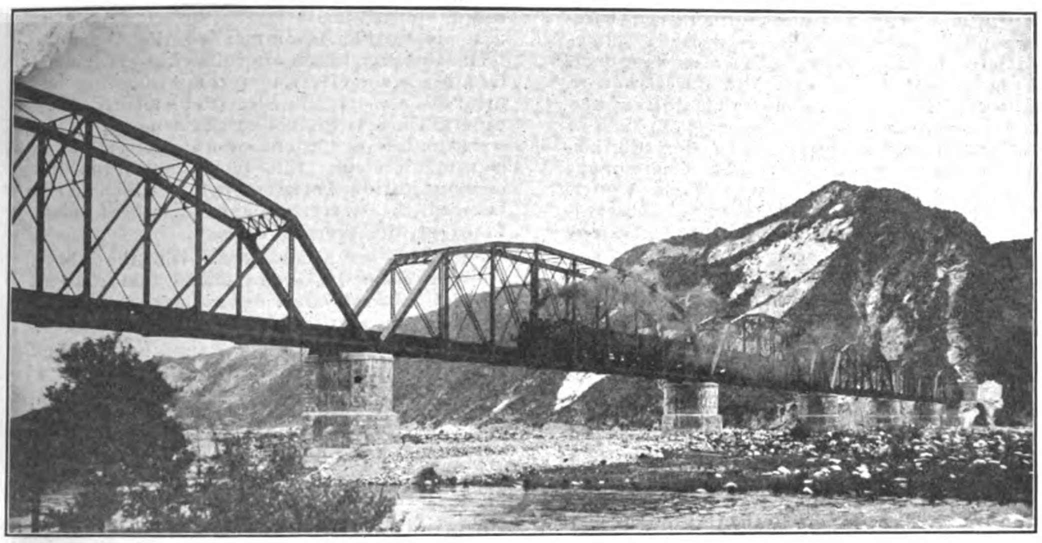
1st BRIDGE AND TUNNEL AT TALAN KEI ON THE IMPERIAL TAIWAN RAILWAYS, FORMOSA

TAKAO STATION ON THE IMPERIAL TAIWAN RAILWAYS

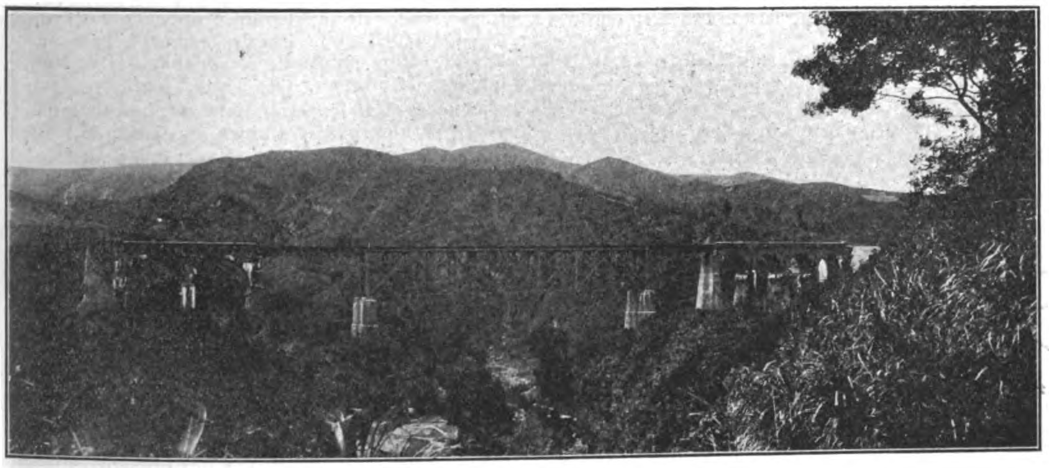
TAINAN STATION ON THE IMPERIAL TAIWAN RAILWAYS

The Arisan Line, 41 miles in length, penetrates into the savage territory. It starts from Kagi, where a bamboo-pulp factory is located and taps the camphor-tree district at Mount Ari. Here are also very valuable forests, and the road is destined to become an important tributary to the main line. The estimated expenditure for the Arisan branch is $1,326,672. Work was to be commenced in April, 1910. The gauge for both lines will be 3.06 feet.

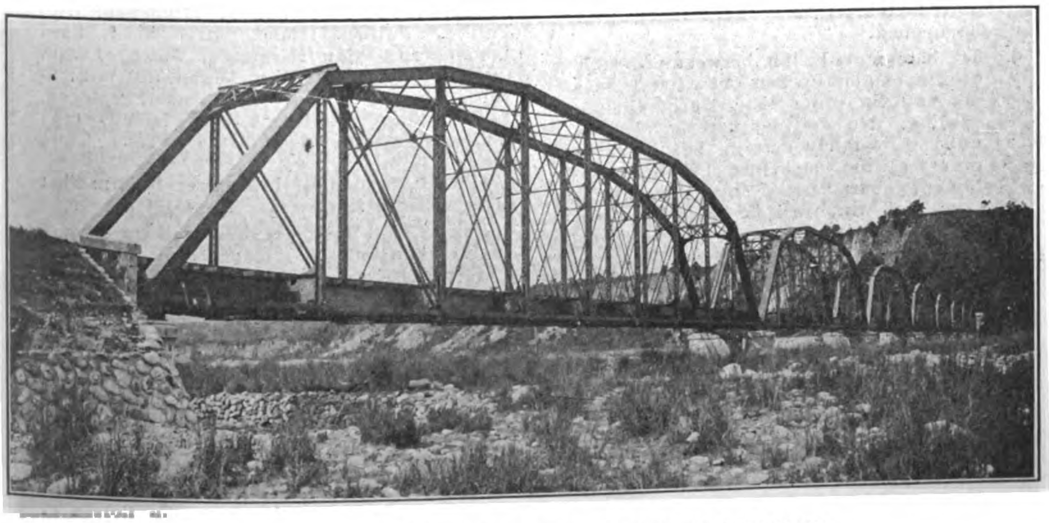
Besides the Imperial Taiwan Railways, Formosa has 298 miles of tramway in operation and 100 miles of tramways under construction. While the tramways are mostly owned by the big sugar companies, there are 45 miles of tramways open to the public and 44 miles of public tramways under construction.



TAIAN KEI BRIDGE SITUATED 102 MILES AND 64 CHAINS FROM KEELUNG, ON THE IMPERIAL TAIWAN RAILWAYS.—LENGTH 1663 FEET OF EIGHT SPANS OF 200 FEET EACH—COMPLETED, FEBRUARY, 1908.



SECOND BRIDGE OVER THE NAISHIWA ON THE IMPERIAL TAIWAN RAILWAYS.



DAIKUSUI RAILWAY BRIDGE, IMPERIAL TAIWAN RAILWAYS.

Some idea of the magnitude of the sugar industry in Formosa may be gathered from the fact that the tramways over which are carried raw materials (sugar cane) comprise 308 miles.

The railway hotel at Daihoku situated directly opposite and convenient to the station is one of the attractions of railway travel. The hotel site proper covers 620 tsubo and including the grounds, 3,000 tsubo. The building is three storey, built of brick and stone, and equipped with every modern convenience. Foreigners traveling through Formosa have found every comfort here at this hostelry. The first floor comprises office, telephone booth, assembly room, tap room, billiard room, smoking and reading rooms, one large and one small dining room, barber shop, lavatories, etc. On the second floor are large and small reception rooms, bedrooms, bath rooms, lavatory, etc. The third floor is divided into bedrooms with baths and a foreign and a Japanese reception room. Outside buildings are provided for recreation, ice plant, engine rooms, servants' quarters, kitchen, stable, etc.

The results for the various working years are as follows:

Year.	Mileage of Open Lines.	Rolling-stock.			Number of Passengers carried.		Quantity of Goods carried.	
		Engine Cars.	Passenger Carriages.	Freight Waggons.	Number.	Fares	Quantity.	Freights.
	M. C.					Yen	Ton	Yen
1900-01	89.04	16	35	164	453,085	239,107	110,173	169,749
1901-02	129.31	19	36	219	792,871	332,578	117,027	183,138
1902-03	154.70	30	45	269	998,467	419,134	234,114	302,917
1903-04	195.40	30	75	310	1,197,644	512,077	315,212	449,507
1904-05	231.16	31	87	426	1,444,715	580,028	349,964	538,870
1905-06	260.24	34	88	449	1,945,567	822,482	433,730	886,930
1906-07	260.24	37	94	495	2,254,731	943,988	508,584	1,066,521
1907-08	271.24	39	99	595	2,489,315	1,055,728	570,509	1,268,302
1908-09	271.24	54	112	826	2,691,034	1,176,696	711,930	1,530,248
1909-10	271.24	59	122	960	3,009,978	1,380,481	853,814	1,907,66

WIRELESS FOR THE PHILIPPINES

The preliminary report of the Philippine Wireless Board appointed by President Taft for the purpose of making "recommendations relating to the construction, operation, maintenance, and management of a system of wireless telegraphy for the Philippine Islands and as to the relations of the Army, the Navy and the commercial community to it" was submitted February 9, 1911, and released for publication last month. The members of the Board were: Honorable Charles B. Elliott, Secretary of Commerce and Police of the Philippine Islands, Lieutenant Colonel George P. Scriven, United States Army, and Commander Chester M. Knepper, United States Navy. The conclusions of the Board embody recommendations not only for a comprehensive system covering the entire archipelago but for the establishment of a system of communications with the neighboring countries and dependencies in the Far East.

The following is a resumé of the recommendations with maps which the Far Eastern Review is in a position to present through the courtesy of the Secretary of Commerce and Police.

"First. That a system of fourteen wireless telegraph stations be established immediately, in conjunction with the existing land lines and cables in the Philippine Islands, as a means of providing quick and uninterrupted communication between the several points of the Philippine Archipelago for the administrative purposes of the Insular Government and the Army and the Navy of the United States; for the transmission of the observations necessary to forecast weather conditions and for the dissemination of these forecasts to the Navy, the merchant marine, and exposed communities; for the requirements of the commercial and business interests of the Philippine Islands in times of peace; and for the strategic and tactical necessities of the Army and Navy in time of riot, insurrection, or war, or the period immediately preceding hostilities.

It is further recommended that the fourteen stations hereinafter listed by name in Groups I and II, and recommended for immediate construction, be supplemented from time to time, as the necessities demand, by the construction of stations of a smaller radius of transmission for the purpose of furnishing communication between points which do not warrant the necessary expenditure of public funds at the present time.

Second. In accordance with the above paragraph, it is recommended that stations of high power, covering as large a radius of transmission as possible, be erected as follows:

(1.) On the Island of Batan, north of Luzon, (2.) At the city of Manila, (3.) At a point near the Straits of San Bernardino, (4.) At the city of Cebu, Cebu Island, (5.) At the city of Zamboanga, Mindanao, (6.) At a point on the southern coast of Mindanao, near Davao.

(These six high-power stations to form what is hereinafter known as Group I.)

The Board further recommends that, in connection with the highpower stations mentioned in Group I, stations of intermediate power, capable of maintaining communication with the nearest high-powered station, be located at—

(1.) Baguio, Benguet, Luzon, (2.) Tacloban, Leyte, (3.) Iloilo, Iloilo, Panay, (4.) Cuyo, Cuyo Island, (5.) Puerto Princesa, Palawan Island, (6.) Dapitan, Mindanao, (7.) Malabang, Mindanao, (8.) Jolo, Jolo.

(These eight intermediate stations to form what is hereinafter known as Group II.)

In addition to the stations mentioned in Groups I and II, this Board recommends that at some time in the future, when necessity demands, low-power stations, capable of maintaining communication with the nearest established station, be installed at the following points:

(1.) Abuyog, Leyte Island, (2.) Alabat, Alabat Island, (3.) Baler, Tayabas Province, Luzon, (4.) Biliran, Biliran Island, (5.) Isabela, Basilan Island, (6.) Burias, Burias Island, (7.) Butuan, Mindanao, (8.) Cagayan, Sulu Island, (9.) Calayan, Calayan Island, (10.) Camiguin Island, (11.) Cape Bojeador, Ilocos Norte, Luzon, (12.) Cotabato, Mindanao, (13.) Culion, Culion Island, (14.) Fort Pikit, Mindanao, (15.) Infanta, Tayabas, Luzon, (16.) Lubang, Lubang Island, (17.) Mangarin, Mindoro Island, (18.) Parang, Mindanao, (19.) Port Banga, Mindanao, (20.) Polillo, Polillo Island, (21.) Siasi, Siasi Island, (22.) San Fernando, Union, Luzon, (23.) Siquijor, Siquijor Island, (24.) Sibuyan, Sibuyan Island, (25.) Bacon, Sorsogon, Luzon, (26.) Tablas, Tablas Island, (27.) Bongao, Tawitawi Island, (28.) Ticao, Ticao Island.

(These stations of low-power to form what is hereinafter known as Group III.)

Third. That having reviewed all correspondence submitted to it concerning the desires and necessities of the Navy in the matter of wireless stations for administrative, strategic, and tactical purposes, and having consulted with various naval officials at present in the Philippine Islands, through the naval representative of the Board; and having considered the opinion of the Commanding General of the Philippines Division upon the necessities of the Army for similar purposes in time of peace and war; and having considered the recommendations of the heads of the Bureau of Navigation, the Bureau of Posts, and the Weather Bureau; and having obtained all possible information concerning

THE BEST CONSTRUCTION OF LOCOMOTIVE FRAMES

(Continued from page 126)

The following approximate rules will produce sections for bar frames either in wrought iron or cast steel, suitable for modern locomotives:

$$A = \frac{T}{2{,}500 \text{ to } 2{,}700} \qquad B = \frac{T}{3{,}000 \text{ to } 3{,}200} \qquad C = \frac{T}{4{,}300 \text{ to } 4{,}500}$$

$$D = \frac{T}{1{,}600 \text{ to } 1{,}800}$$

T=Piston thrust (area of cylinder multipled by boiler press.)

A=Square inches of sectional area of frame, top of pedestals.

B=Square inches of sectional area of frame, top rail between pedestals.

C=Square inches of sectional area of frame, lower rail between pedestals.

D=Square inches of sectional area of frame, integral single rail at back of cylinder-keying lug.

TEST PIECES:

4. Test pieces 10 in. long, 1 in. wide and 1-¼ in. thick, giving 1 in. square when removed, must be cast on each frame.

5. Test pieces must be left attached to castings, but so nearly cut through that they can be easily detached with hammer and chisel.

STAMPING AND MARKING:

6. Each casting must have melt number plainly stamped with ¾ in. figures or larger, manufacturer's trade mark and pattern number stamped or cast on, and order number plainly marked with white lead.

7. Each test piece must have melt number and order number stamped on it.

ANNEALING:

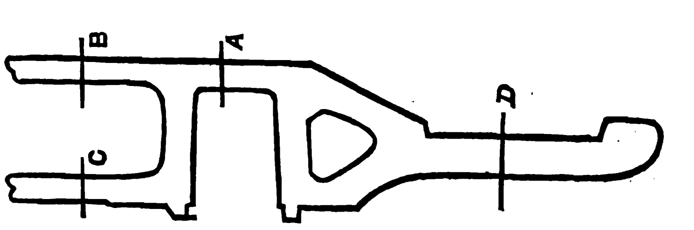
8. Castings must be heated uniformly to about 850 degrees Centigrade, or 1560 degrees Fahrenheit. The heat must be applied slowly enough so that castings in all parts of the furnace are approximately the same temperature. As soon as the castings have reached the required temperature the furnace may be opened.

9. Tie bars must be left between pedestals of frames and broken out after frames are cold in order to judge of the annealing. No castings can be shipped until it is fairly certain that the proper crystalline structure has been obtained, characterized by fine grain, sample of which will be furnished upon request.

FINISH:

10. Castings must be true to pattern, and free from slag, blowholes, shrinkage-cracks, and sand. Bearing surfaces must be solid, and no porosity will be allowed in positions where the resistance and value of the casting for the purpose intended will be seriously affected.

11. Defective castings will be returned at the expense of the manufacturer. Where tests are made at foundry no extra charge will be allowed for such tests as are required.



The width of frames is usually made in proportion to the weight and power of the engine. Frames of 6 in. are not uncommonly used for very heavy engines.

Most of the important bolts in a frame are vertical. Therefore it is often advisable to increase the width rather than make up the section entirely in depth, because the section is not cut away so much when large bolts are used, and for that reason, where 1-⅜ or 1-½ in. bolts are used, frames of greater width can be more economically employed than the narrower sections."

The following is the specification to which some of the larger railroads buy their cast steel frames:

MATERIAL:

1. Open hearth or crucible steel.

CHEMICAL:

2. Phosphorus not to exceed 0.05 per cent. Sulphur ,, ,, ,, 0.05 per cent.

PHYSICAL:

3. Tensile strength per square inch, not less than 60,000
Elastic limit per square inch, not less than 27,000
Elongation in 2 inch., not less than 22%
Reduction in area, not less than 30%

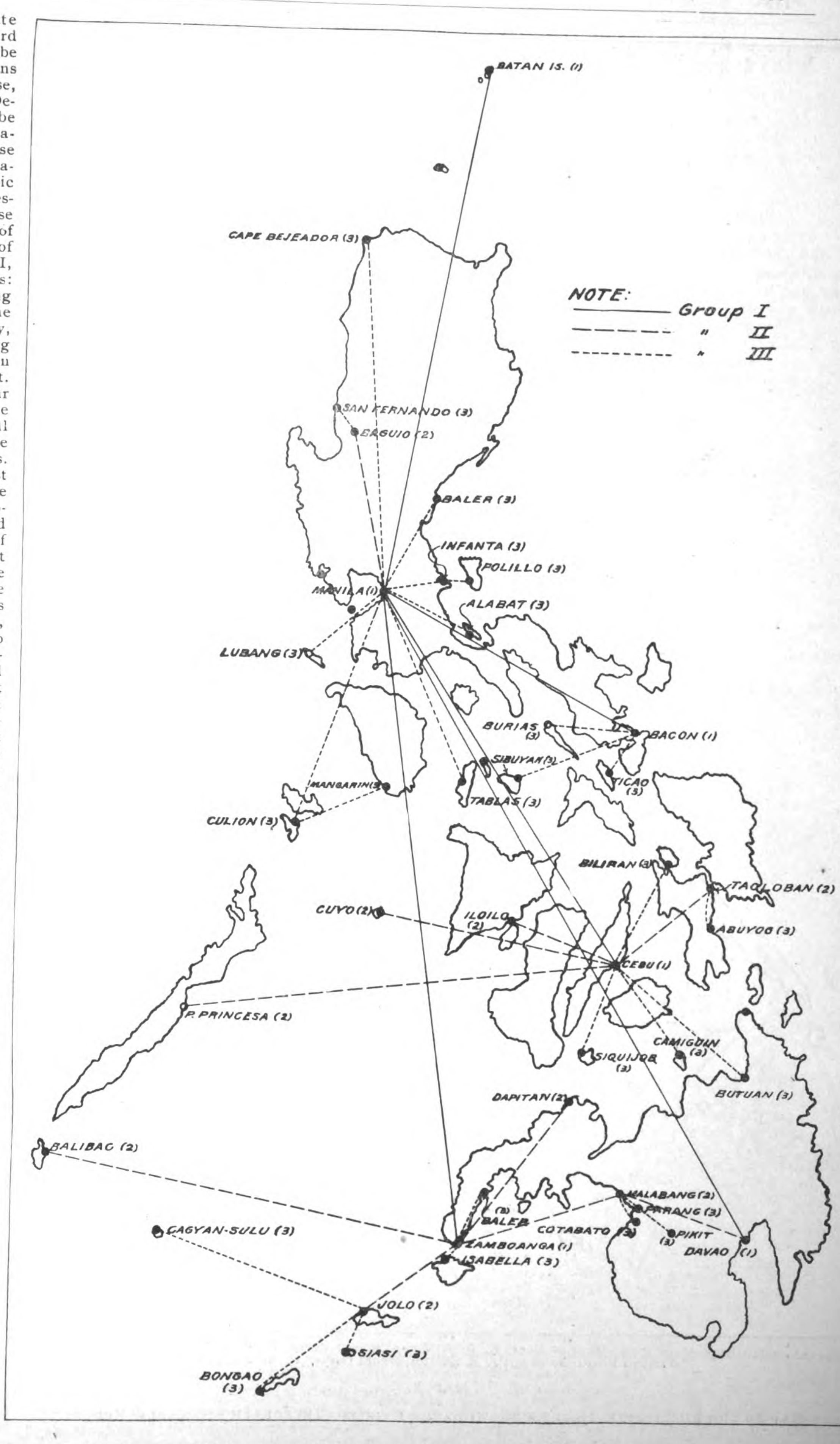
the necessities and desires of the private shipping and commercial interests—this Board recommends that the Navy Department be permitted to construct and operate stations at Cavite and Olongapo, at its own expense, for the free and unrestricted use of that Department; and that the War Department be permitted to construct and operate such stations as may be installed at the expense of the War Department on military reservations, in the vicinity of Manila and Subic Bays, or elsewhere on the order of the President, for the free and unrestricted use of that Department; and, exclusive of these stations, that the cost of erection of the stations recommended in Groups I, II, and III be apportioned as follows: Thirty per cent of the cost as representing the interests of the Army, 25 per cent of the cost as representing the interests of the Navy, and 45 per cent of the cost as representing the interests of the Insular Government, in time of peace, war, insurrection, or riot. The 45 per cent apportioned to the Insular Government represents the interests of the several Bureaus of that Government, as well as the commercial, private, and coastwise shipping interests in the Philippine Islands.

Fourth. From careful estimates of the cost of wireless material, the expenses of the erection of the necessary antennæ and supports, the construction of the stations, and the necessary labor and superintendence of erection, the Board is of the opinion that the sum of $300,000 will be necessary for the purchase, erection, and installation of the necessary apparatus at the fourteen stations recommended for immediate construction, marked "Group I" and "Group II" on Map A, facing page 8. The Board further recommends that the Congress of the United States be requested to appropriate, on account of the interests of its Army and Navy in the wireless telegraph system of the Philippine Islands, the sum of $165,000, and that the Insular Government of the Philippine Islands be requested to appropriate the sum of $135,000 (the remainder of the sum necessary for the construction of these stations), provided that, when any station in Group III is erected, the cost of erection be borne by the United States and Insular Government in the same proportion as those stations listed in Groups I and II, and that when the necessity arises for a station or stations to be added to the system other than those designated in Groups I, II, and III, they shall be erected by the Insular Government, subject to the approval of the Secretary of War and the Secretary of the Navy, in the same manner as recommended for the erection of the stations in Groups I, II, and III.

Fifth. The Board recommends that on account of the fortification of Manila Bay, the naval stations of Cavite and Olongapo, and the constant presence of naval vessels in the adjacent waters, all wireless stations erected in connection with the defenses of Manila Bay and the naval bases adjacent thereto at the cost of either the War or Navy departments, and maintained exclusively by those Departments, shall be considered as a separate group of stations, to be governed and regulated as to tolls in the express manner hereinafter mentioned in paragraph (*a*) of this section, and that all other stations erected as a part of the wireless telegraph system of the Philippine Islands, at the joint cost of the Insular Government, the Army, and the Navy, known as Groups I, II, and III, which form a part of the system of information throughout the Philippine Islands in combination with the cable system, shall be maintained by and be under the exclusive control of the Insular Government in time of peace, in the manner set forth in the following paragraphs marked (*a*), (*b*), (*c*), and (*d*):

(*a*) All messages, whether public or private, received for transmission at any wireless station shall be paid for at a rate and in a manner to be fixed by the Bureau of Posts, with the following noted exceptions:

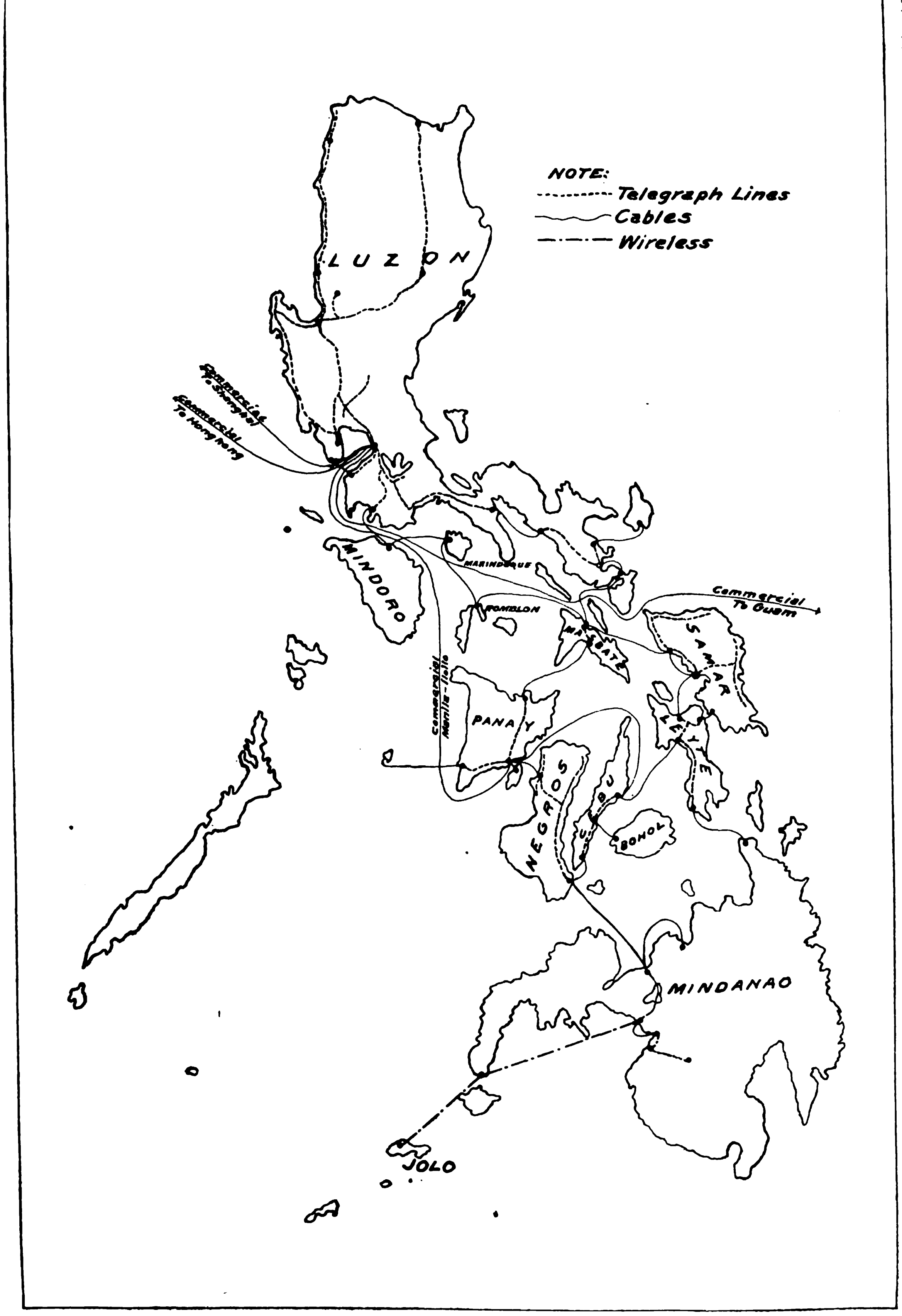
The tolls for purely official messages originating at and destined for the stations maintained and operated by the War and



[Prepared under the personal supervision of Capt. L. D. Wildman, Signal Corps, U. S. Army, by direction of the Join Wireless Board, by Sergt. J. R. Shettel, Signal Corps. U. S. Army.]

MAP A.

OUTLINE MAP OF THE PHILIPPINE ISLANDS, SHOWING THE STATIONS ENUMERATED IN GROUPS I, II, AND III.



(Prepared under the personal supervision of Capt. L. D. Wildman, Signal Corps, U. S. Army, by direction of the Joint Wireless Board, by Sergt. J. R. Shettel, Signal Corps, U. S. Army.)

MAP B.

OUTLINE MAP OF THE PHILIPPINE ISLANDS, SHOWING THE EXISTING TELEGRAPH AND CABLE ROUTES

Navy Departments, and the vessels equipped with wireless telegraph owned or operated by those Departments, shall be regulated exclusively by the proper military and naval authorities, provided that these Army and Navy stations shall accept for delivery all proper messages, public or private, and shall transmit, to designated stations of the system, messages tendered by any wireless station in the Philippine Islands, or transmitted by wireless apparatus installed on domestic or foreign vessels with which written arrangements concerning these regulations have been made by the Bureau of Posts.

(*b*) That the amount of the tolls collected on behalf of each station in the system shall be credited to the "Wireless Maintenance Fund" of the Philippine Islands, from which fund shall be paid all expenses for the operation and maintenance of the stations of the wireless system, except those stations operated and maintained by the Army and Navy Departments for the defenses of Manila Bay.

(*c*) That at the end of each fiscal year a balance shall be struck between the cost of maintenance and operation and the amount of the tolls received, and that all profits shall be deposited in the Treasury of the Philippine Islands in the manner now provided by the regulations governing the funds of the Bureau of Posts.

(*d*) That if at the end of the fiscal year there shall be a deficit the Bureau of Posts shall be reimbursed, by appropriation or otherwise, from the Insular Government and from the Government of the United States in the proportion of 45 and 55 per cent, respectively.

Sixth. That, with the exception of the stations heretofore mentioned, to be erected and operated by the Army and Navy for the defenses of Manila Bay, all purchases of instruments, apparatus, material, and devices for the wireless telegraph system of the Philippine Islands, the preparation of the plans for all structures in connection therewith, the erection of the necessary buildings, and the installation of the machinery shall be under the direction of the Secretary of Commerce and Police of the Philippine Islands, provided that such purchases, whenever possible, shall be based upon actual results obtained by experiments with similar wireless instruments, apparatus, or devices, tested in the Philippine Islands; and provided further, that the apparatus when installed shall be capable of emitting any wave length between a minimum length of 400 meters and a maximum length of 5,000 meters, and that the waves so emitted shall be damped by not more than 10 per cent.

Seventh. That no authority or franchise be granted for the erection or operation of any wireless station on land within the boundaries of the Philippine Islands, other than those stations erected and operated by the War and Navy Departments as heretofore specified, and those stations recommended in Groups I, II, and III, unless approved by the Secretary of Commerce and Police, and that no commercial vessel of American registry in the Philippine Islands shall be permitted to operate any wireless telegraph apparatus emanating a wave or waves within 10 per cent of the wave length habitually used by the wireless telegraph stations of the Philippine system.

The Board further recommends that the Secretary of Commerce and Police be given the necessary power to inspect the wireless apparatus installed on commercial vessels of American registry operating in the Philippine Islands and to issue such rules and regulations as will prevent interference with stations operated by the Insular Government, and that this power be extended to include the regulation of vessels of foreign registry fitted with wireless apparatus when within the waters under the jurisdiction of the Insular Government, and that suitable penalties be prescribed for infraction of the promulgated regulations.

Eighth. That whenever there exists insurrection, riot, rebellion, or threatened trouble to the peace of the Philippine Islands, all the means of communication within the Philippine Islands shall be placed under the control of the Commanding General of the Division, upon authority of the Secretary of War, except those stations erected by the Navy which shall at such times continue under control of the senior officer of the Navy present in Philippine waters."

Appendix A. attached thereto contains a letter written by Colonel George P. Scriven,

Chief Signal Officer, Philippine Islands, under date of March 11, 1910, to the Division Commander reviewing the wireless situation and needs of the service and recommending the co-ordination of the Army, Navy and Insular Government and the appointment of an Advisory Board representing the different interests to make recommendations to Washington. It was this letter that finally resulted in its appointment by President Taft on April 30, 1910. The last paragraph of Colonel Scriven reads:

"In conclusion, I beg to say that the only excuse for the somewhat extended exposition of the matter here submitted lies in the importance of the subject to the three interests involved. The vast field of wireless telegraphy in the Philippine Islands is still open, but can not much longer remain so, and the danger that the United States and the Insular Governments may lose possession of the field and be forced to oust a parcel of squatter claimants is, I think, threatening, unless immediate steps to prevent are taken. Furthermore, it is probable that both Governments and that each military service will, if allowed to work out its own plan without co-ordination, establish three conflicting systems, that must end in increased cost and ultimate confusion to all, and it is this fact that warrants the attempt to draw in the strongest manner possible the attention of proper authority to the extreme importance of taking at this time such preliminary steps toward securing immediate and concerted action as shall be necessary to organize an economical, coördinate, and efficient system of wireless that shall answer the requirements of the civil and military conditions existing in the Philippine Islands."

At the present time the length of cables in the Philippines aggregates 1,483 miles mostly installed by the U. S. military and entailing large expense in up-keep. It is estimated that an expenditure of $1,000,000 would be involved to repair the present system and an annual expense of $1,000,000 for maintenance due to the numerous landings over coral reefs exposed to the battering action of strong tides in shallow water. The extensive land wires involved serious expense for maintenance due to damage by storms, insects and the encroachments of rapid vegetable growth through many miles of wooded areas. The maintenance of the main cable lines connecting Manila and Mindanao is recommended for the reason that the volume of business north and south demands a greater capacity than could be handled by wireless stations at the present state of the art with regard to delays caused by atmospheric and static disturbances. The maintenance of the main cable as well as the wireles would provide against delay from these causes in time of peace. The destruction of cables in time of war or insurrection, jeopardizing effective mobilization of troops would make the installation of wireless stations seem imperative.

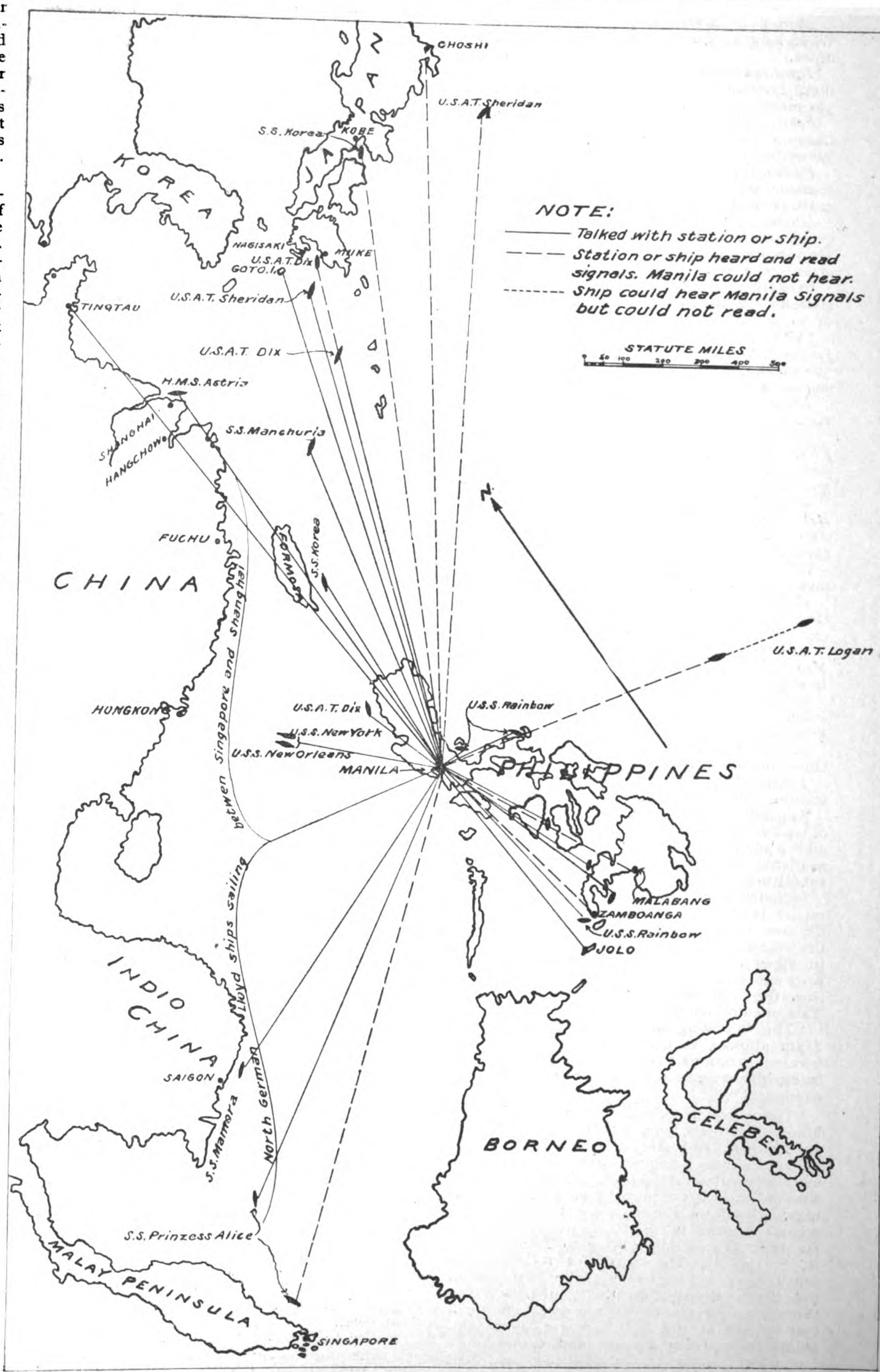
A further consideration besides the military and civil functions referred to the Board emphasized the desirability of wireless for use of the weather bureau to obtain information from points far beyond the waters of the Philippines—Guam on the east, Yap to the south east and numerous stations on the Chinese and Japanese coasts to the north. Such a system as proposed would make instantaneously available knowledge of local weather conditions in all the various areas referred to including reports from ships at sea, as well as intensity and direction of destructive typhoons.

The conclusions of the board as to the location of the different stations were arrived at after consultations with the chief signal officer of the Philippine Division, the Chief of the Weather Bureau, the Chief of the Bureau of Navigation, the Chief of the Bureau of Posts and representatives of the various commercial, shipping and business interests, the details of which are included in appendix "B".

Among other information included is that contained in a memorandum of wireless stations within range of Manila concerning which the board has actual information as follows:

CHINA: *Hongkong (Cape d'Aguilar), HK.*—Small British admiralty station. For the exclusive use of the admiralty in communication with His Majesty's ships close in.

Tsingtau, KTS.—German naval station. Wave length, 350 meters; daylight range, 130 miles. This station has exchanged signals with Manila.



[Prepared by Sergt. J. R. Shettel, Signal Corps, U. S. A.]

MAP C.

TRANSMISSION RESULTS OBTAINED FROM A 4.6-KILOWATT (PRIMARY ENERGY) WIRELESS TELEGRAPH STATION (TELEFUNKEN SYSTEM) ERECTED BY GERMANN & CO. AT MANILA, P. I. OPERATED UNDER THE DIRECTION OF CAPT. L. D. WILDMAN, SIGNAL CORPS, U. S. ARMY, FOR THE INFORMATION OF THE JOINT WIRELESS BOARD.

Shanghai, SNG.—Commercial station. Wave length, 300 meters; daylight range, 70 miles.

Tai Lien Wan.—Japanese Government station. Located near Port Arthur. Wave length, 350 meters; daylight range, 170 miles.

Pekin, PK.—Italian Government station. Located in the Italian legation grounds. Wave length, 300 meters.

Pastingfu; Tientsin; Pekin.—Chinese Government stations. Small stations thoroughly military with a range of not over 40 miles.

Hoihow; Chuwen; Canton; Kongmoon.—Chinese Government stations. These stations are reported as having a daylight range of about 70 miles.

FORMOSA: *Kelung.*—Japanese Government stations. Believed to have a daylight range of 60 or 70 miles.

JAPAN: *Osi Saki* (*Gota Island*), *JOS.*—Japanese Government station. Wave length, 300 meters; daylight range, 130 miles. This station has exchanged signals with Manila.

Nagasaki; Sasebo.—Japanese Government stations. Power not known.

Choshi, JCS; Shiomizaki, JMS; Tsunoshima, JTS; Ot chishi, JOI.—Japanese Government stations. Reported to have wave length of 300 meters and daylight range of 130 miles.

DUTCH EAST INDIES (JAVA): *Batavia, BA; Cheribon, CB.*—Netherlands Government stations. Wave length, 600 meters; daylight range, 125 miles.

INDIA: *Bombay, BYR.*—Indian Government station. Range, 300 miles.

Victoria Point; Diamond Point.—Indian Government stations. Wave length, 600 meters. Power not known.

CAROLINE, ISLANDS: *Angauar, KAN; Yap, KJA.*—German Government stations. Daylight range, 185 miles.

GUAM: *Guam, NPN.*—United States naval station. Wave length, 425 meters; power, 3 kilowatt.

SIBERIA: *Vladivostok, BWT.*—Russian Government station. Wave length, 360 meters.

Vladivostok, MW.—Russian Government station. Wave length, 1,200 meters.

Appendix "C" is devoted to the division of cost of the federal and insular governments and Appendix "D" contains all the data available in preparing the estimates of cost submitted.

Included in appendix "I" attached to the report is the following description of the Chinese wireless stations furnished by one of the officers of the Italian legation guard and in view of the fact that Italians have been instructors and advisers of the Chinese authorities the information is of special interest. This memorandum reads:

"The following is the information which I am allowed to give you about the Chinese wireless stations, some of their features being the same as ours, which are of reserved character.

"There are in Chili Province three Chinese Marconi stations, viz, one at Paotingfu, one at Tientsin, and one at Peking (in the Nanhaitzu). These stations form an approximately equilateral triangle. The first one is situated among the numerous barrack buildings, close to the military hospital. The second is near the public gardens and not far from the avenue leading to Tientsin City R. S. station. The third lies 10 kilometers south from Peking among the barracks of the Sixth Division in the Nanhaitzu. The three stations are under the direct charge of two officers of the board of war—their rank being respectively colonel and captain.

"The noncommissioned men, two telegraphists and an interpreter for each station, depend from (are under direct supervision and instruction of) an inspector, English speaking, whose teacher in electricity was a corporal in our semaphore corps, now in Italy.

"He inspects them with the utmost rigor and minuteness, but the condition of the material is no longer such as it was when first installed and cared for by Lieutenant Grassi, R. I. N., three years ago.

"The Marconi wireless company having refused to sell to the Chinese their detectors (?), probably being prevented from doing so by arrangements with the British and Italian Governments, this inspector has succeeded in building them up according to the descriptions he may have read in scientific books and papers, but such are far from the efficiency of reception possessed by ours.

"The Chinese stations are a thoroughly military concern and do not accept telegrams from the public on civil business, but some absurdly private service is being carried on in the English language. Official messages are sent in cipher."

"The Chinese employees do not give us an exact account of the distance now reached by their apparatus. But it is stated that their messages from Paotingfu do not get as far as Tientsin, nor those from Tientsin to a ship at Chingwangtao.

"Time table: 8 o'clock and 18 o'clock correspondence hours.

"Every two hours news is exchanged concerning weather conditions and atmospheric discharges.

"The station at Paotingfu appears to be the less efficient one. Especially in summer time, it very often goes days at a time without wiring or answering.

"The men are clever and intelligent and if the material is not kept up so carefully as by Europeans, it can be ascribed to that lack of continuous effort and logicity (?) that is so peculiar to Chinese mentality and character.

"As for the stations on board ship, I can only tell you that Lieutenant Monroy before leaving (in 1906, winter) inspected them and restored them to their previous efficiency. He found that distances differed according to ships, although the materials given to them were all alike. Now they are thought to be all right, as they ask for our help as a rule when in distress. Admiral C. P. Sah takes the utmost interest in the stations of his fleet.

"It is stated that the Germans have started a school of wireless (Telefunken) and have applied for permission to erect two stations and masts in Canton and Kowloon.

"It is also stated that there is a branch of the Telefunken Company in Shanghai; Arnhold, Karberg and Co. have for some months past been engaged or concerned in the wireless business.

"There is some talk of erecting some wiretess stations in Mongolia to connect it up with Pekin.

"It is also stated that Tuan Fang (viceroy at Shanghai) will erect some stations in the Yangtsze Valley.

From other sources than the above it is known that Tuan Fang approached the Italian overnment, or rather the Marconi Company through the Italian Government representative here, with reference to the purchase and erection of certain stations in the Yangtsze Valley. It is understood that the deal failed because of price, but more because the Marconi Company would not sell certain parts outright, being prevented from doing so, it is said, by their contract with the British Government.

In connection with the location of the Chinese wireless stations at Paotingfu, Tientsin, and Peking, it should be kept in mind that the Italian Government has a station here in the Italian legation grounds in Peking; that it is the same system that the Chinese are using; that by means of it they are enabled at all times to know when the Chinese stations are working and of course to know a good deal about the character and condition of such stations, especially their rate and ability to dispatch telegrams, etc.

The Italians say that they have no difficulty in communicating with warships lying off Chingwangtao.

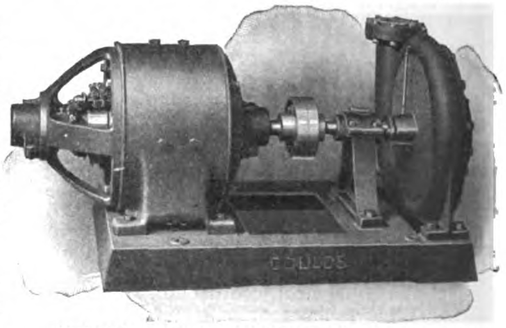
The Italians formerly also had a station in their settlement (concession) at Tientsin. That was discontinued, out of respect, they say, to the susceptibilities of the Chinese Government.

A NEW LINE OF CENTRIFUGAL PUMPS

The Goulds Manufacturing Company of Seneca Falls, N. Y., have just placed on the market an entirely new and improved line of centrifugal pumps. These pumps are furnished in both the single stage, single suction and single stage, double suction types. Either type may be arranged for belt drive or direct connection to electric motor, gas, gasoline or steam engines, steam and hydraulic turbines. The single suction, as well as the double suction pumps, contain many special features which are very important from an operating and economical standpoint.

The impeller in the single suction pump is of the open type. The vanes are carefully designed so that the maximum efficiency is obtained under normal conditions. The impeller is accurately machined to minimize the clearances between the impeller and the side covers. This feature has considerable influence upon the high efficiency which is obtained with this type of pump.

Although the single suction type, which in most cases means a considerable amount

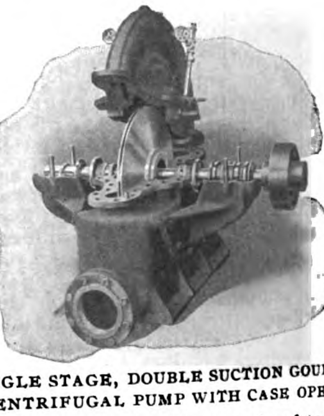


SINGLE STAGE, SINGLE SUCTION GOULDS CENTRIFUGAL PUMP, DIRECT CONNECTED TO ELECTRIC MOTOR.

of end thrust, the impeller in the Goulds pump is designed in such a manner that this annoying feature is entirely eliminated.

The stuffing box, through which the shaft passes, has a brass water sealing ring which prevents air being drawn into the pump at this point. Air will destroy the vacuum in a pump and impair suction.

The single stage, double suction centrifugal pumps are designed with a view of combining all mechanical details necessary to produce a centrifugal pump of the very highest grade. The casing proper consists of two castings bolted together on a horizontal joint. The purpose of dividing the casing is to permit quick and ready access to the interior parts of the pump for inspection, without disturbing the pipe connections. The impeller is of the most modern enclosed type and developes the highest efficiency under the conditions for which the pump is sold. The bearings are of the ring oiling type, independent of the stuffing boxes and they are provided with removable shells lined with the best quality of anti-friction metal. The stuffing boxes are provided with brass water sealing rings.



SINGLE STAGE, DOUBLE SUCTION GOULDS CENTRIFUGAL PUMP WITH CASE OPEN.

The double suction pumps are sold for heads up to 150 ft. while the single suction pumps operate against maximum heads of 100 ft.

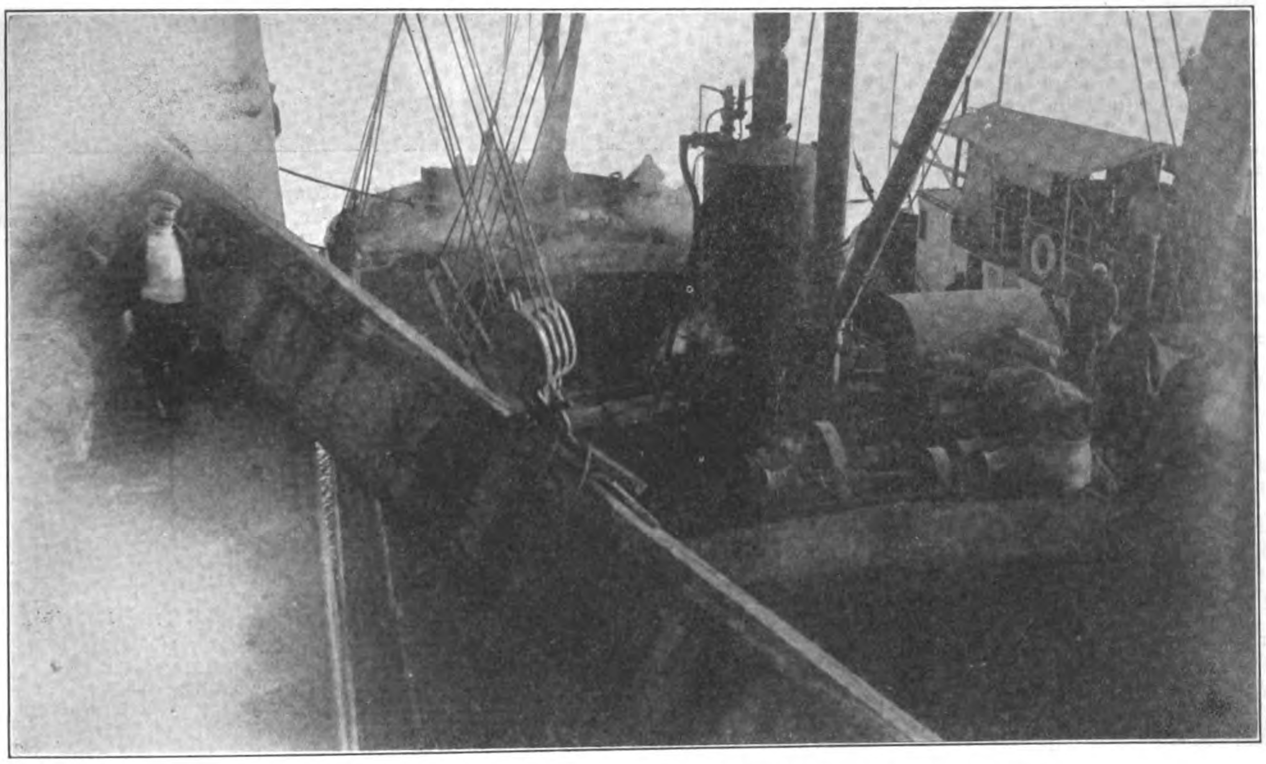
The illustrations show one of the single suction pumps direct-connected to an electric motor and a view of the double suction pump with the upper half of the casing partially removed.

PHILIPPINE TIMBER FOR AN EMPEROR'S MAUSOLEUM

It is recorded in the ancient annals of China, stored in the Hall of Records in Peking, that once on a time in the Ming Dynasty a fleet of Chinese junks set forth in quest of timber, rare, beauteous and durable, fit for the Mausoleums of Emperors. Legend told of great girthed trees, hard as flint and lustrous as red marble when polished, growing in the fastnesses of fever-infested mangrove swamps in the far Sulu Islands, and thither the fleet ultimately laboured on its voyage of discovery. And that legend did not lie, and that the ancient mariner of China knew his courses, conquered his seas in frail craft, and won his treasure from the forests of the tropic isles is testified silently, eloquently and abundantly by the mighty beams and columns now supporting the Mausoleums of the Ming Emperors, freshened rather than depreciated by age, and hurling long sustained defiance at the ravages of time and the decaying influences of sun and storm, frost, hail, and snow.

Since that time the actual home of these great timbers has fled from the memory of man, and the romancers of the villages have woven wonderful stories from the fragments of fact which have leaked down through the corridors of time. The return of the fleet deeply laden with mighty logs that giants alone could lift dissolved from a stern reality into a mystic romance, and the silver-haired elder, bent of back and full of years, knows no better now than to repeat how his forebears went beneath the earth and hewed and wrested those pillars from among its supports.

And then an Emperor died. When the soul of Kwang-hsu, of the Manchu Dynasty, rode to the skies a while ago on the back of a dragon the nation realised that it must build a mausoleum no less adequate than those at the Tombs of the Mings, but where to get that same time-defying timber no living Chinese knew, but there was hope that a foreigner who was known in Peking could solve the difficulty. Chips were cut from the Ming Mausoleum and were taken to Peking, and there the foreigner was sought and questioned. That foreigner was an American citizen named Carl L. Seitz, Manager of the China Import and Export Lumber Company, Ltd., and he at once recognised the wood as being from the southern Philippine Islands, In his boyhood days he had penetrated the forests of the Philippines, and had seen such timber occasionally dragged from the noisesome depths of the swamps. He knew its haunts, its character, its choice of difficult surroundings, and the dangers to be run to obtain a quantity. But it could be got at a risk and a price, and he was willing to run the risk for the price he would name. The Chinese officials did not hesitate. He could name his price and they would agree so long as they had the timber. Mr. Seitz modestly asked what in the average lumber camp would be regarded as a fabulous sum, and without hesitation it was accepted, and, for the price, the American was called upon to pit his courage, energy, and knowledge against the forces of nature and the foibles of human physical structure. Undismayed by the fever, the poisonous insects and reptiles infesting the swamps, the great scarcity of the timber and the difficulty of transporting it to the seaboard when found and cut, Mr. Seitz set out with intrepid courage, taking with him two other



LOADING MONSTER LOG OF PAGATPAT ON THE S. S. HELLAS IN PHILIPPINE WATERS

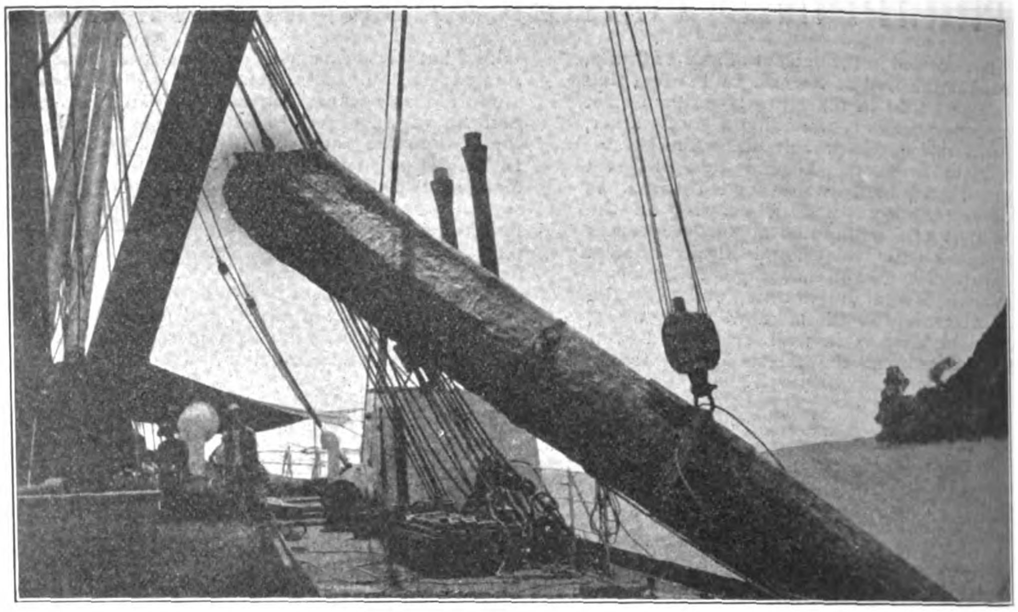
PAGATPAT LOGS WON FROM THE MINDANAO JUNGLE, DESTINED FOR AN EMPEROR'S MAUSOLEUM

Americans, Messrs. H. Williamson, of Virginia, and F. Redding, of Texas, one of the men who went out for the fighting with Astor's Volunteers. And the timber was got.

With American aid and from American territory the wood for the desired Mausoleum ultimately came, the contract undertaken being to supply 338 pagatpat logs varying from 48 feet long and five to six feet in diameter to 20 or 30 feet with proportionate dimensions.

From Sibuguey Bay, on the south of Mindanao Island, the party, with a gang of Filipino labourers armed with sharp-edged bolos, plunged into the forbidding mangrove swamp, cutting and cleaving a way through the reeking undergrowth, threatened by crocodiles, and beset continuously by poisonous sea urchins, malaria-bearing anopheles and tormenting insects. The ravages of salt water rendered leather boots useless in a few days, and straw sandals alone offered frail protection from the flesh-tearing tangle of roots and branches, and the urchins which lurked beneath the soggy ooze. Shut out from sunlight and breathing steaming malodour, the party floundered on towards the solid land to the accompaniment of the ringing bolo and the savage curses of the struggling, stumbling, semi-naked natives carving the way ahead. Here and there the clean boled pagatpat pushed and shouldered through the dense growth to shake its crown of foliage in the purer air and sunlight high above, and each tree discovered was carefully examined and marked for future reference. Only the largest trees were selected, and most of these shot skyward straight as an arrow to the first limb some 60 feet from the ground, the bole being without flaw and of grain true as a die. All the trees grew in the swamps, those nearer the solid earth being older and larger than the others, and consequently increasingly difficult to drag to the seaboard, some three miles distant. And even at the sea difficulties did not end for there was no harbour capable of taking a steamer of the size necessary for the transportation of the whole of the logs in one load.

Nature entrenched the valuable patagapat behind barriers such as would confound and defeat the resourceless man. But its fine-grained, chocolate-coloured, polishable wood was demanded for an Emperor's Mausoleum, and defeat was not in the scheme of reckoning of the men seeking it out. Buying the winch from the carcase of a steamer cast on the reef near Zamboanga, and connecting it with a condemned donkey-engine picked up in the same palm-fringed port, the improvised hauling gear was placed upon a raft and was towed 85 miles across the Celebes Sea—a feat of merit in itself—to the hole in the mangrove swamp whence entered the party on its first exploring expedition. And that hole was pushed into the steaming heart of the jungle, bolos cleaving the mangroves root and stem, till a canal three miles long had been made. Up this canal the raft was steadily pushed till the last corpse of the forest monarch was reached, and there hauling commenced. Suspended between dug out canoes 60 to 80 feet long, the unfloatable logs were dragged stage by stage to the lapping sea, and journey after journey was made, the wire hawser, the winch and the patience and endurance of the human enduring till the last of the 338 was landed in the sunlight. Then another feat had to be accomplished. No harbour could be found for the chartered steamer Hellas, nearer than Buluwan Island, sixteen miles off, and across this span of sea log after log had to be towed in the calm waters of early morning, the slightest breeze rendering transportation dangerous owing to the heaviness of the timber and the frailty of the supporting canoes. Six of the largest logs went to the bottom in fourteen fathoms of water owing to the canoes filling in a blow, and those logs are still among the blind eyed snakes and dank sea growths. But the qualities which invariably win out triumphed in this as in other



ANOTHER VIEW OF THE LOADING PROCESS

A MIDNIGHT MARAUDER OF THE MINDANAO JUNGLE

difficult enterprises, and between May and November of last year the whole of the work was accomplished, there being on the 20th of the latter month a dead weight of 4000 tons of timber in the holds or on the deck of the steamer Hellas, ready for transportation to China. Logs weighing up to 21 tons each were skillfully handled by natives who had never before seen a steamer, and although all wire and hempen hawsers broke in turn only one accident of note occurred—an accident which might well have put a period to the usefulness of the Hellas had the hold been empty—for one of the heaviest logs broke its hawsers whilst in mid-air and in its descent to the hold broke in half the huge log it fell upon and badly split a second one against which it pounded. Vivid imagination is not needed to indicate what might have happened had one of the earlier logs fallen upon the unprotected bottom of the steamer.

Difficulties of the sort related, however, were nothing in comparison with those encountered by the humans from fever and poison, and at times all the camp were sufferers, and some mortally so. The laborers constantly fell victims, and at one period the whole of the crew of the steamer, officers included, were attacked with malaria. Natives succumbed and white men fared badly throughout the sojourn in the jungle, and to cap the series of troubles Mr. Seitz himself was on the verge of death from blood poisoning caused by a scratch from a sea urchin on the foot. Careful nursing by an American nurse and strength of constitution of the sufferer overcame the terrors of the malady, but Mr. Seitz is still unable to use the injured limb properly. He escaped where others have succumbed, however, the latest victim being an American army surgeon who was scratched whilst crossing one of the swamps, and the money paid for the logs by the Chinese Government will scarcely compensate for permanent injury to a leg or for the loss of life and injury to constitution entailed in getting them out.

Those logs are now at Hai-ling, the site of the Emperor's tomb, 75 miles south of Peking, and about the same distance inland from the line running to Hankow, and there they were got from Chinwantao—where they were unloaded from the steamer—by railway.

The Mausoleum of the Empress Dowager, who died about the same period as the Em-

ARTICULATED COMPOUND LOCOMOTIVE OF THE AMERICAN LOCOMOTIVE COMPANY

In 1910, American railroads curtailed their locomotive buying as much as possible; the significance, therefore, of this figure as indicating the growing faith in the articulated locomotive will be readily understood.

Since its installation in 1904, the original Baltimore & Ohio articulated compound locomotive has been operated in pushing service on the Connellsville Division between Rockwood and Sand Patch, 16 miles The track is exceedingly crooked, having seven curves of seven degrees. The maximum grade is 1%. In the Rockwood yard, the curves are even worse than on the road. With one consolidation at the head, the articulated locomotive handles a train of 2,200 tons on the above grade at a speed of 18 miles an hour. It does the work of two consolidation locomotives in pushing service, at a saving in the cost of maintenance alone of 38%; as shown by the following figures from records:

From January 6th, 1905, to December 31st, 1910, the total cost of repairs to the articulated locomotive, including running and classified repairs, per actual mile run was 11.07 cents, the corresponding aggregate figure for the two locomotives which it replaced was 18.2 cents per the same unit. This is based on the average for 13 consolidation engines in identically the same service as the articulated locomotive for a period of two years.

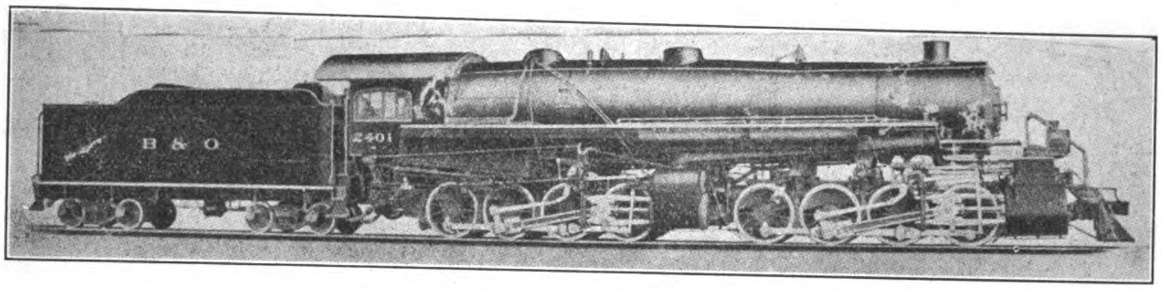
This locomotive is in operation 24 hours a day, running forward up the hill and backing down, and is never turned. It has been necessary to make all running repairs at a terminal having only one machinist and one boilermaker, a sure indication that little attention has been required in the matter of running repairs.

With the track conditions previously mentioned, an exceptionally good opportunity has been afforded to determine whether there was any tendency toward excessive flange wear due to the wheel arrangement. Careful comparison between the articulated and consolidation locomotives in the same service shows that the former makes about four times as much mileage as the latter between tire turnings necessitated by flange wear. The articulated engine made 47,234 miles for the first set of tires, while the consolidation locomotives make an average of only 10,000 to 12,000 miles.

In the matter of wear in the valve motion, it has shown a marked advantage as compared with the consolidation locomotives. In 4,454 miles, the lost motion in the valve gear of the articulated engine was 3/64 in., as compared with ½ in. for the consolidation locomotives for an equal length of time and measured in the same way.

No trouble has been experienced with the flexible joints; and practically no attention has been necessary to keep them in repair.

In the matter of boiler repairs, the record of the articulated locomotive has been exceptional. It still has the same fire box with which it was equipped when delivered seven years ago.



230-TON ARTICULATED COMPOUND LOCOMOTIVE

Built for the Baltimore & Ohio Railroad

GENERAL DIMENSIONS

Gauge of Track	4 ft. 8½ in.	Fuel	Bituminous Coal
Maximum tractive power, compound	105,000 lbs.	Boiler pressure	210 lbs.
Maximum tractive power, simple	126,000 lbs.	Weight on driving wheels	461,000 lbs.
Heating surface, fire box	321.5 sq. ft.	Wieght, total of engine	461,000 lbs.
Evaporating heating surface, tubes	5205.5 sq. ft.	Weight, total of engine and tender	642,500 lbs.
Total evaporating heating surface	5527 sq. ft.	Extreme height	15 ft. 6 in.
Superheating surface	1002 sq. ft.	Extreme width	11 ft. 6 in.
Grate area	100 sq. ft.	Length over all	93 ft. 3⅜ in.

For the six years from January 6th, 1905, to December 31st, 1910, it was available for service 40,011 hours out of a possible 50,343, or practically 80% of the total time.

The Baltimore & Ohio officials freely admit that in reliability, cost of repairs and fuel consumption, per unit of work done, it is one of the best engines on the road.

The locomotives illustrated in these columns will operate on the division between Cumberland and Grafton. They will be used in pushing service, part of them on the six-mile grade East out of Newburg, and the remainder on the 12-mile grade between Rowlesburg and Cranberry. On the former grade, the steepest rise is 2.27%; while on the latter the ruling gradient is 2.2 combined with uncompensated curves of 12 degrees. There are also reverse curves of 9.5 and 4 5 degrees on this grade.

Though the sharpest curves on the road are 12 degrees, the locomotives are built to pass curves of 20 degrees in the yards and terminals.

They are designed to handle a train of 1,750 tons on the ruling grade with a Baltimore & Ohio Class E-19-A consolidation locomotive, rated at 475 tons, at the head. This leaves 1,275 tons to be moved by the pusher.

In actual service, these later engines have exceeded their theoretical capacity by a considerable margin.

On a recent occasion, locomotive 2405, with a Baltimore & Ohio consolidation locomotive rated at 475 tons, handled a train of 2,032 tons on the 2.01% six-mile grade from Newburg to Kingwood tunnel. The articulated locomotive pushed 1,557 tons.

The locomotive was stopped by a flag on the worst part of the grade for five minutes, after which, it easily started the train when thrown into simple working. The six miles were made in a total time of 47 minutes, including the five minutes' stop, making the actual running time 42 minutes.

The load pushed by locomotive No. 2405 was 132 tons more than three consolidation

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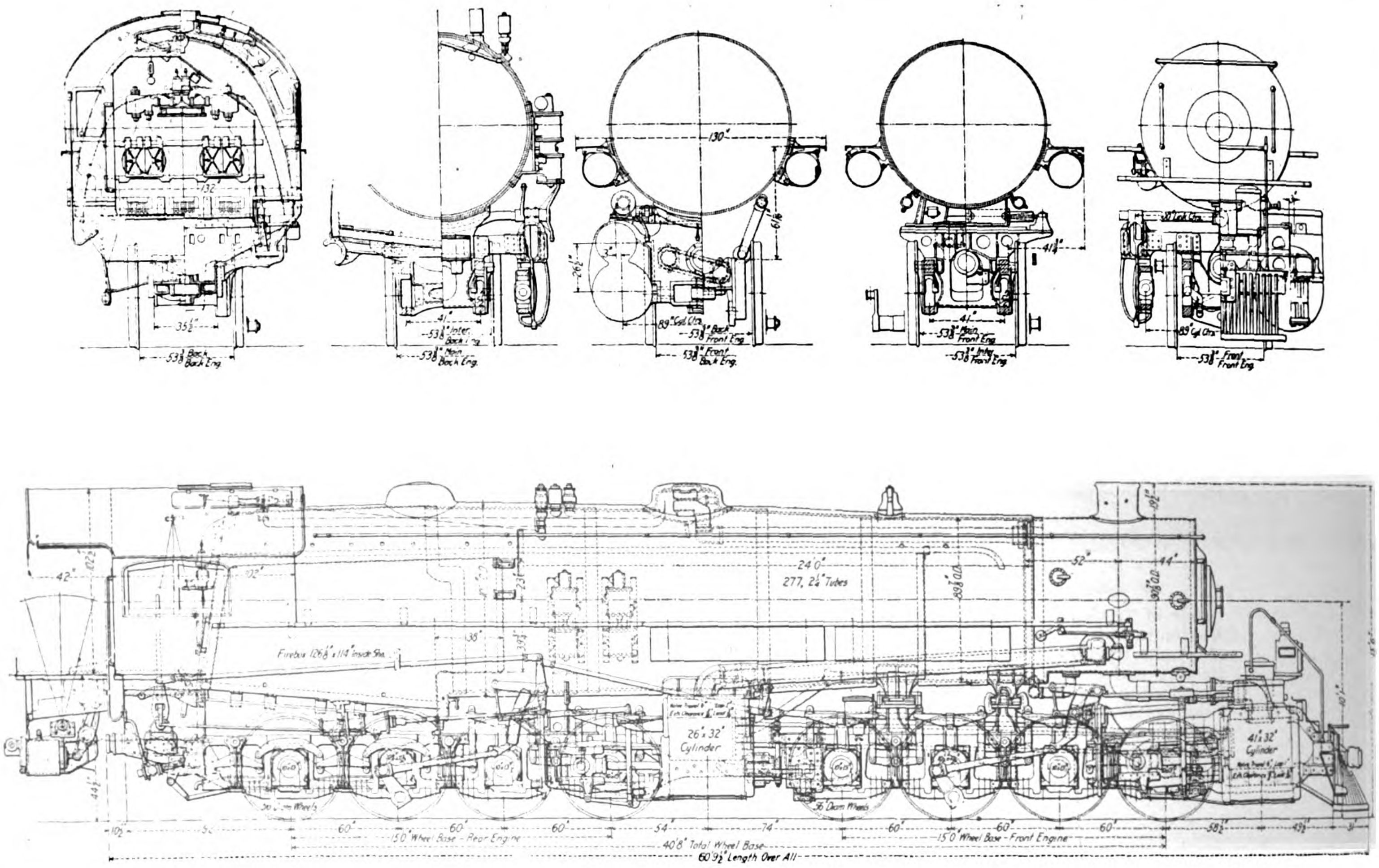
peror, was built by the "Old Lady" herself from timber procured from the Celebes during her lifetime, and she spent upon her last resting place about four million taels (Taels 4,000,000). It is not far from where the late Emperor's Mausoleum will be, but the latter will only cost about 2,000,000 Taels at most, though of similar design. The grave of the Emperor—where reposes the coffin—is hewed from solid rock in a hill side, and one-third of a mile from the grave is the main gate of the Mausoleum. The foundation of the Mausoleum is of stone with white marble tiles and railing, all being carved with the five-clawed dragon design (similar to that of the Temple of Heaven). The tiles and steps are all laid in odd numbers, the Chinese being superstitious of even numbers. The Mausoleum itself is supported on four main columns 48 feet high and five to six feet in diameter, and numerous other minor columns. Twenty-four of the largest logs have been, or will be, used as cross-beams, and will weigh on an average 16 tons each, one being as much as 21 tons. These logs will be hauled into place and fitted into sockets without being fastened, so designed as to resist the effect of earthquakes and render the Mausoleum permanent for all time. Around the Mausoleum will be a moat, and residences for the official caretakers. Across the moat fronting the Mausoleum will be five marble bridges, two on the outside for the use of those in charge, the three centre ones for visitors. Of the latter three the middle one is for the Royal family and the other two for distinguished visitors at times when worship is proceeding. A spur railway has been built from the main Peking-Hankow line to the tombs and so they may be reached easily at certain periods, and are likely to be the object of curiosity to tourists when China is further opened to the travelling public ofthe world.



SIDE ELEVATION AND CROSS SECTION OF THE 230-TON ARTICULATED COMPOUND LOCOMOTIVE BUILT FOR THE BALTIMORE AND OHIO R. R. BY THE AMERICAN LOCOMOTIVE CO.

locomotives, having an aggregate tractive power of 124,800 pounds, had ever been able to handle on this grade; though the articulated locomotive are rated at a tractive power of only 105,000 pounds.

In the characteristic features of the type, these later engines follow the builders' practice established in the first Baltimore & Ohio articulated locomotive, which speaks well for the care with which the details were originally worked out.

Apart from the enormous increase in weight, the most important change from the previous locomotive was the application of a superheater. This is of the fire tube type, designed to give a high degree of superheat. Recent tests have demonstrated the value of the superheater for this type of locomotive.

Though the boiler is the largest ever built in which all the heating surface is utilized for evaporation, its design is in accordance with ordinary practice, except for the superheater; and embodies no new or unusual features. It incorporates a 38-inch combustion chamber, and the tubes are 24 feet long.

Because of the application of the superheater, a different arrangement of high pressure steam pipes from that used in the former design was necessary. This arrangement is shown in the illustration of the side elevation.

Another modification from the previous engine is an inside reach rod for the valve motion of the forward engines, extending along the center line of the engine and having a universal joint connection with the main reverse shaft. The flexible joints, sliding boiler bearings, spring centering device and power reversing gear are of the same construction as in the first articulated locomotive.

PROSPEROUS YEAR FOR J. G. WHITE & Co.

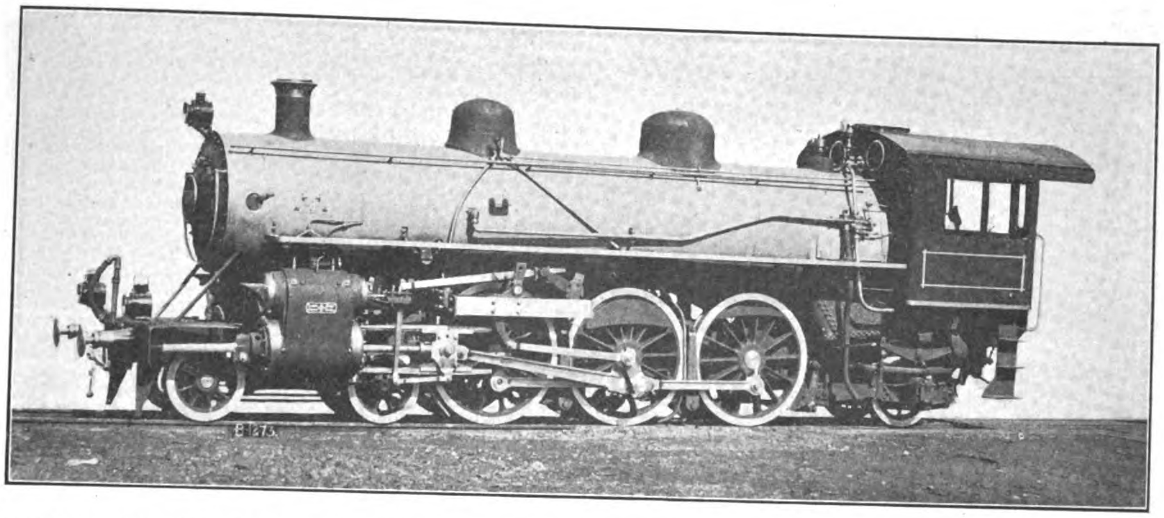
The annual report of J. G. White & Company, Limited, of London, recently presented at the Company's Twelfth Ordinary General Meeting by the Chairman, Mr. J. G. White, shows the phenomenal success of an engineering firm of American origin, though operating entirely as a British company. The English company is the direct outcome of the successful operations of J. G. White & Company, Incorporated, of New York in foreign territory. Organized in 1900, the English company was equipped to undertake the largest problems in the field of consulting, designing and supervising engineering and construction as well as the operation of Public Service properties and participation in financing such properties.

The English company has this year declared a total dividend of 12 per cent on its preferred stock and 62 per cent on its common stock, after which the net earnings for the year have been sufficient to write off the balance of "Purchase of Business" Account and increase the special reserve and surplus account to an amount equaling the total dividends paid. This has been done after making ample provision for contingencies and without writing up the value of securities owned. Some of these securities have increased materially during the year, so that even greater profits were actually made, although not realized, and, consequently, not considered as earned. The market value of the ordinary shares, par value £1, has increased from £1 6s in 1906 to £7 4s in 1911.

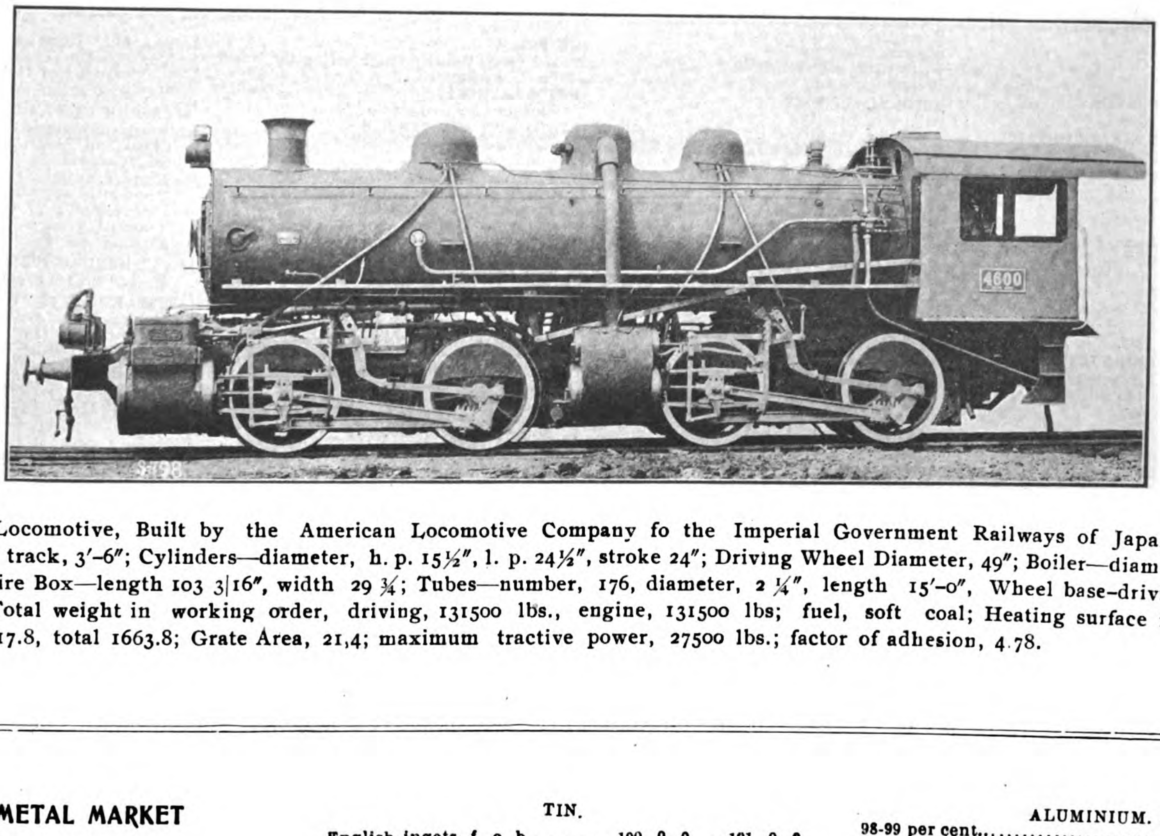
The Chairman in his report stated in part:

"The net profit for the year amounts to £91,466 as against £64,801 for last year; the quick assets of the Company in the form of cash and loans against securities, amount to £135,381, an increase of about £18,000 over the figures shown in the preceding year. This quick-asset item is nearly double the total single-creditor item on the other side of the balance sheet. The figure for investments stands at £150,781, which is also considerably more than twice the Company's total debts. This item shows an increase of approximately £28,000 over last year.

"During the ten and one-half years of the Company's life, including the distribution recommended in the report, the Company will have paid out in dividends £160,708 and has retained in the business out of profits, £182,787. The directors believe in continuing the policy of building up reserves and therefore propose that of the sum of £85,813 now available for distribution, £15,000 be allocated to writing off the balance of purchase of business account and a further £15,000 be placed to the credit of a new reserve account for the equalization of future dividends. This total sum of £30,000 having been set aside, your directors recommend a dividend of 7% for the half-year on both the preferred and ordinary shares, making, with the interim dividend of 5% paid January 1st, a total distribution of 12% for the year. As you know, the preferred shares are accumulative as to 6% and therefore they share with the ordinary up to a total distribution of 12%, the ordinary being entitled to remaining surplus profits. We further recommend an extra dividend of 10 s. per share or 50% on the ordinary shares, making a total of 62% for the year, leaving the balance of £19,812 to be carried forward to next year's accounts."



Class 462-137 Locomotive, Built by the American Locomotive Company for the Imperial Government Railways of Japan. Road Number 8606—Gauge of track, 3′ 6″; Cylinders—Diam. 18.½, stroke, 24″, Driving Wheel diameter, 63″; Boiler-diameter 56″, pressure 180; Fire Box—length, 72.3|16″, width, 54¼; Tubes—number, 16,} with diameter each of 5½, and 99 with diameter of 2¼″, length 16′ 3″; Wheel Base—driving, 11″-0″, engine, 29′-0″; Weight in pounds, working order—leading, 33500, driving 79500, trailing, 23500, engine 136,500; Fuel, soft coal; Heating surface in sq. feet—tubes, 1314, fire box, 95, total 1409, superheater, 280; grate area 27 sq. feet; Maximum Tractive power 19,900 lbs.; factor of adhesion, 4.



Class 0440 C 132 Locomotive, Built by the American Locomotive Company fo the Imperial Government Railways of Japan.—Road Number 4,600. Gauge of track, 3′-6″; Cylinders—diameter, h. p. 15½″, l. p. 24½″, stroke 24″; Driving Wheel Diameter, 49″; Boiler—diameter 59 1|8″, pressure, 180 lbs; Fire Box—length 103 3|16″, width 29 ¾; Tubes—number, 176, diameter, 2 ¼″, length 15′-0″, Wheel base-driving 7′-0″ & 2′-0″, engine 22′-8″; Total weight in working order, driving, 131500 lbs., engine, 131500 lbs; fuel, soft coal; Heating surface in sq. feet—tubes, 1546, fire box 117.8, total 1663.8; Grate Area, 21,4; maximum tractive power, 27500 lbs.; factor of adhesion, 4.78.

*LONDON METAL MARKET

AUGUST 11, 1911.

COPPER.	£ s. d.		£ s. d.
*Tough cake and ingot	60 5 0	..	60 15 0
*Best selected	60 5 0	..	60 15 0
*Electrolytic	60 10 0	..	61 0 0
*Sheets and sheathing	71 0 0	..	—
*Flat bottoms	74 0 0	..	—
*Copper tubes, seamless per lb.	0 0 8½	..	—
*Lake	60 15 0	..	61 0 0

* Less 3½ per cent. † Net.

ALLOYS.			
Brass: Wire	0 0 6¾	..	—
,, Tubes (solid drawn)	0 0 6¾	..	—
,, Sheets	0 0 7¼	..	—

*Mining Journal.

TIN.			
English ingots, f. o. b.	190 0 0	..	191 0 0
,, bars	191 0 0	..	192 0 0
,, refined	192 0 0	..	193 0 0
Banka (in Holland) Cash	191 15 0*	..	—
	—	..	—

*Close of market for prompt.

LEAD.			
English pig, L. B.	14 10 0	..	—
,, sheet and bar lead	15 12 6	..	—
,, pipe	16 2 6	..	—
,, red	16 10 0	..	—
,, white	19 5 0	..	—
,, patent shot	17 0 0	..	—

ANTIMONY.			
Antimony Crude	11 5 0	..	12 5 0
,, Ore (basis 50%)	7 5 0	..	7 15 0

ALUMINIUM.	Per ton.		Per ton.
98-99 per cent.	60 0 0	..	61 0 0

NICKEL.	Per ton.		Per ton.
98-99 per cent. guaranteed	167 10 0	..	171 0 0

PLATINUM.

Per oz. Troy, 172s. 6d.; nominal and subject to negotiation.

MANGANESE ORE.

Ore c. i. f., U. K. ports.	Per unit.*		
Indian or Brazilian, 50 per cent.	£0 0 9¼	to	£0 0 9½
,, ,, 48 ,,	—	..	9 0 9
,, ,, 45 ,,	—	..	0 0 8½
Caucasian 50 per cent. ..	—	..	0 0 7¾
,, 48 ,, ..	—	..	0 0 7½

*Unit corresponds to 1 per cent.

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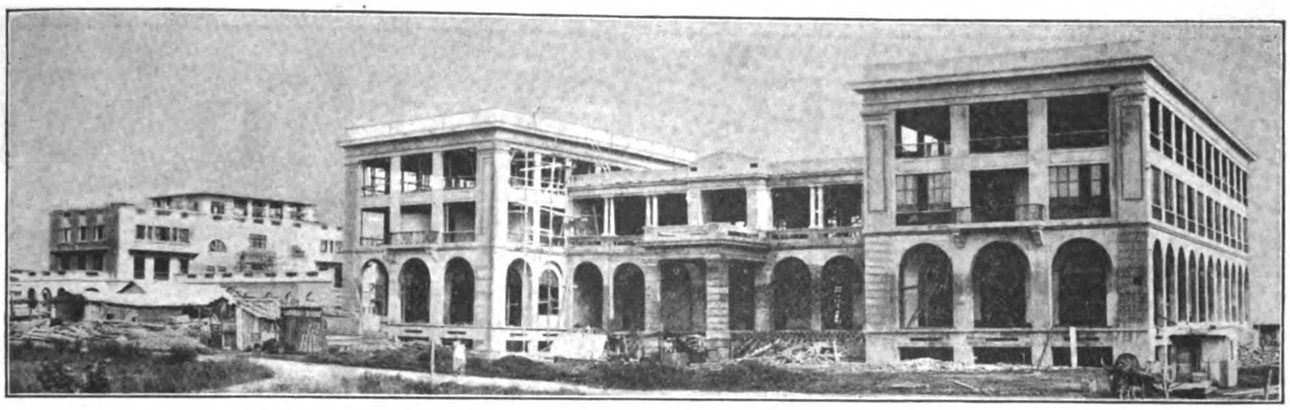

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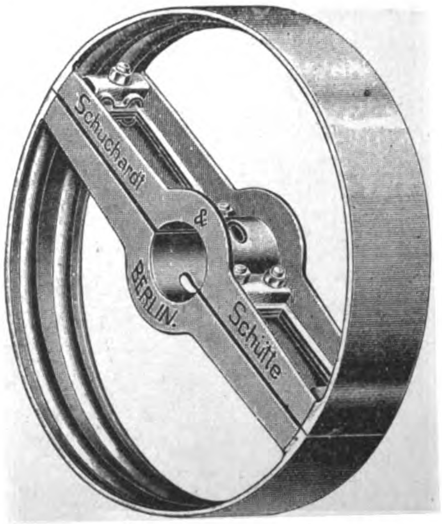

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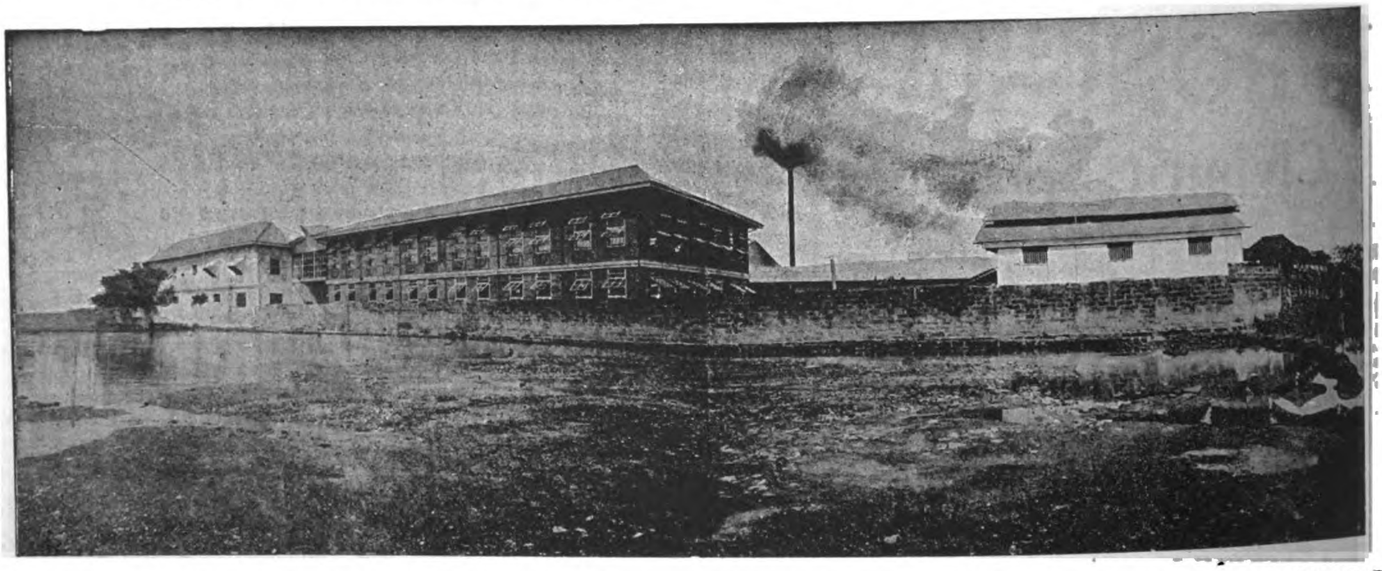

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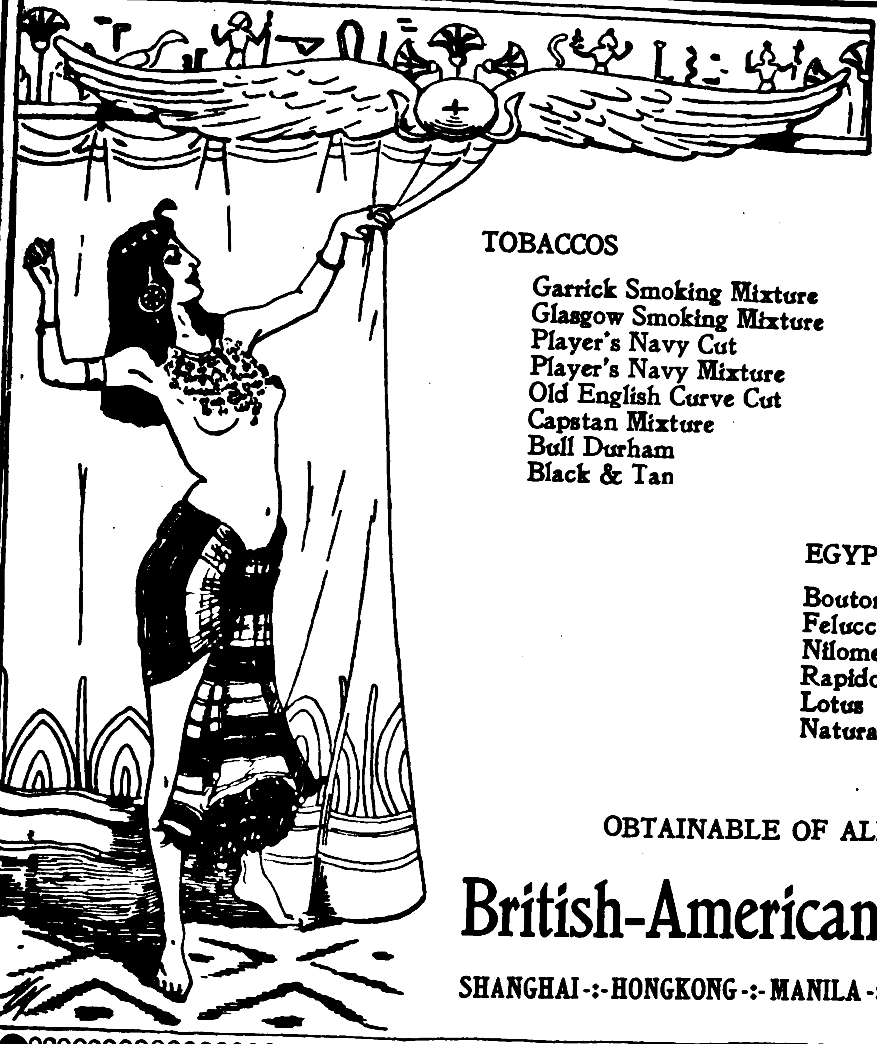

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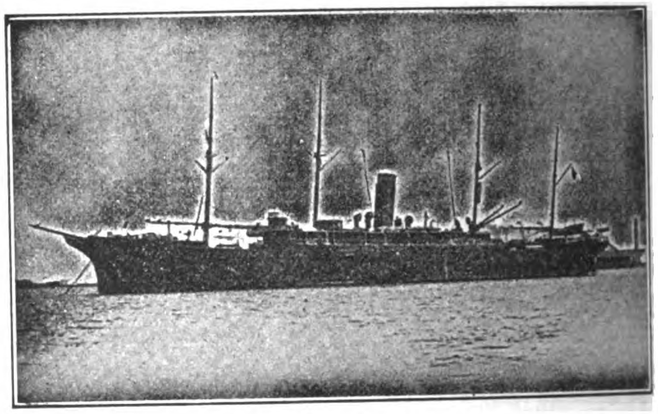

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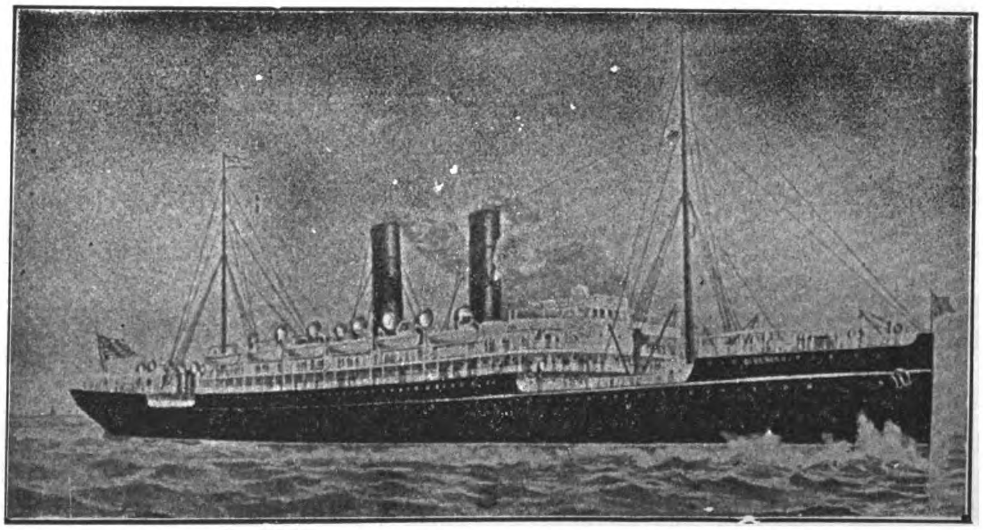

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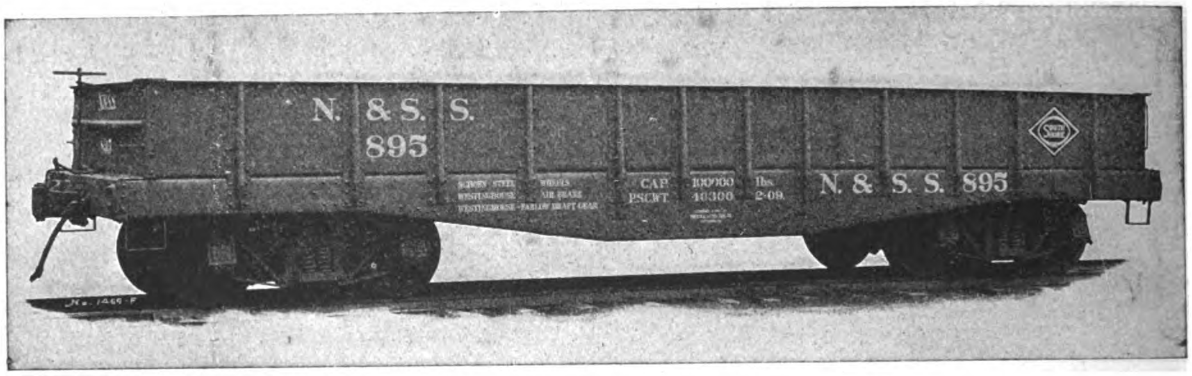

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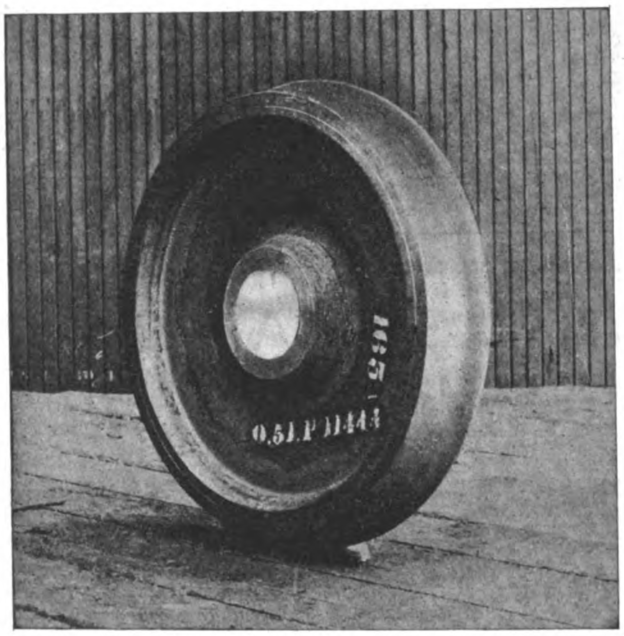

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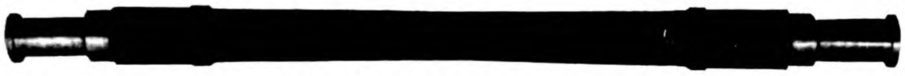

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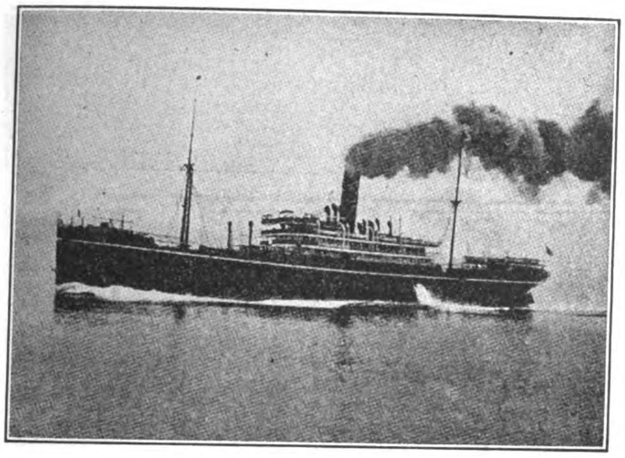

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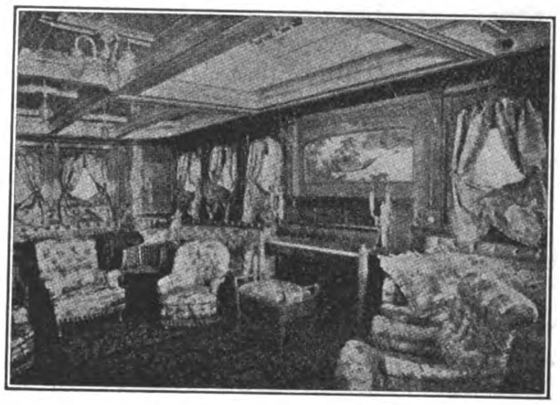

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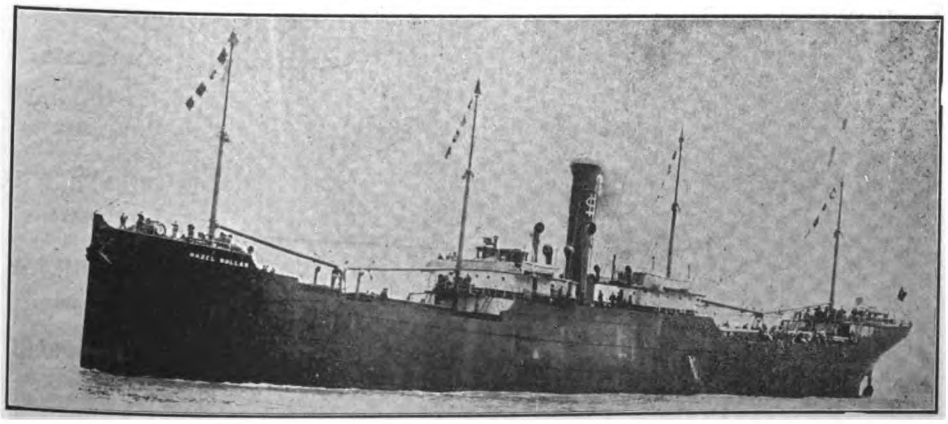

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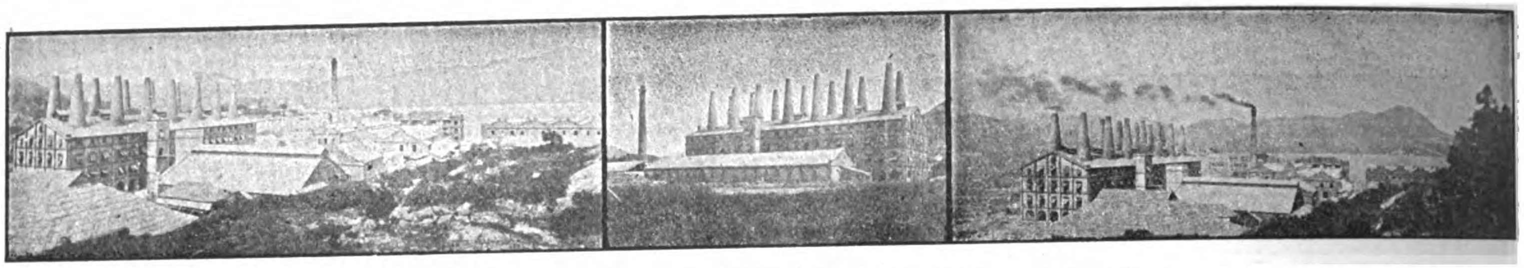

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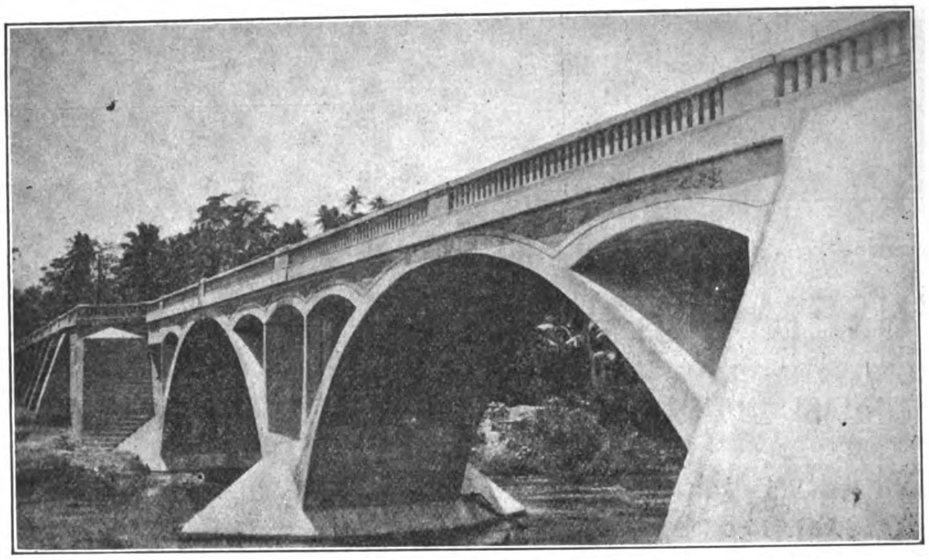

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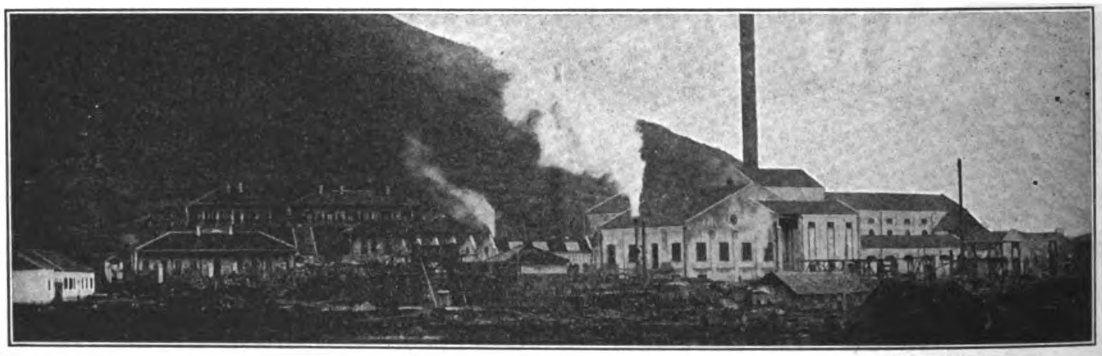

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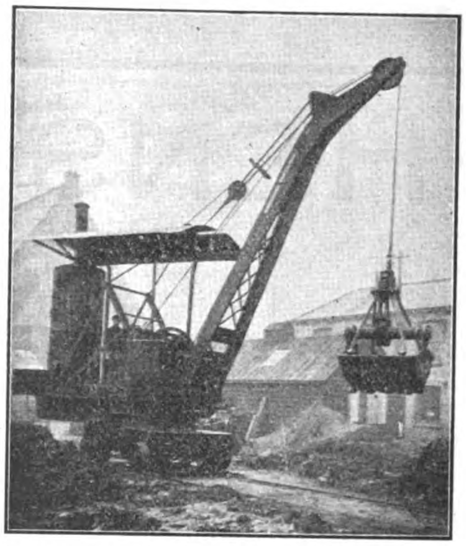

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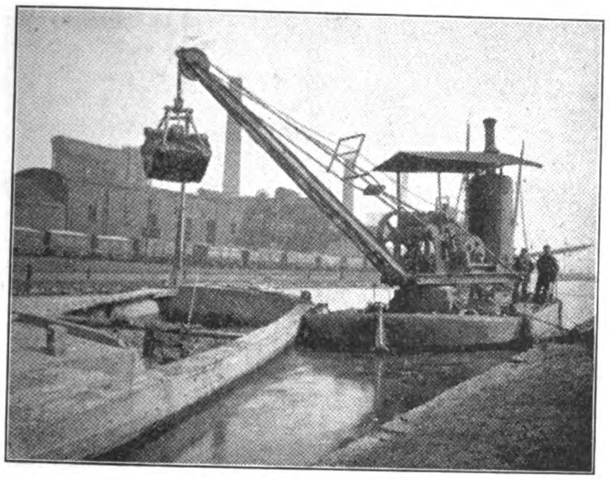

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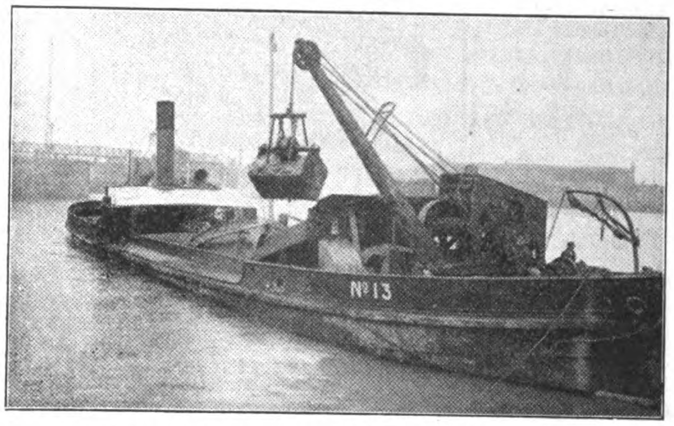

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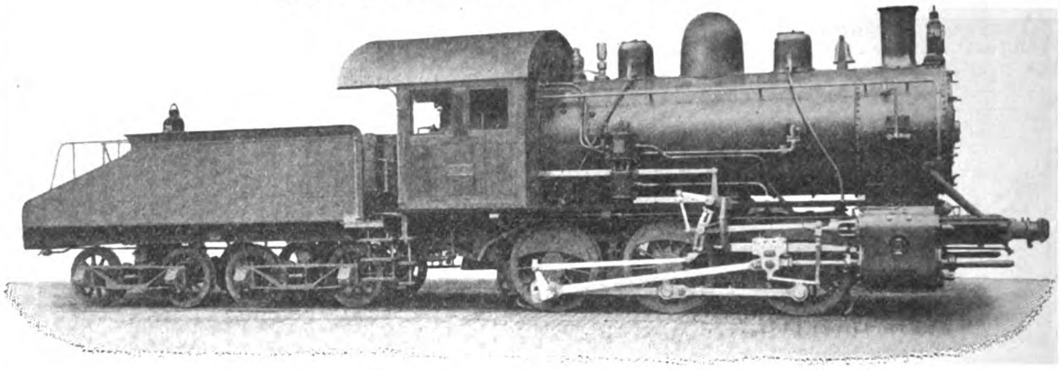

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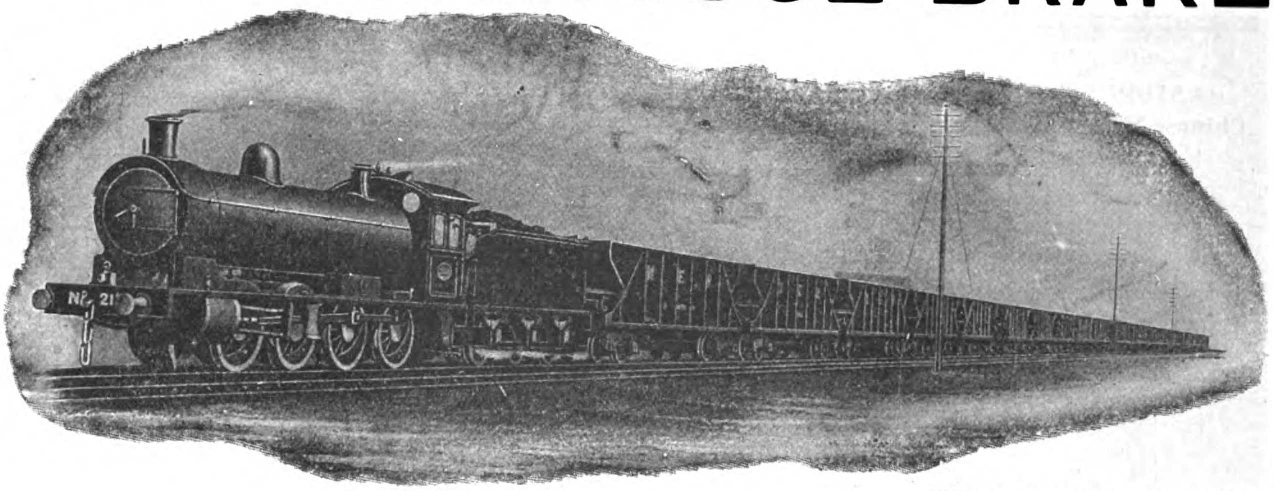

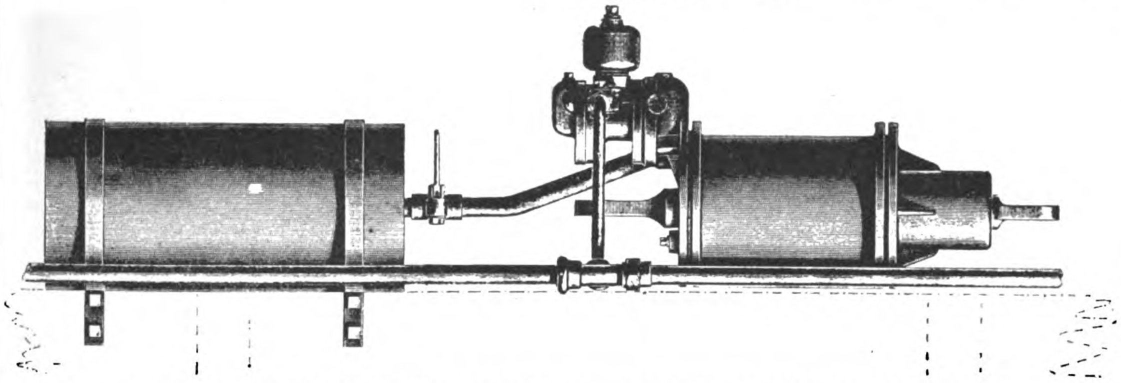

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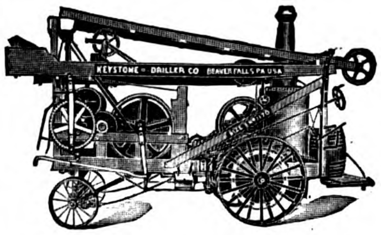

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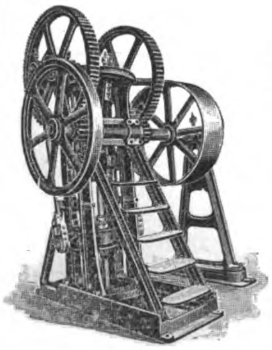

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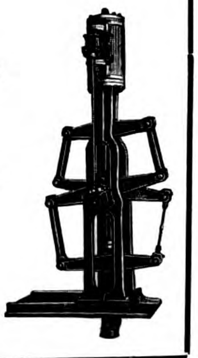

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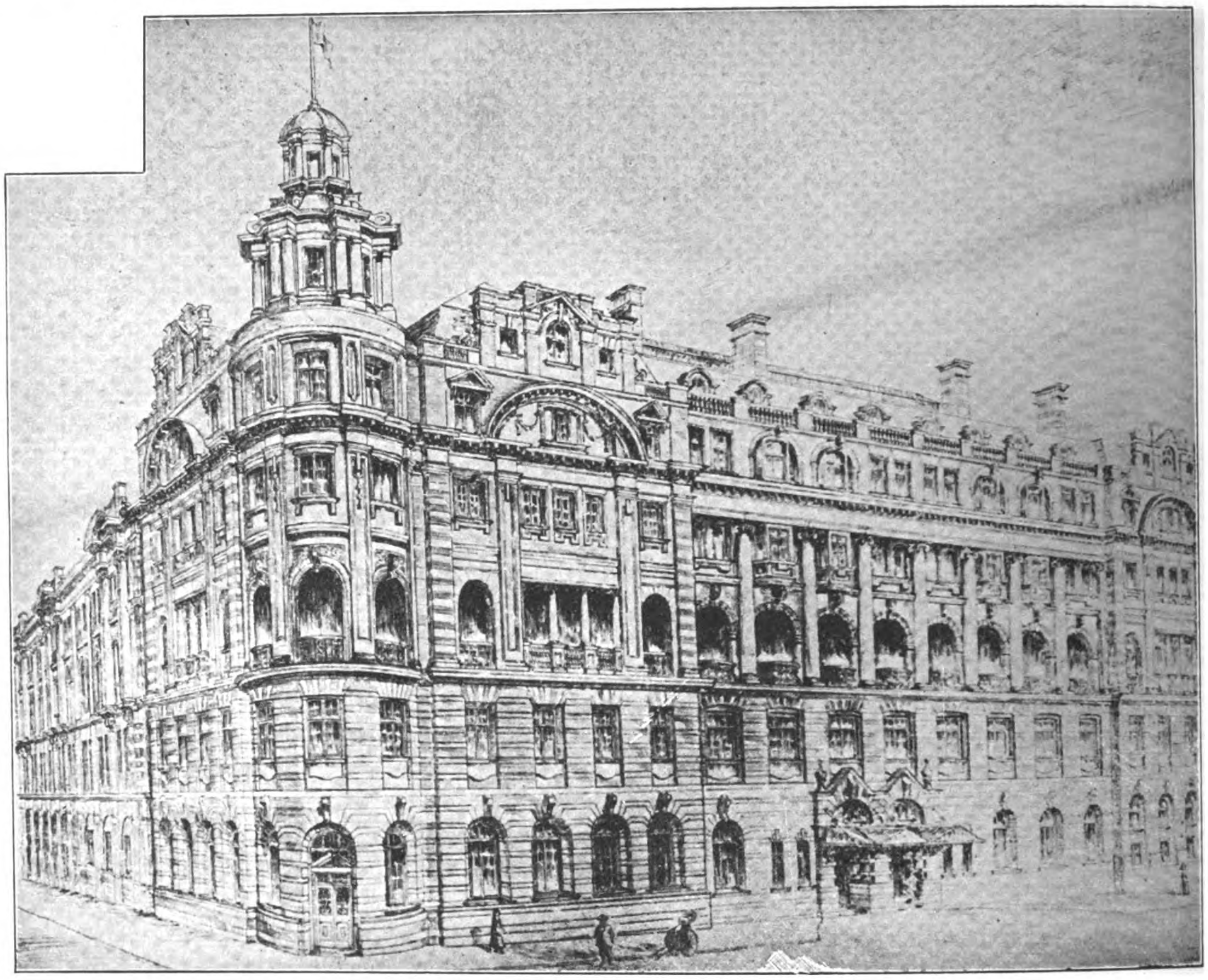

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TIENTSIN	C. E. & M. Co., Ltd., Office	MAISHAN
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CHINWANGTAO	do.	MAISHAN
HONGKONG	do. Alexandra Buildings	MAISHAN
SHANGHAI	do. 1 Jinkee Rd.	KAIPING
CHEFOO	Anz & Co. Agents	MAISHAN
DALNY	Cornabe, Eckford & Co. ,,	CORNABE
WEIHAIWEI	Lavers & Clarke ,,	MAISHAN
TSINGTAU	Arnhold Karberg & Co. ,,	MAISHAN
NEWCHWANG	Arnhold Karberg & Co. ,,	MAISHAN
MUKDEN	Arnhold Karberg & Co. ,,	MAISHAN
HANKOW	C. Monbaron ,,	MONBARON
SINGAPORE	Adamson, Gilfillan & Co., Ltd. ,,	GILFILLAN
PEKING	J. Redelsperger ,,	REDELSPERGER
LONDON	C. E. & M. Co., Ltd., Office 22 Austin Friars E.C.	KAIMACS
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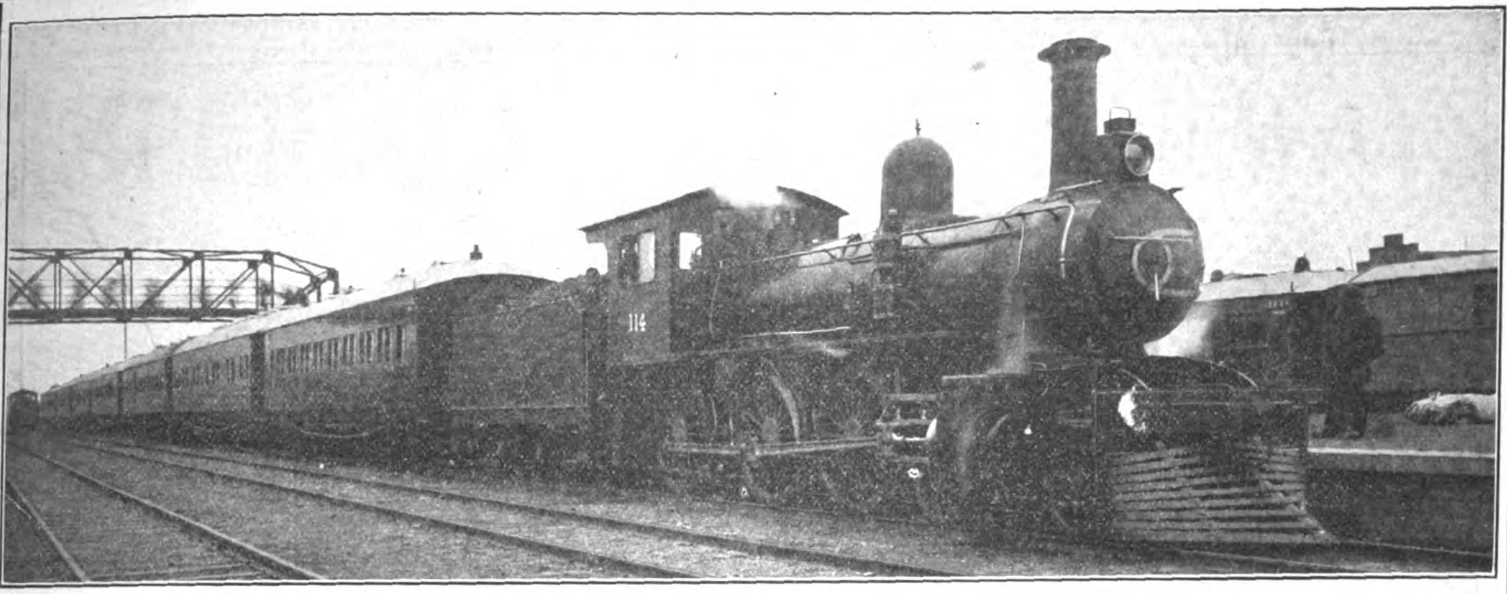


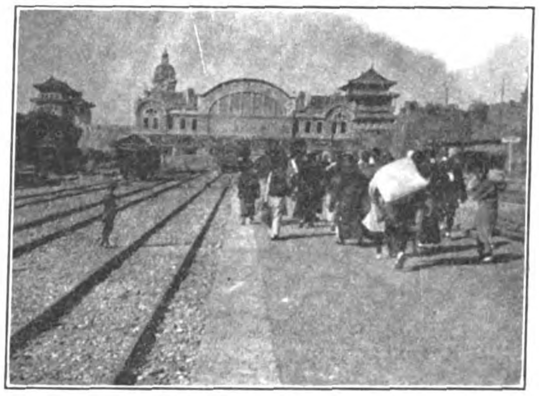
TRAIN DE LUXE AT TIENTSIN SETTLEMENT STATION

IMPERIAL RAILWAYS OF NORTH CHINA

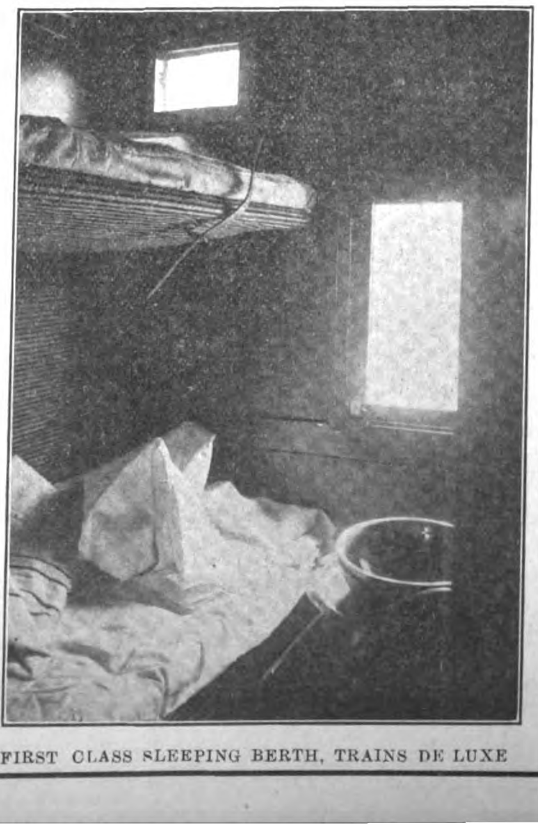
THROUGH SERVICE FROM PEKING TO MUKDEN, CONNECTING AT MUKDEN WITH THE SOUTH MANCHURIA EXPRESS FROM TRANS-SIBERIAN ROUTE: AT PEKING CONNECTION IS MADE WITH THE IMPERIAL PEKING-HANKOW RAILWAY FOR HANKOW AND YANGTSZE PORTS, AND INTERMEDIATE POINTS REACHED BY THE IMPERIAL CHEN-TAI LINE TO TAIYUANFU, THE TAO-CHING LINE, AND THE PEINLO RAILWAY TO KAIFENGFU AND HONANFU. CONNECTION IS ALSO MADE AT PEKING WITH THE PICTURESQUE KALGAN LINE, "THE ROAD TO THE GREAT WALL."

THE IMPERIAL RAILWAYS OF NORTH CHINA PASS THROUGH THE MOST INTERESTING PART OF CHINA

PEKING: THE CAPITAL, WITH ITS WALLS, PALACES, TEMPLES AND TOMBS.—**TIENTSIN:** THE GREAT TRADE CENTER OF NORTH CHINA. —**TONGSHAN:** THE LARGEST MINING AND INDUSTRIAL TOWN IN THE EMPIRE.—**SHANHAIKWAN:** WHERE THE GREAT WALL ENDS AT THE SEA.—**NEWCHWANG:** THE BUSY COMMERCIAL PORT OF MANCHURIA. —**MUKDEN:** THE ANCESTRAL HOME OF THE MANCHU DYNASTY. A MINIATURE PEKING, WITH ITS WALLS, IMPERIAL PALACES, TEMPLES AND TOMBS.



PEKING STATION



FIRST CLASS SLEEPING BERTH, TRAINS DE LUXE

THE THROUGH TRAINS ARE EQUIPPED WITH BUFFET AND DINING CAR SERVICE, AND A COMFORTABLE, MODERN TRAIN DE LUXE OF COMPARTMENT SLEEPING COACHES HAS BEEN PLACED IN OPERATION THIS SEASON TO CONNECT WITH THE THROUGH SERVICE OF THE TRANS-SIBERIAN AND SOUTH MANCHURIAN RAILWAYS

For further information apply to any office in America or Europe of

The Cie. Internationale Des Wagons-Lits, Thos. Cook & Sons, or Imperial Railways of North China

TIENTSIN, NORTH CHINA
J. E. FOLEY, Traffic Manager

THE CHIEN MEN GATE, PEKING, TERMINUS OF THE PEKING-HANKOW LINE

CHINESE IMPERIAL RAILWAYS

PEKING-HANKOW LINE

"THE ROAD THROUGH THE HEART OF CHINA"

Avoid the Cold and Rough Weather in the Sea Trip between Shanghai and the North by the more comfortable Route up the Yangtsze to Hankow, and from there via the Ching-Han Railway to Peking, where through connections for Europe are made with the Trains de Luxe of the Imperial Railways of North China.

This line passes through the Heart of the Empire and enables the traveller to and from Europe to catch a glimpse of Old China. Ancient walled cities, temples and pagodas are seen from the comfortable seats of the weekly trains de luxe operated by this line. From Peking, the great capital of the oldest civilization in the world, the train departs from the famous Chien-Men and carries the traveller through the historical and legendary portions of the Empire, to the modern industrial center at Hankow—the Chicago of China. Connections are made with the Cheng-tai Railway at Chengtingfu, with the Tao-Ching Line at Sin Siang-sien, and at Chengchowfu with the Pienlo Line.

A weekly express train de luxe leaves Peking every Tuesday, and Hankow every Friday, making the trip of over 700 miles in less than thirty hours.

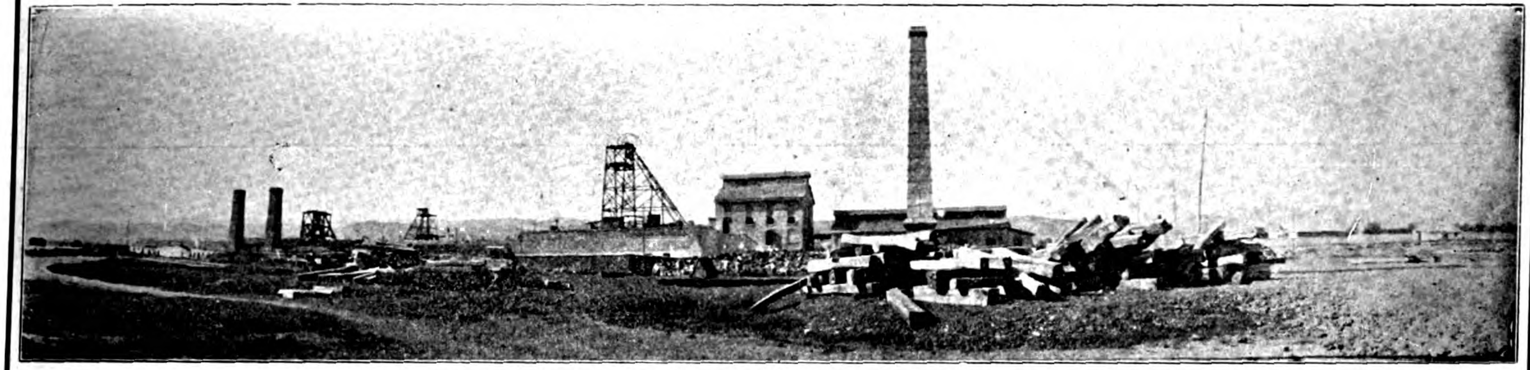
For information apply to any office of the International Sleeping Car Co. or Thos. Cook and Sons.

IMPERIAL CHINESE RAILWAYS

THE TAO-CHING RAILWAY

TAOKOU TO CHINGHUA

(Imperial Chinese Government Honan Line)



GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

"China's Road of Anthracite"

THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

THE PIENLO RAILWAY

(KAIFENG-FU TO HONAN-FU)

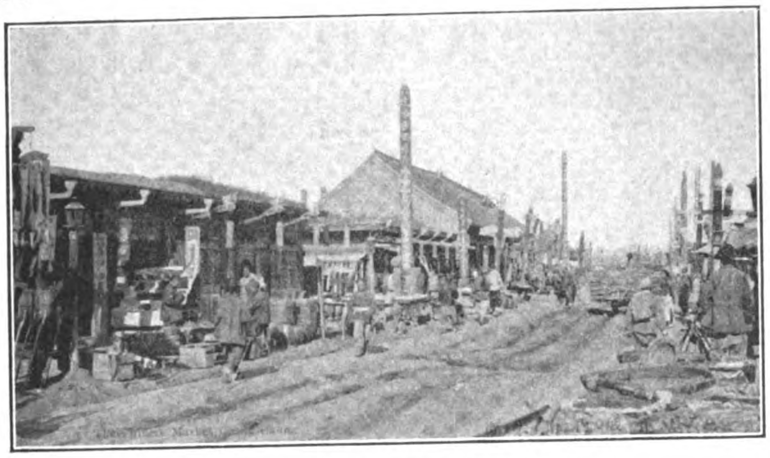
"THE FIRST SECTION OF THE PROJECTED CENTRAL TRUNKLINE"

CHUNG-HUAN TEMPLE, KAIFENG FU.

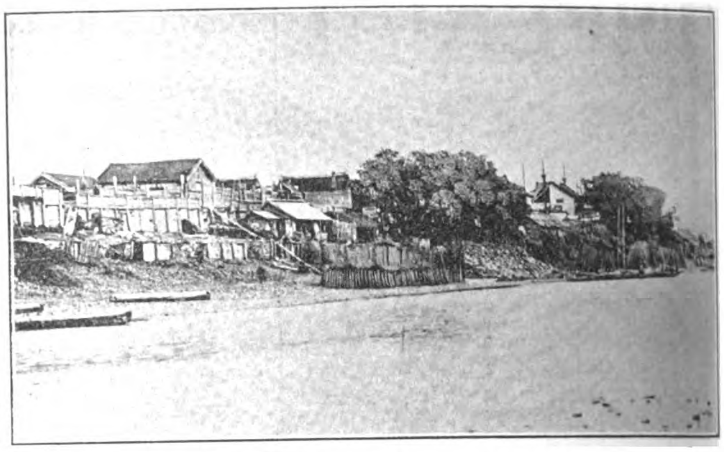
This line connects with the through service of the Peking-Hankow Railway at Tcheng Tchéou, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

IMPERIAL CHINESE RAILWAYS

KIRIN-CHANGCHUN LINE



CHINESE MARKET AT CHANG-CHUN



VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

TIME TABLE

The Kirin-Changchung Railway

DOWN TRAIN

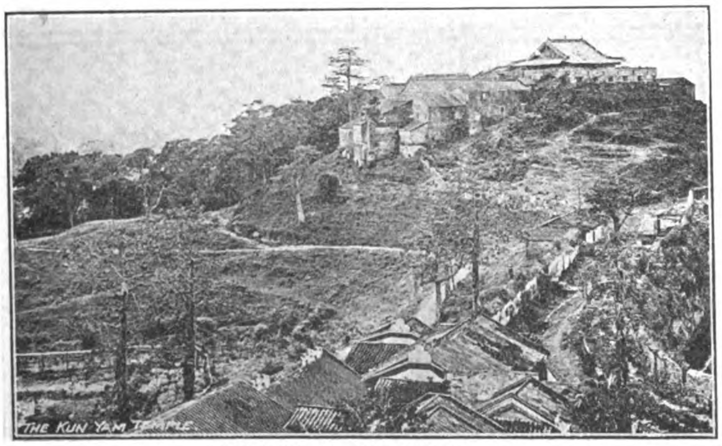
Station	*No.* *1* a. m.	*No.* *2* a. m.
Changchung	7:00	12:00
Coran	8:17	1:17

UP TRAIN

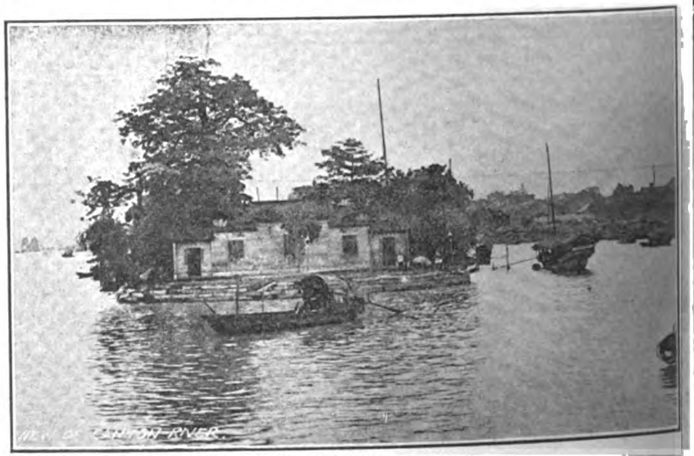
Station	*No.* *2* a. m.	*No.* *4* p. m.
Coran	10:00	5:00
Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS

CANTON-KOWLOON LINE



THE KUN YAM TEMPLE



VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 24th APRIL, 1911, UNTIL FURTHER NOTICE.

Canton (Ta Sha Tou) to Shek Lung

Miles	STATION		Daily Passenger Trains. No. 1	No. 3	No. 5
			A. M.	P. M.	A. M.
	Canton (TAI SHA TOU)	dep	7.30	11.00	3 00
3.63	Shiek Pai	arr	7.39	11.09	3 09
		dep	7.42	11.12	3 12
7.90	Che Pi	arr	7.53	11,23	3.23
		dep	7.56	11.26	3.26
12 58	Wu Chung	arr	8 07	11.37	3 37
		dep	8.10	11 40	3 40
17.09	Nam Kong	arr	8.21	11.51	3 51
		dep	8.25	11 55	3 55
21.67	Sun Tong	arr	8.37	12.07	4.07
		dep	8.41	12.11	4.11
23.61	Tong Mei	arr	8.46	12.16	4.16
		dep	8.50	12 20	4.20
25.54	Nga Yeo	arr	8 55	12 25	4 25
		dep	8 58	12.28	4 28
29.00	Sien Tsun	arr	9 07	12.37	4.37
		dep	9.11	12 41	4 41
32.25	Shek Ha	arr	9 22	12 52	4 52
		dep	9-24	12,54	4 54
34.77	Shek Tan	arr	9 33	1.03	5.03
		dep	9 37	1.07	5.07
36.34	Shek Lik Kou	arr	9.43	1.13	5.13
		dep	9.45	1.15	5.15
40.15	Shek Lung	arr	9.58	1.28	5.28

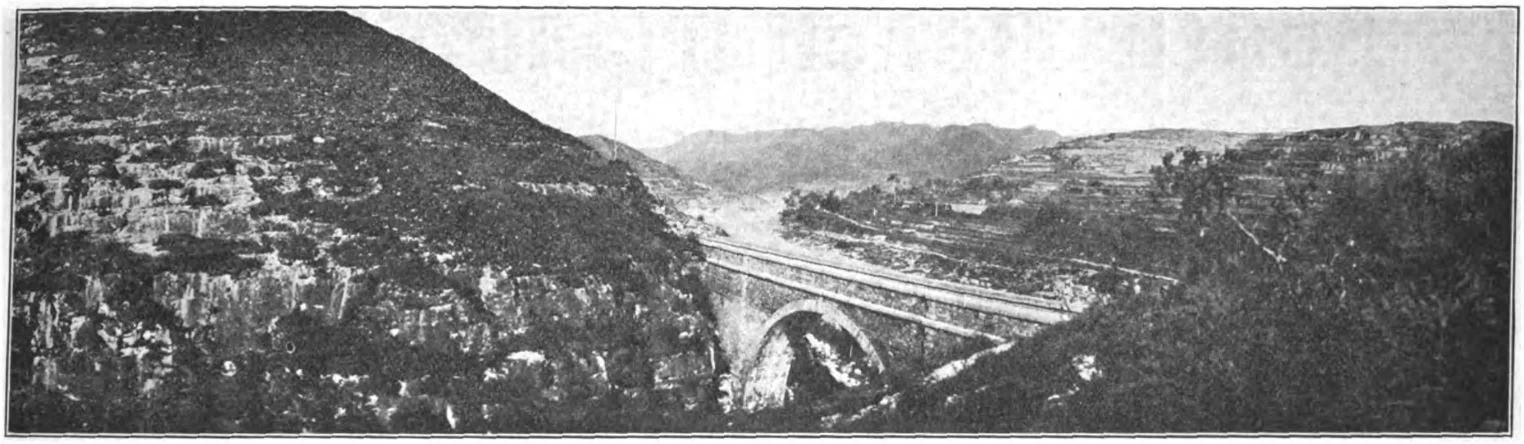
Shek Lung to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2	No. 4	No. 6
			A. M.	P. M.	P. M.
	Shek Lung.	dep	7.35	11.05	3 05
3 81	Shek Lik Kou	arr	7.48	11.18	3.18
		dep	7.50	11 20	3.20
5.38	Shek Tan	arr	7.56	11.26	3.26
		dep	8.00	11.30	3.30
7.90	Shek Ha.	arr	8.C9	11.39	3.39
		dep	8.11	11.41	3.41
11.15	Sien Tsun.	arr	8.22	11 52	3.52
		dep	8.26	11.56	3.56
.61	Nga Yeo	arr	8.35	12 05	4.05
		dep	8.88	12 08	4.08
16.54	Tong Mei	arr	8.43	12.13	4.13
		dep	8.47	12.17	4.17
18. 48	Sun Tong	arr	8.52	12.22	4.22
		dep	8.56	12 26	4.26
23 06	Nam Kong	arr	9.08	12.38	4.38
		dep	9 12	12.42	4.42
27 57	Wu Chung	arr	9.23	12.53	4.58
		dep	9.26	12.56	5 56
32 25	Che Pi	arr	9 37	1.07	5.07
		dep	9.40	1.10	5.10
36 52	Shek Pai	arr	9.51	1.21	5.21
		dep	9.54	1.24	5.24
40.15	Canton (TAI SHA TOU)	arr	10.03	1.33	5.33

IMPERIAL CHINESE RAILWAYS

The Cheng-Tai Railway

(IMPERIAL GOVERNMENT SHANSI LINE—CHENGTINGFU TO TAIYUANFU)

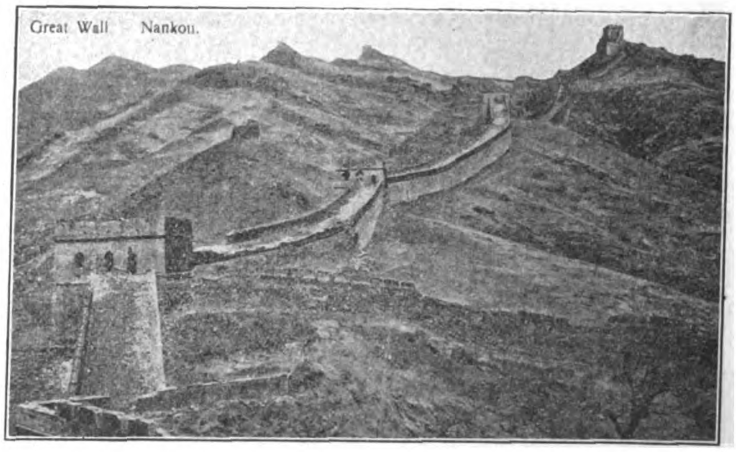


VIEWS ALONG ROUTE OF CHENG-TAI RAILWAY.

The trains of this line connect with the through service of the Peking-Hankow Railway, affording Travellers the opportunity of seeing the most picturesque part of China. The line passes through a mountainous section of country, rich in Mineral Resources to the Provincial Capital of Shansi at Taiyuanfu. This interesting city is a great educational center, and famous for the fine quality of its artistic embroideries.

The Peking-Kalgan Line

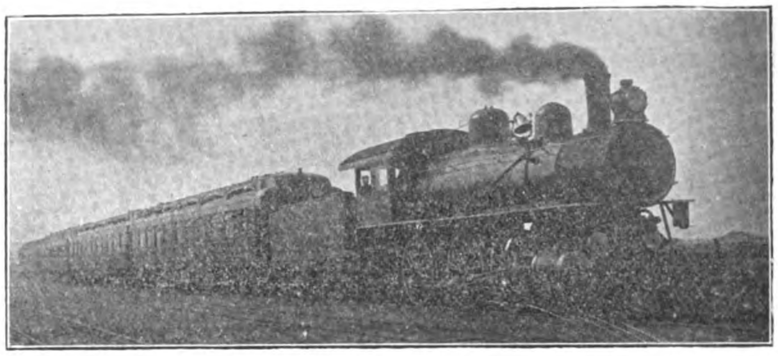
"THE ROAD TO THE GREAT WALL"



This line follows the ancient caravan route and military highway from Mongolia into China by the way of the historic Nankow Pass. This pass is the Key to Peking, and Kalgan is the gate of the Empire. From here the great camel caravans set out on their long journeys across Mongolia to Siberia and Central Asia. This old frontier mart, retaining its time-honored characteristics, one of the most interesting sights of the Old World, is made accessible by the new railway. The line also carries the passenger in two hours from Peking to Nankow, when the Great Wall of China and the Ming Tombs may be seen. A foreign hotel is operated by the railway authorities at Nankow, where chairs and guides may be secured for the Tombs.

TAOTAI JEME TIEN-YU, Director General

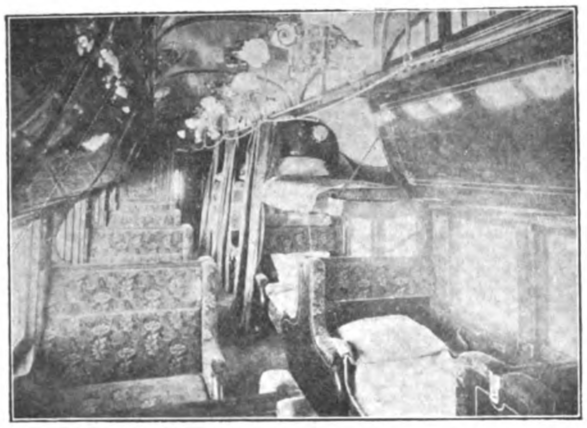
SHORTEST, QUICKEST AND CHEAPEST ROUTE BETWEEN THE FAR EAST AND EUROPE VIA DAIREN (DALNY)



THE SOUTH MANCHURIA EXPRESS

From Dairen	Time Required
To Changchun	12½ hours
,, Harbin	25 ,,
,, St. Petersburg (via) Viatka	10 days.
,, Berlin	11 ,,
,, Paris	12 ,,
,, London	12½ ,,

South Manchuria Railway



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THRICE WEEKLY EXPRESS TRAINS.—Composed of excellently equipped SLEEPING, DINING and 1st CLASS CARS, are operated between DAIREN & CHANGCHUN in connection with the TRANS-SIBERIAN ROUTE and SHANGHAI MAIL STEAMERS.

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CONNECTIONS AT MUKDEN.—These Express Trains connect at MUKDEN with the PEKING-MUKDEN RAILWAY running via TIENTSIN, and also with the MUKDEN-ANTUNG LINE traversing a most picturesque country and connecting with the KOREAN RAILWAY.,

OTHER STEAMER CONNECTIONS AT DAIREN.—Regular Steamship Services are maintained from DAIREN to MOJI, KOBE, CHEMULPO TIENTSIN, CHEFOO, TSINGTAU and other ports in Japan and China.

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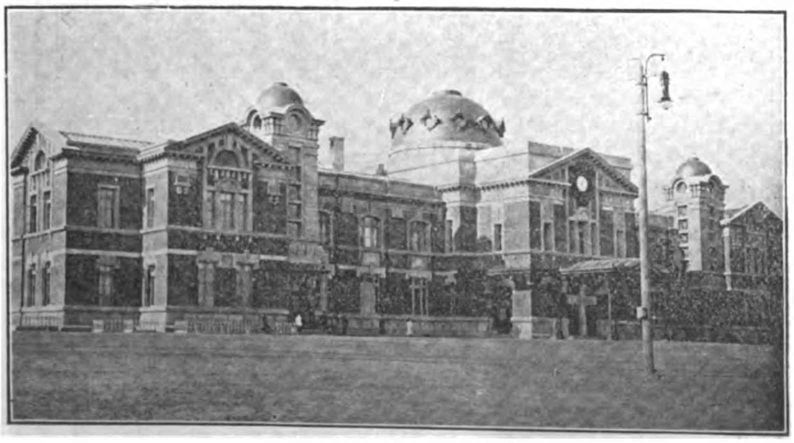
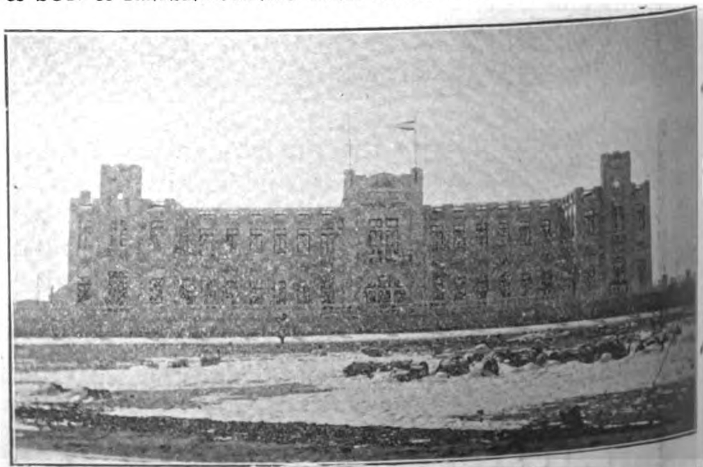


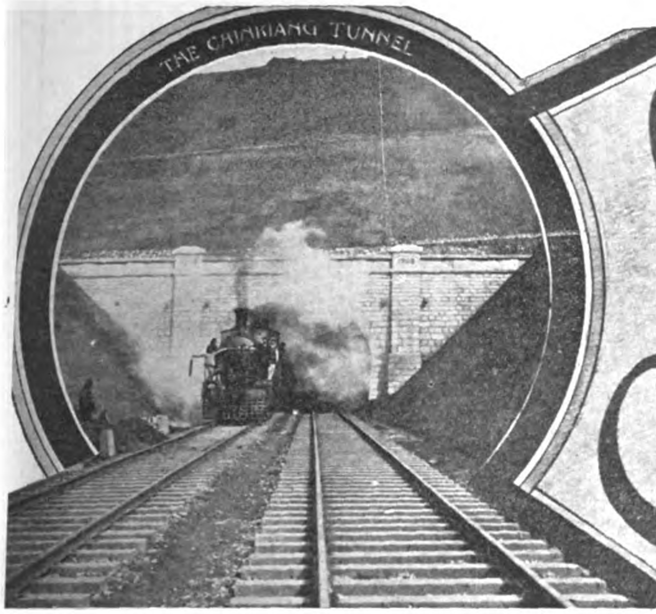
S. M. R. YAMATO HOTEL, MUKDEN



S. M. R. YAMATO HOTEL, CHANGCHUN

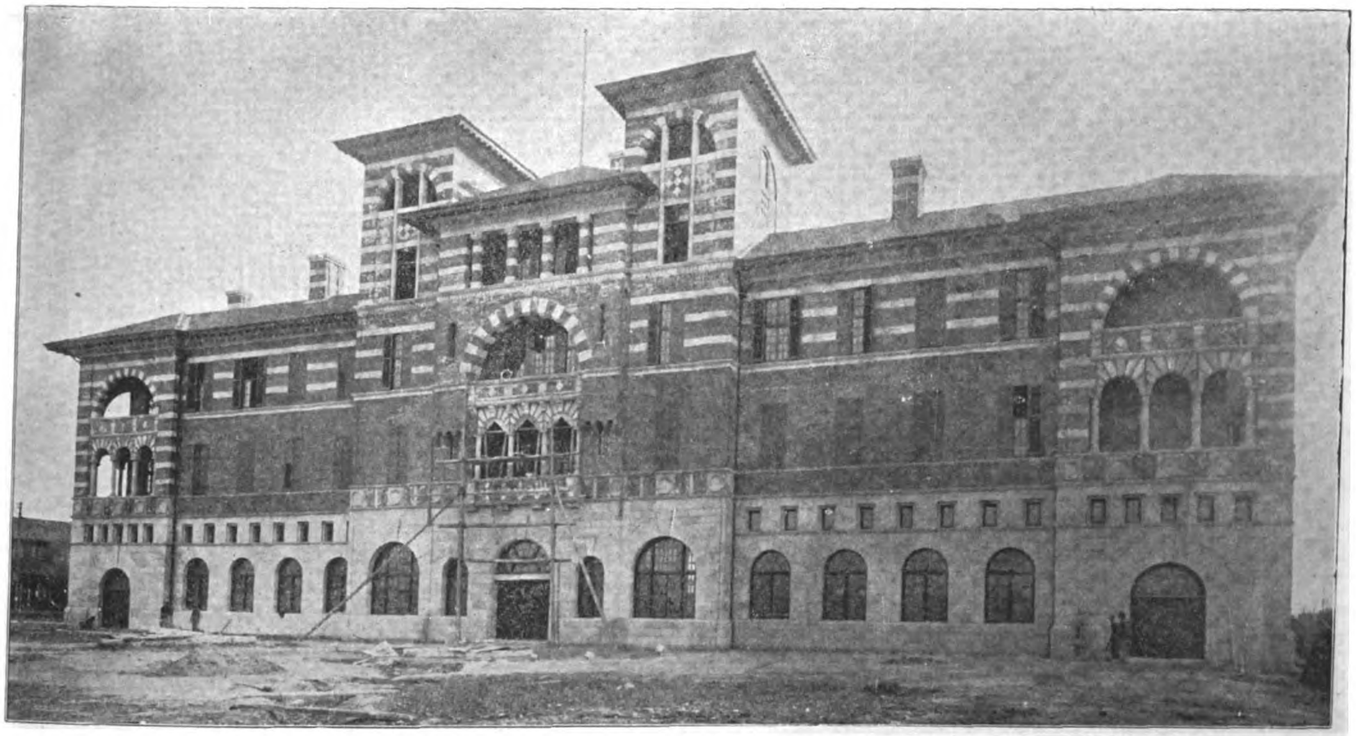
SOUTH MANCHURIA RAILWAY COMPANY, Dairen, Manchuria

Tel- Add.: "MANTETSU" -:- Codes: A. B. L. 5th Ed., A-1 and Lieber's



SHANGHAI NANKING RAIL-WAY

The Line of A Hundred Pagodas



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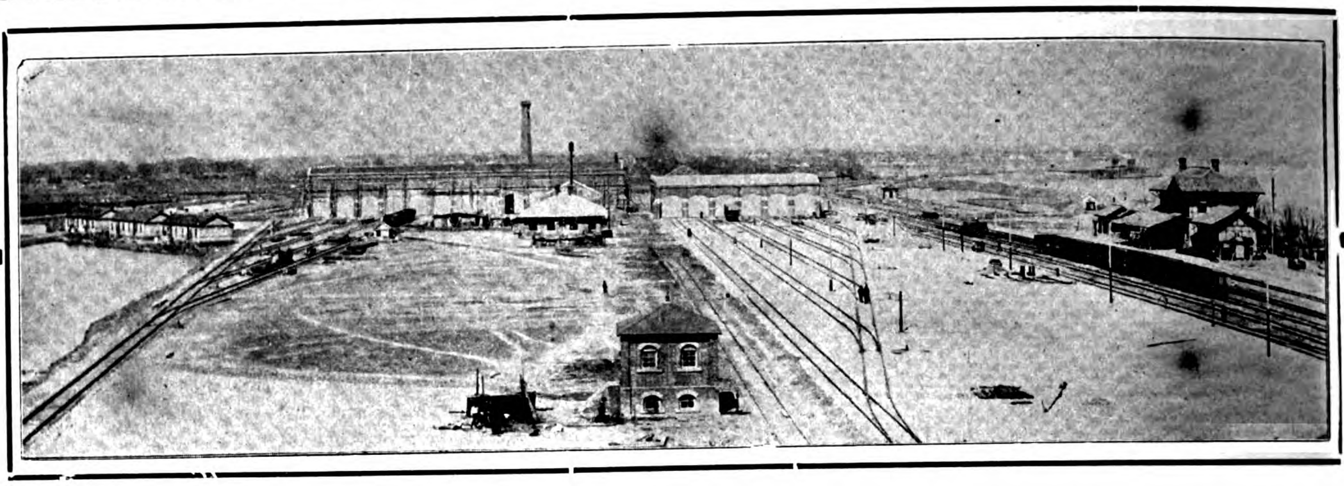

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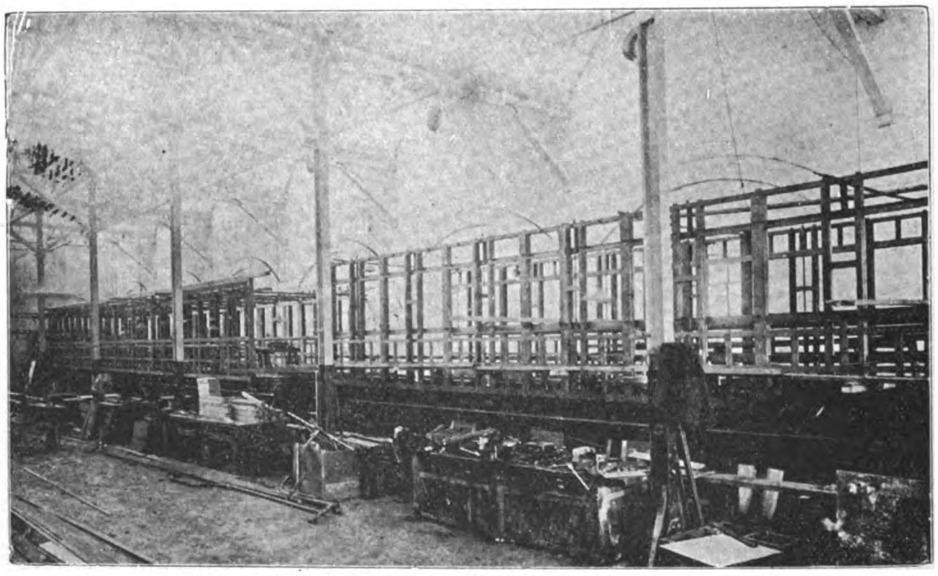

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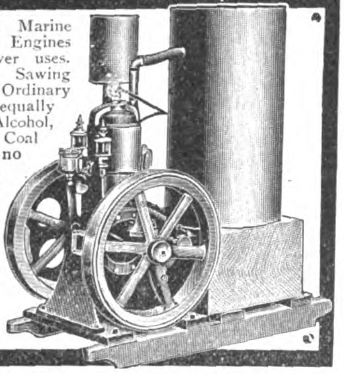

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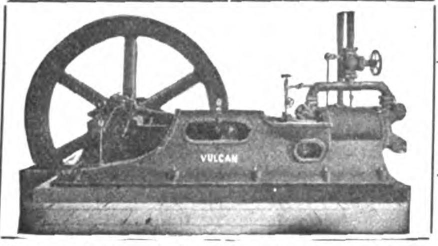
VUL  CAN

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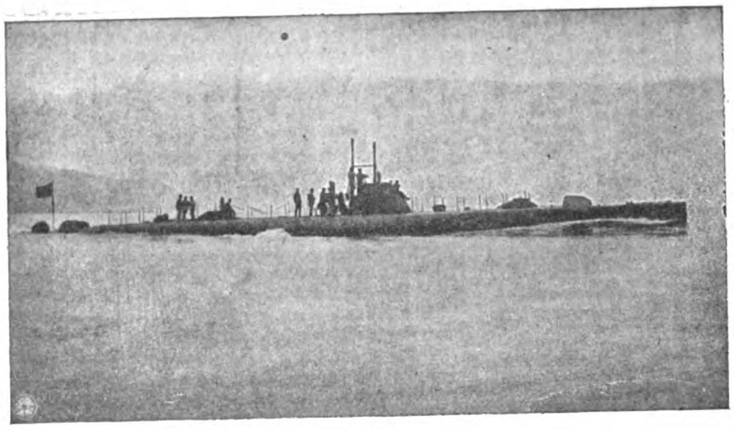

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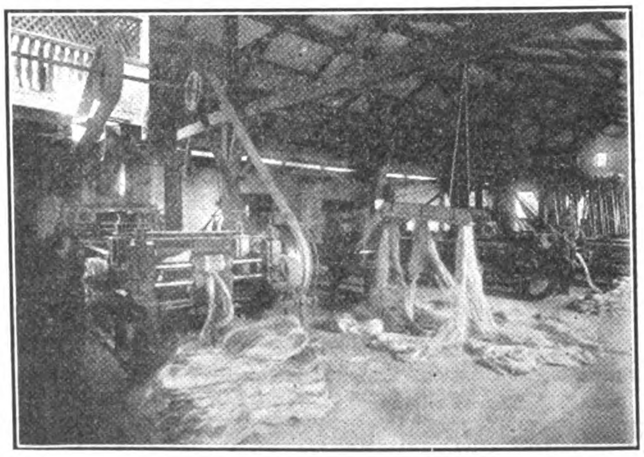

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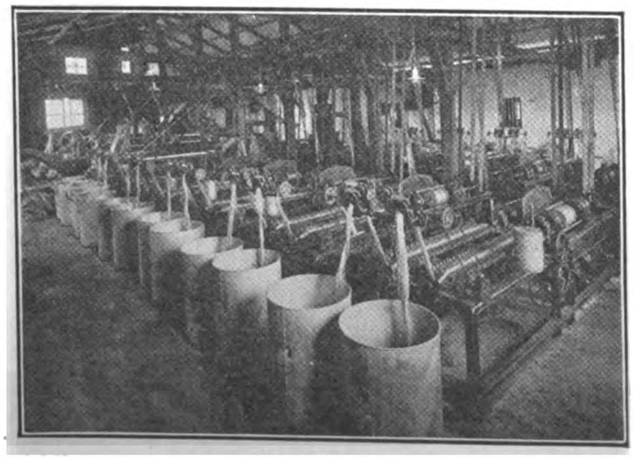
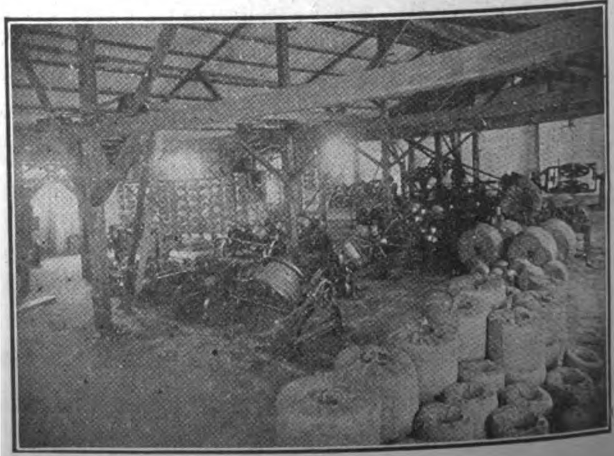


SPINNING



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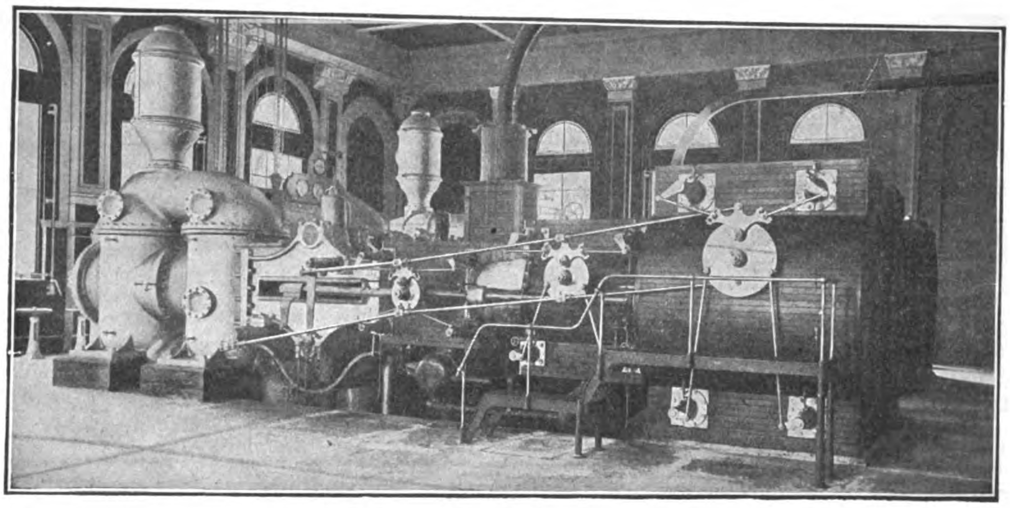

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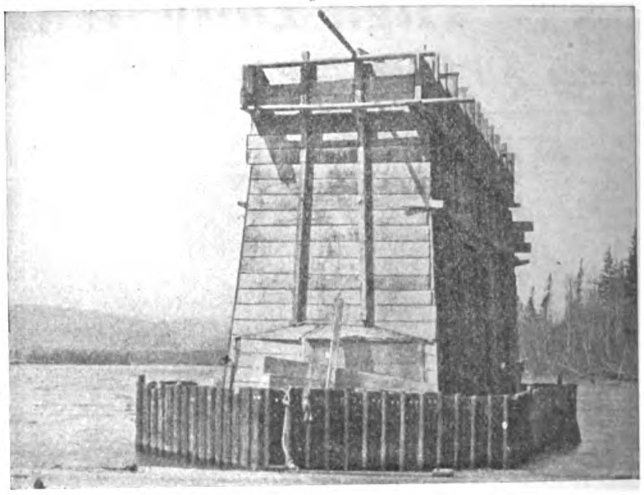

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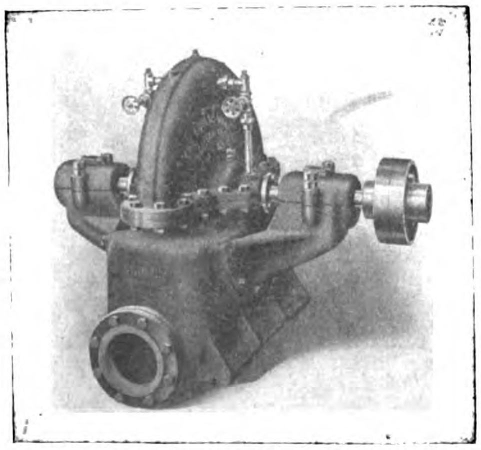

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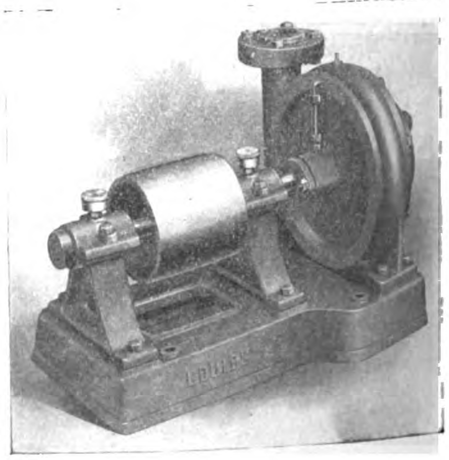

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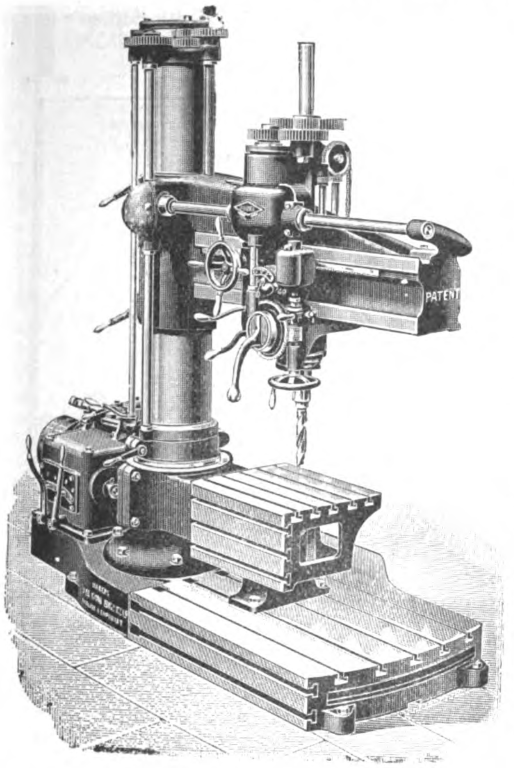

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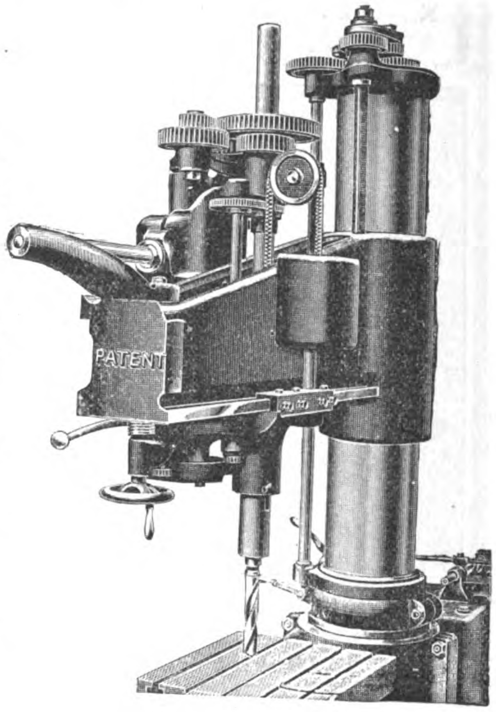

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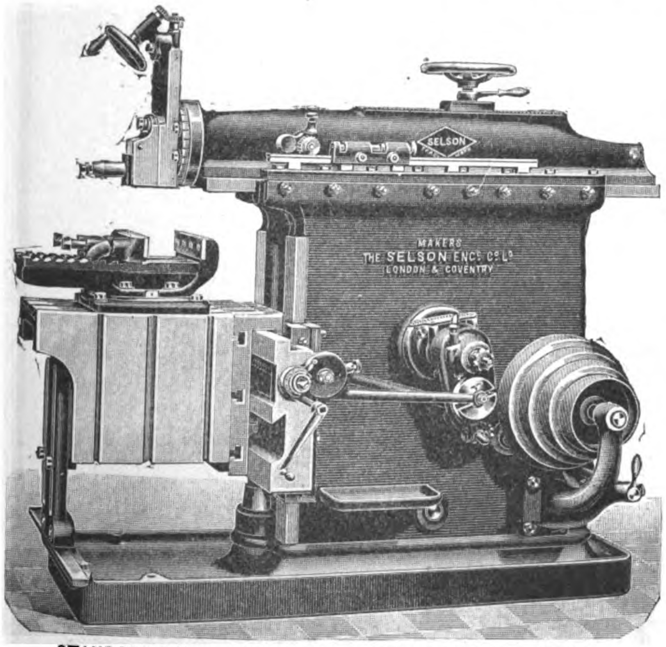

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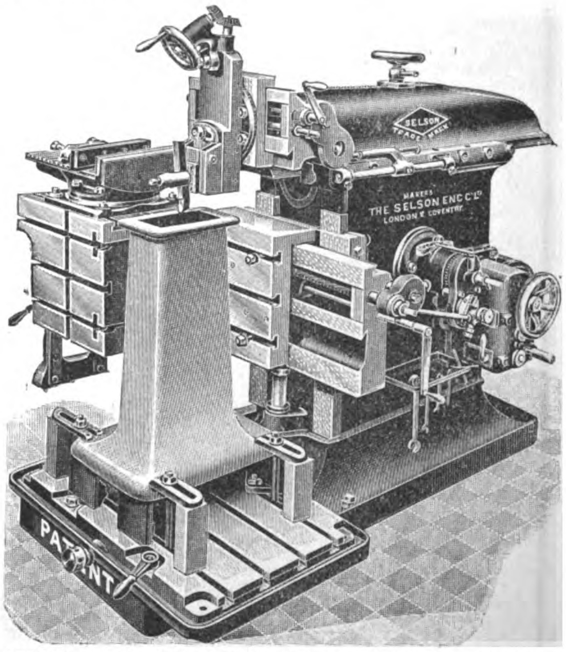

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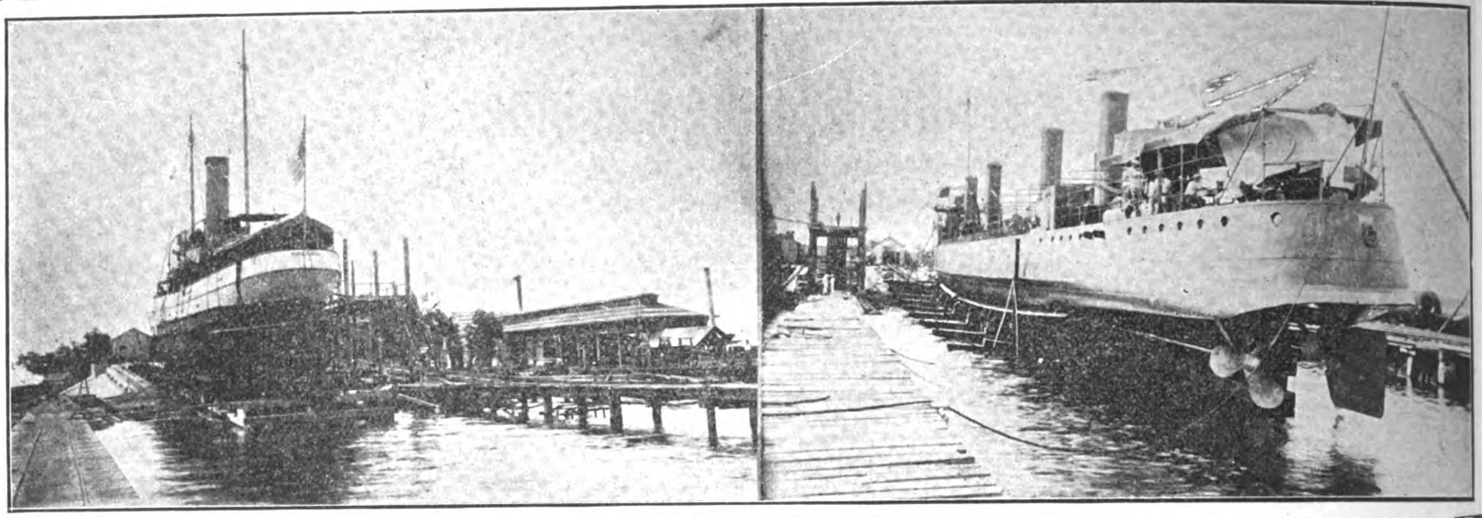

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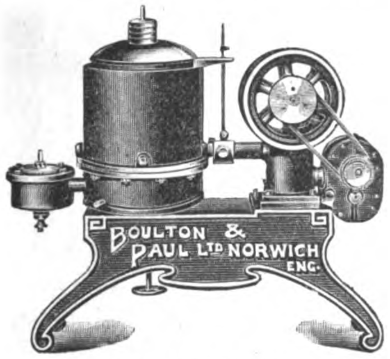

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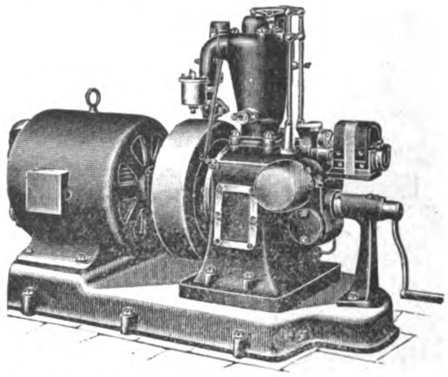

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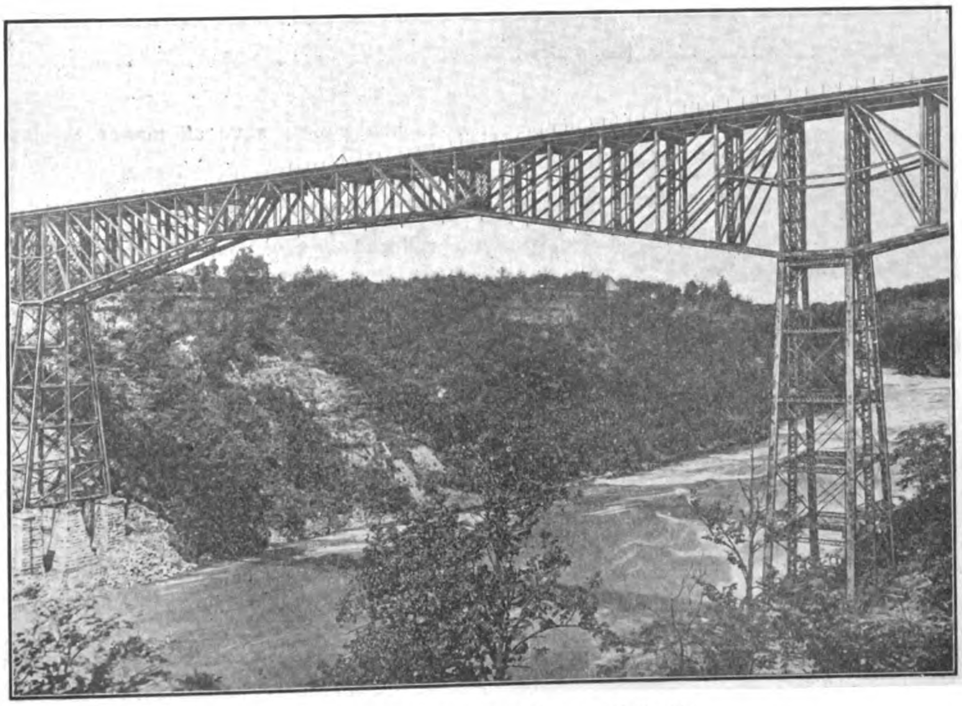

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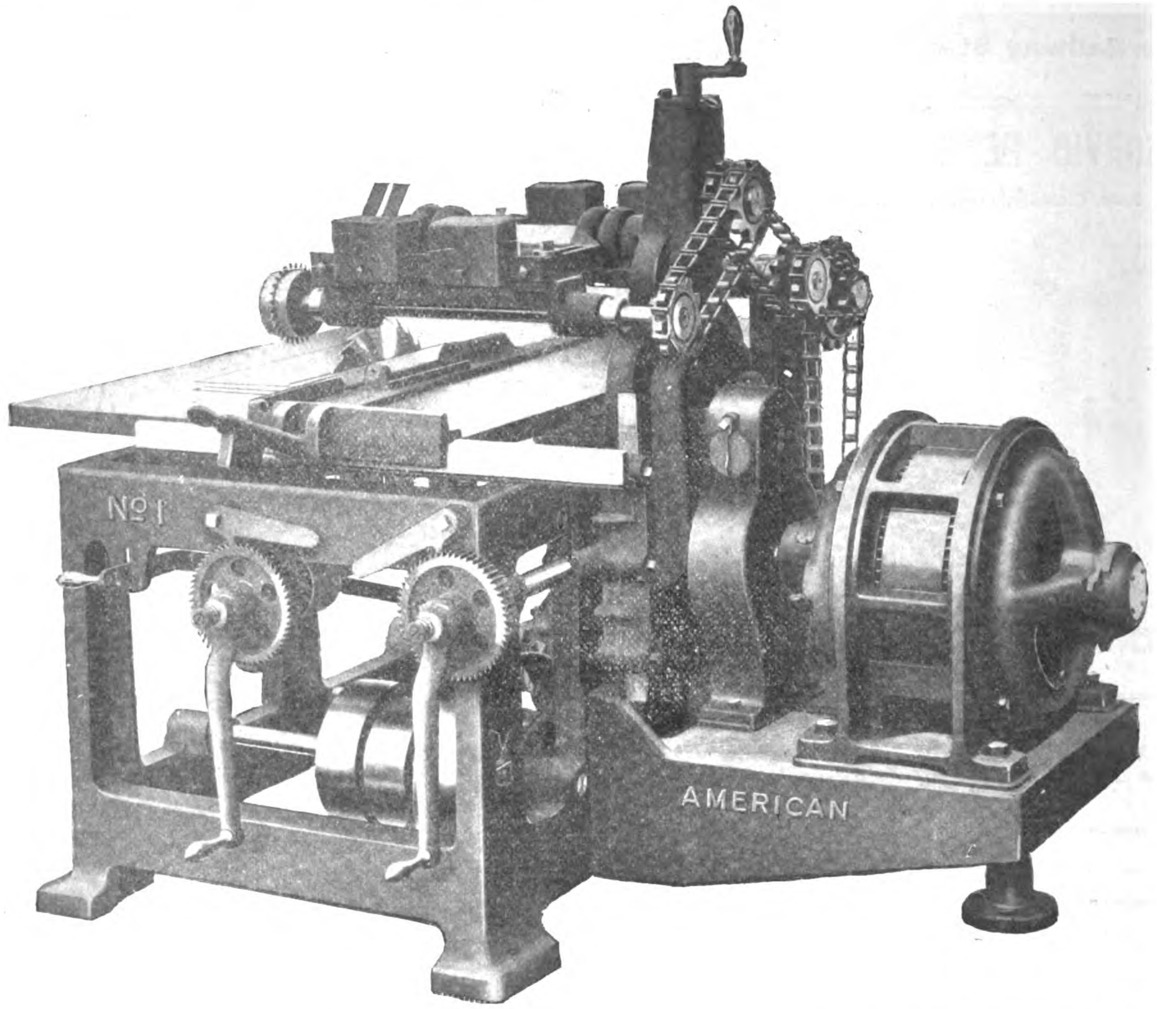

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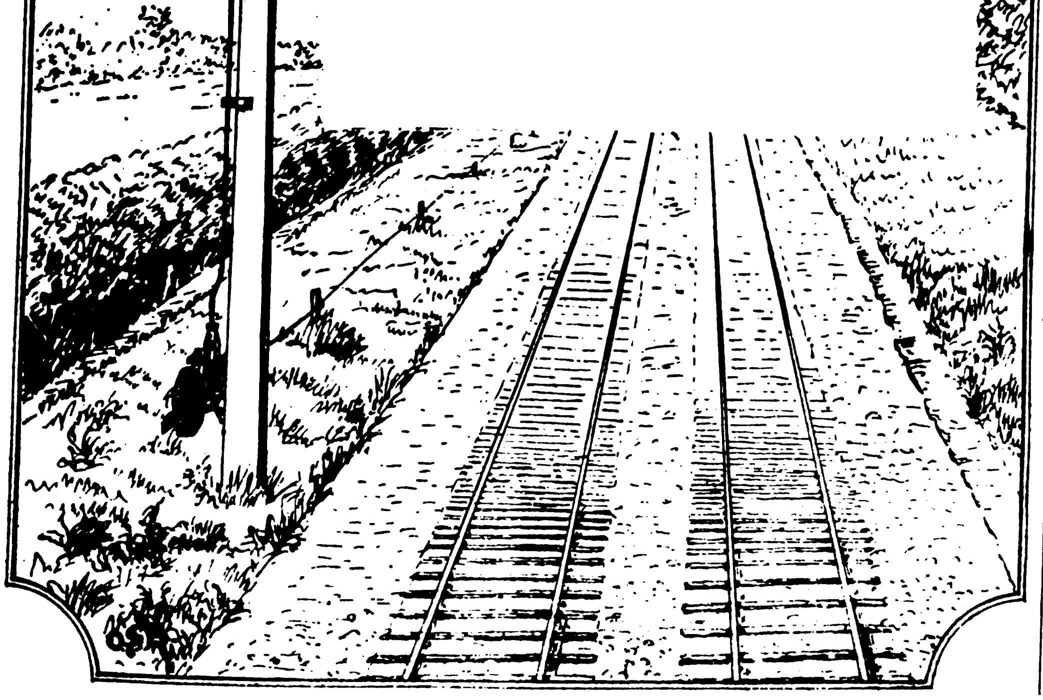

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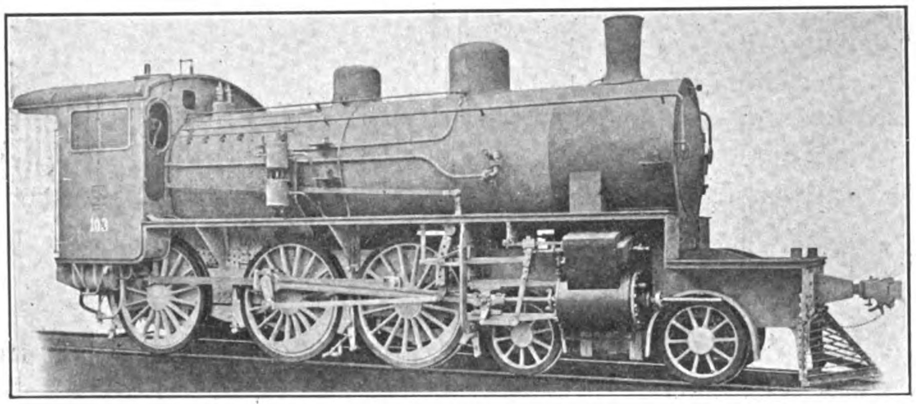

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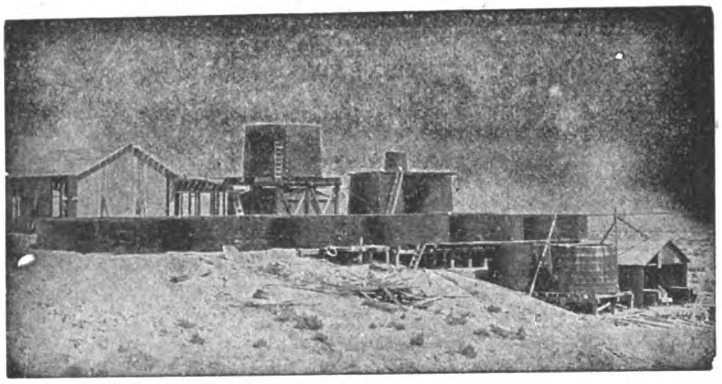

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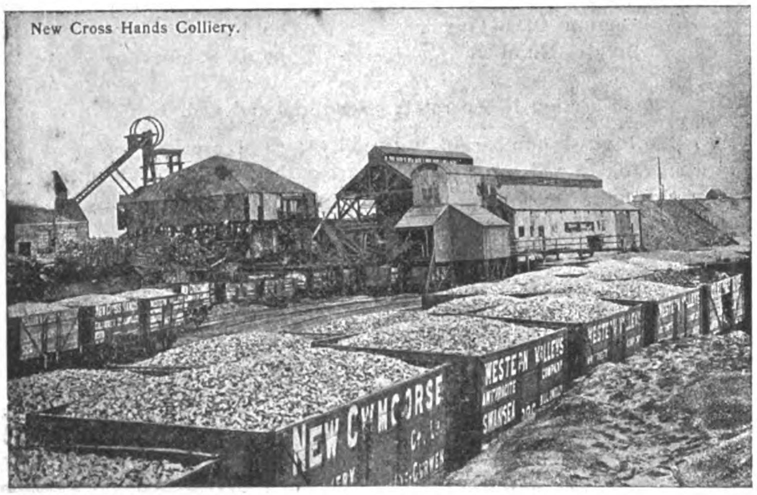
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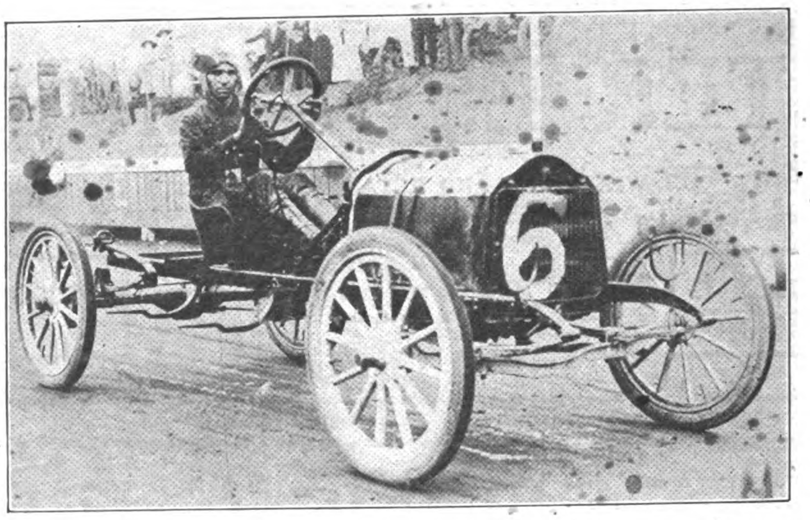

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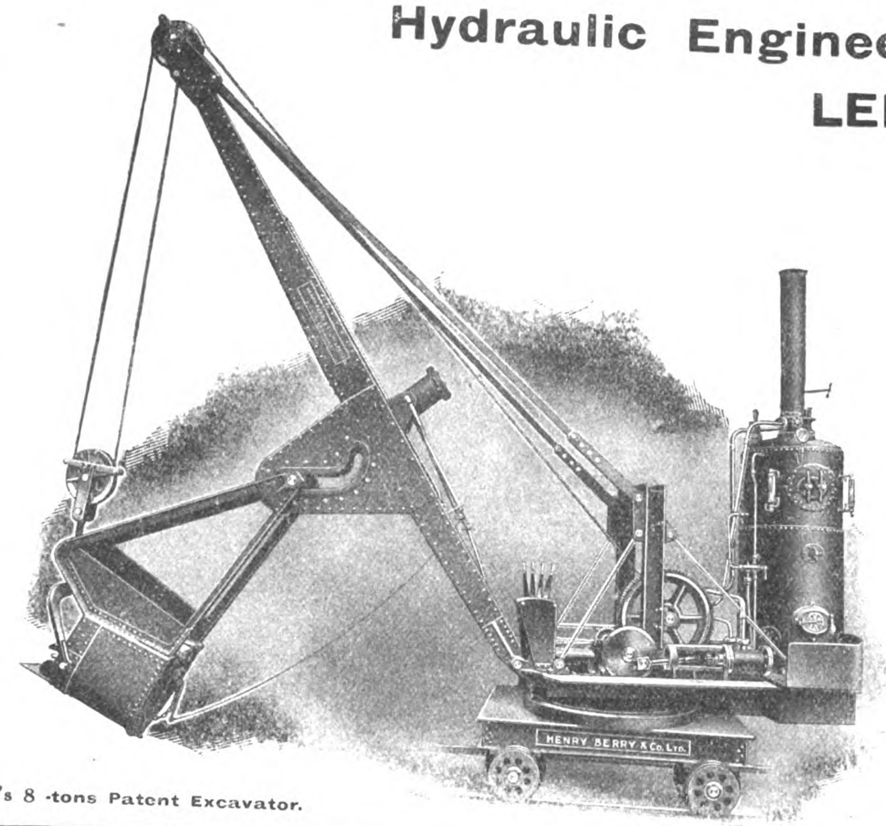

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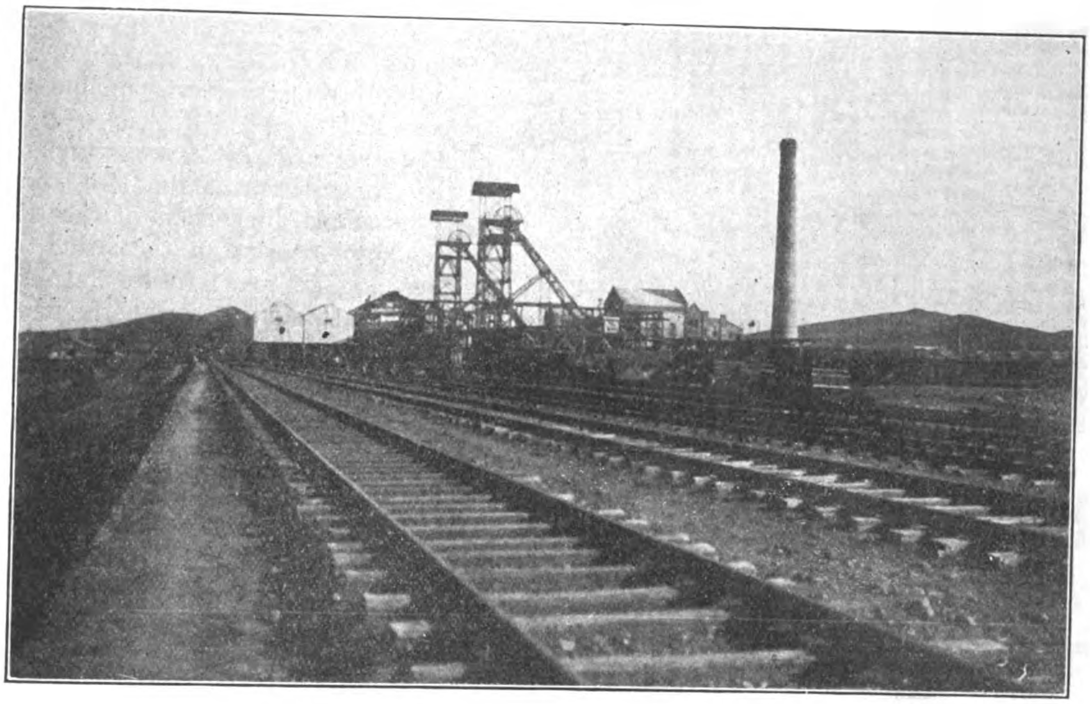

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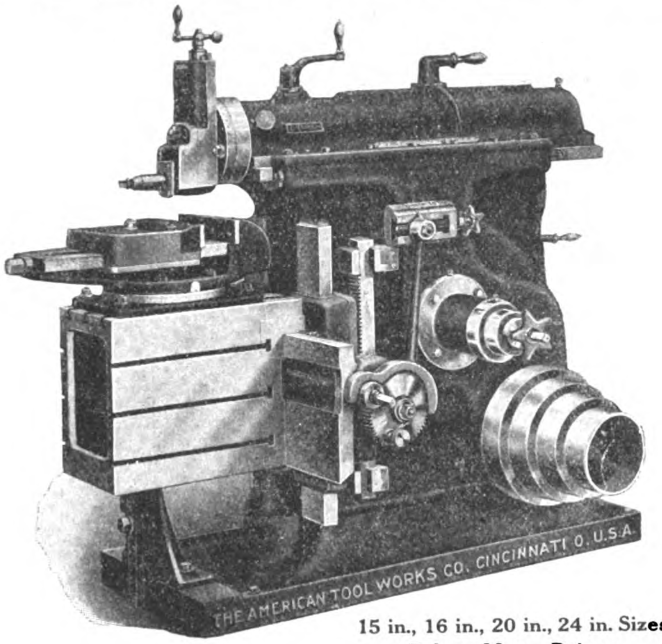

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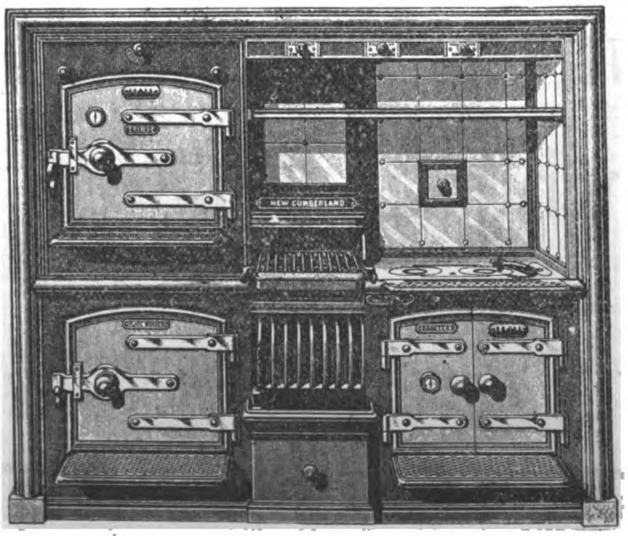

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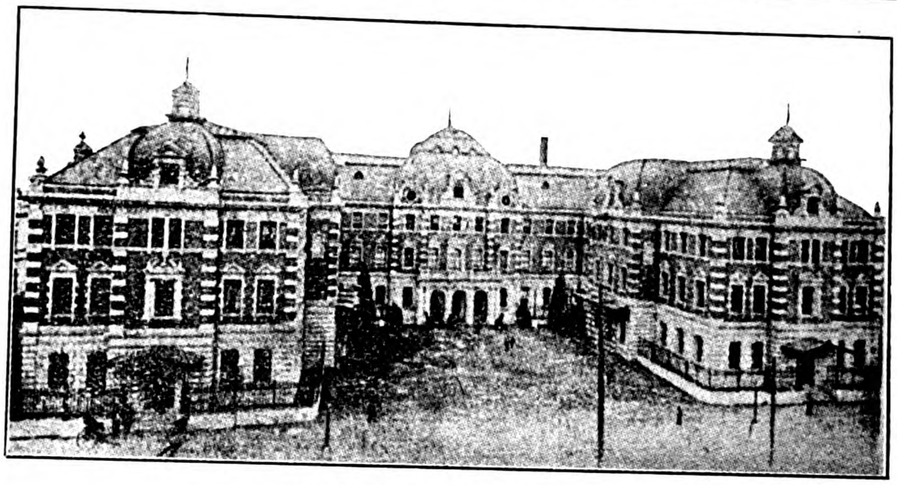

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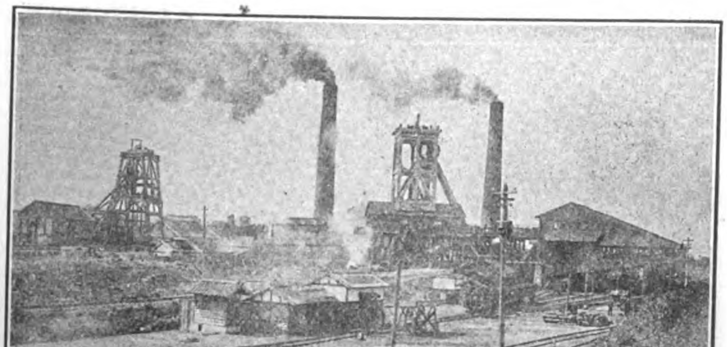

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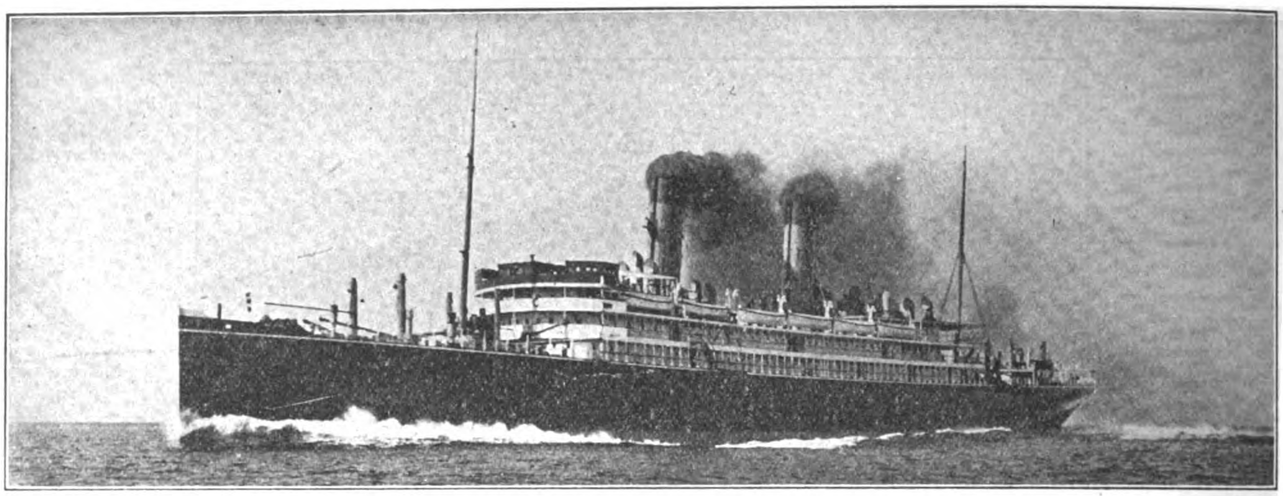

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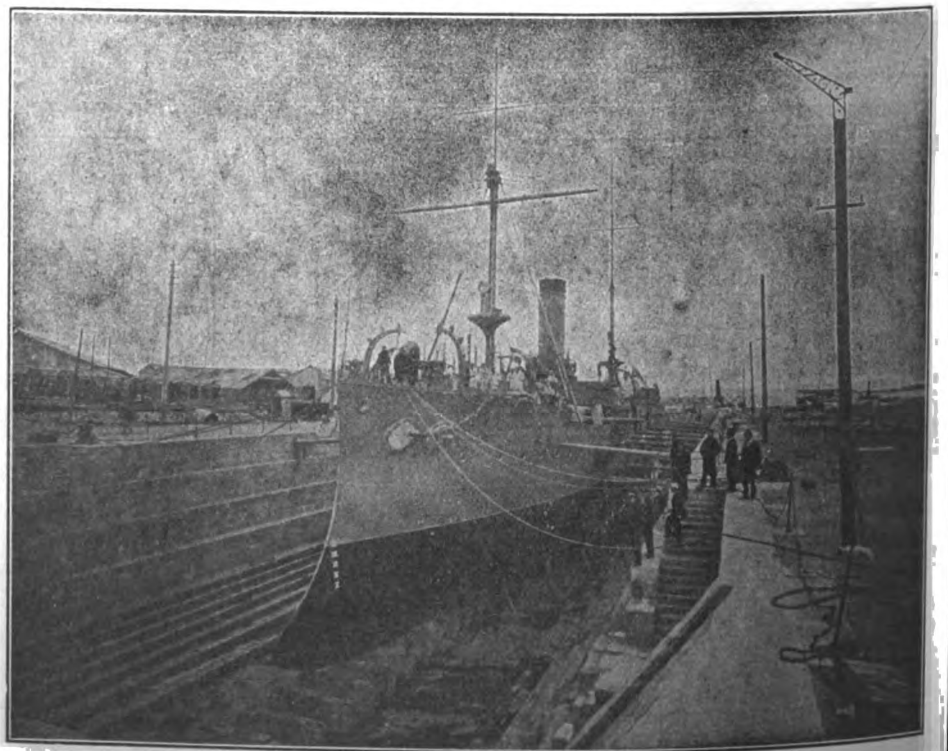

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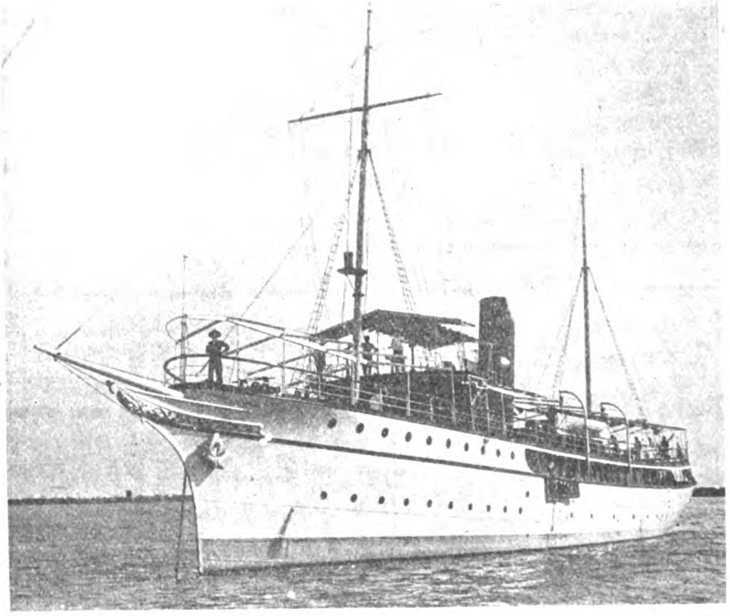

Yacht of H. I. H. Prince Hsui, Built by the Kiangnan Dock & Engineering Works.

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Length over all, 385'; length on blocks, 575'; water on sill, 19'; dock entrance, top 70', bottom, 60'.

The dock accommodates the largest coasting steamers and is equipped with complete modern facilities for handling work thoroughly and promptly.

The new machine and boiler shops, and the foundry and shipbuilding plant are equal to any this side of Suez.

Patent slipway for small steamers and launches. Complete boat and launch building shops.

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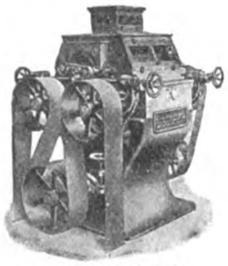

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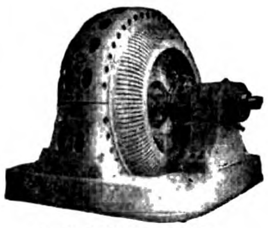
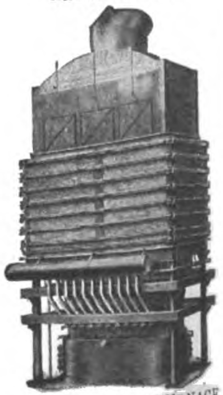


A. C. GENERATOR



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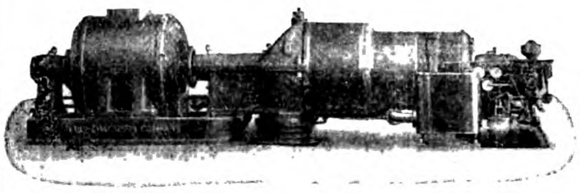

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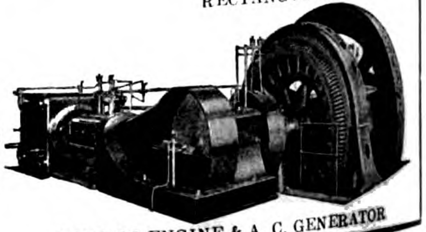

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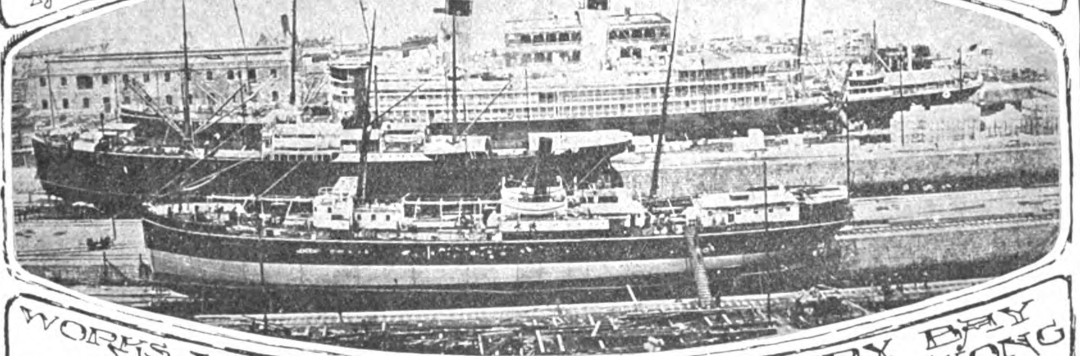

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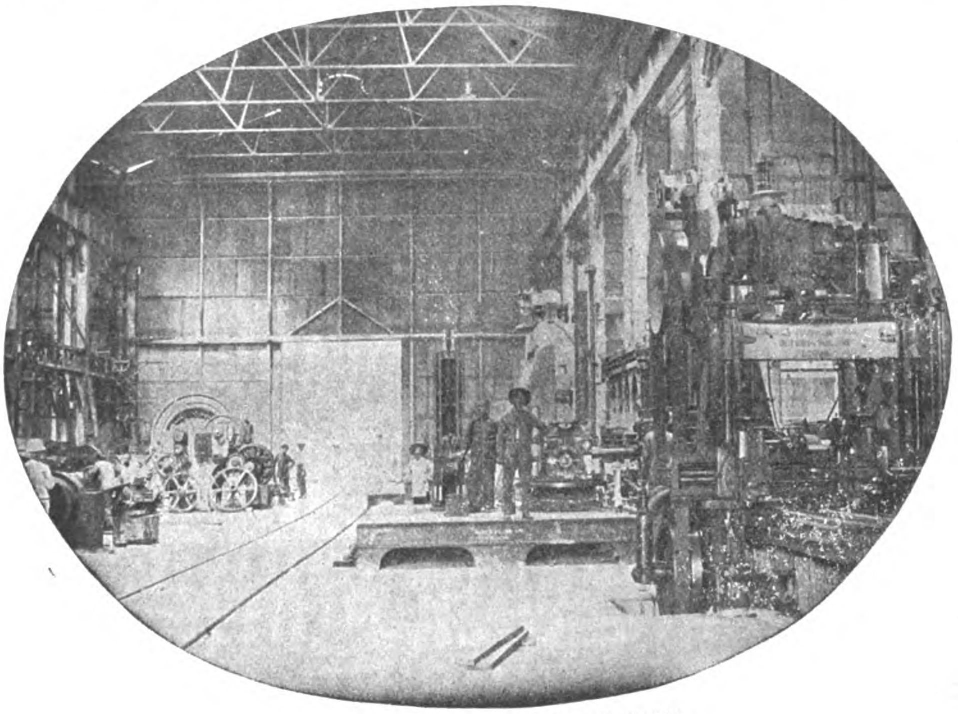

VIEW OF PORTION OF MACHINE SHOPS

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AN ELECTRIC DERRICK CRANE, capable of lifting weights up to 100 tons, is erected on the Sea Wall, and 14 Electric Overhead Travelling Cranes ranging from 5 tons to 100 tons, are fitted throughout the Workshops.

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THE DOCK PUMPS consist of 2 sets of Centrifugal, Electrically driven, pumps, together capable of emptying the Dock with 35 feet of water on the Sill in 2¾ hours.

THE MACHINERY in the Engine Works is laid out for dealing with the heaviest classes of Engines.

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All classes of CONSTRUCTIONAL and GENERAL ENGINEERING WORK undertaken, also LOCOMOTIVES, RAILWAY ROLLING STOCK and PLANT, BRIDGES, etc.

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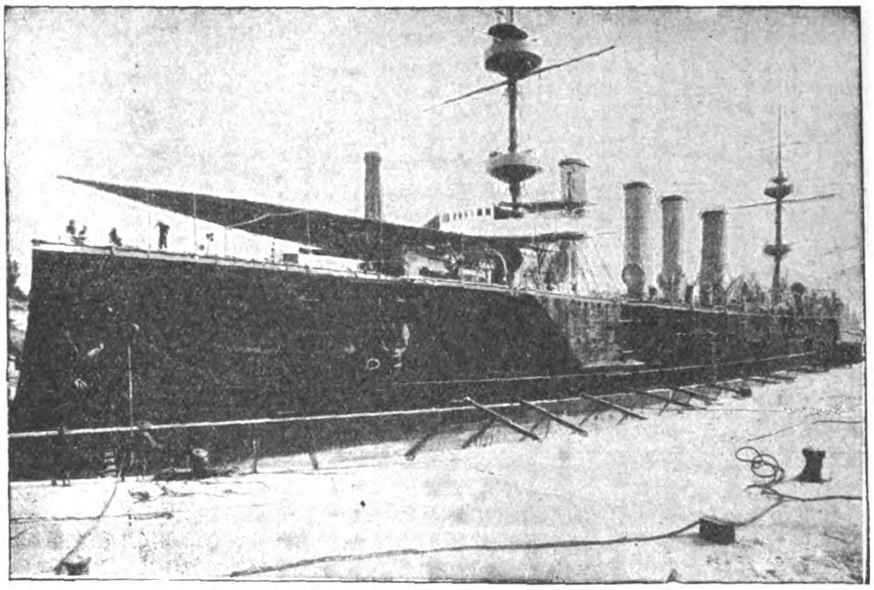

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HIGH SPEED MOTOR BOATS for PASSENGER and CARGO Traffic.

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FINISHED NUTS in BRASS and IRON.

A LARGE STOCK of STEEL and IRON PLATES, BARS and ANGLES, always in hand.

The Company possesses SIX GRANITE DOCKS and TWO PATENT SLIPWAYS and these are equipped for EXPEDITIOUS WORK. Our plant is of the most modern type throughout.

Ship Owners and Captains are assured that DOCKING and REPAIRS are carried out PROMPTLY and at MODERATE CHARGES.

The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	Length on Keel Blocks	Entrance Breadth	Depth Over Sill at Ordinary Spring Tides	Rise of Tide	
				Springs	Neaps
KOWLOON	Feet	Feet	Feet	Feet	Feet
No. 1 Dock, Kowloon	700	86 ft. top / 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon	240	60′	14′	7′ 6″	—
Patent Slip, No. 2, Kowloon	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock	466	85′ 6″	20′	7′ 6′	—
ABERDEEN					
Hope Dock	430	84′	23′	7′ 6″	—
Lamont Dock	333	64′	16′	7′ 6″	—

Please Address Enquiries to the Chief Manager, R. M. DYER, B. Sc., M. I. N. A., Kowloon Dock, Hongkong.

Telephone No. 13 K. Head Office, Kowloon.

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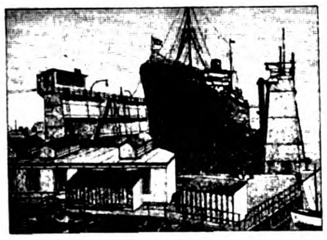
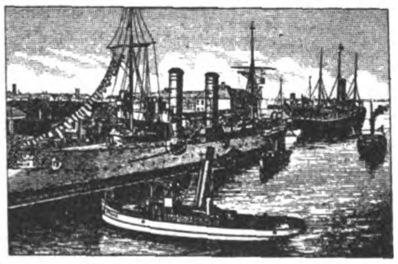
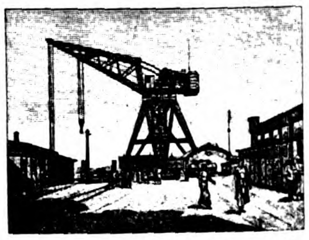
ELECTRIC CRANE LIFTING 150 TONS







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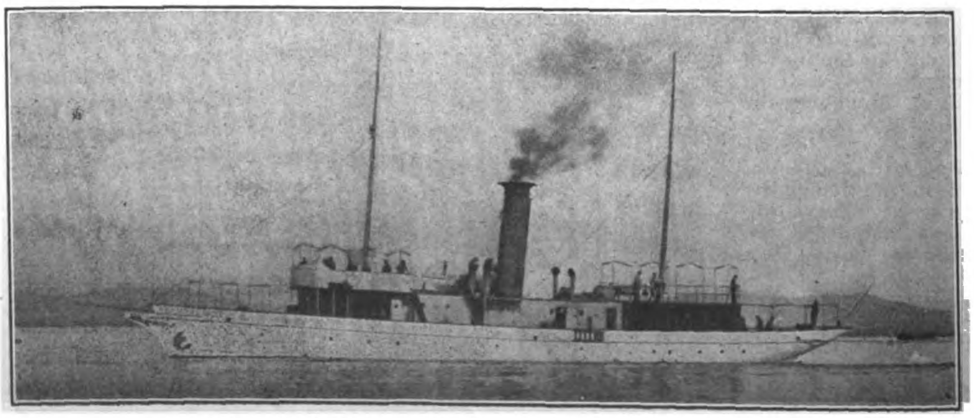

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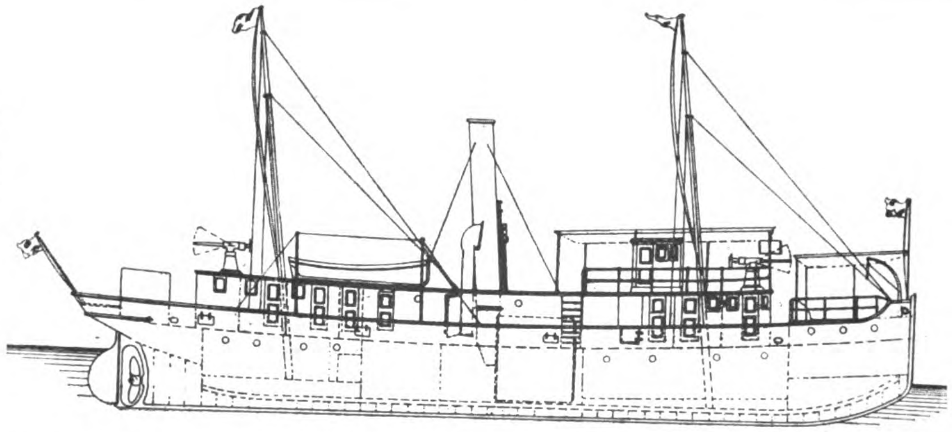

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SHANGHAI

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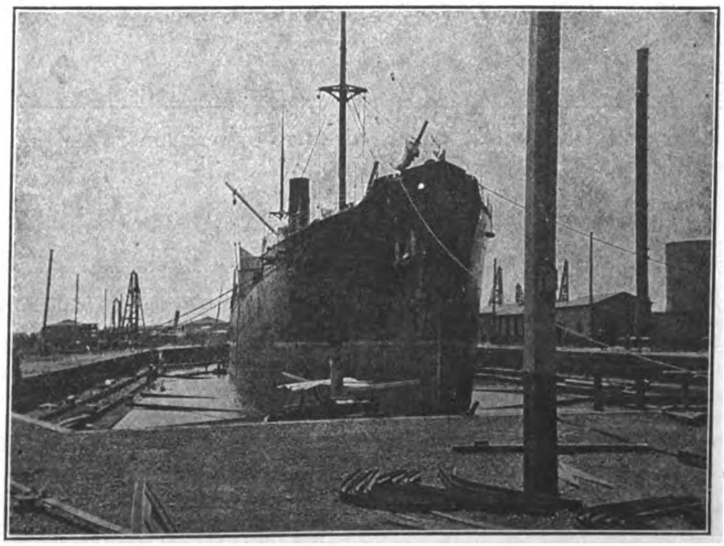
THE DOCK, WORKS AND OFFICE ARE LOCATED ON THE SHANGHAI SIDE OF THE RIVER, 15 MINUTES BY ELECTRIC TRAM FROM HEART OF THE CITY

THE WORKS ARE EQUIPPED WITH THE MOST MODERN MACHINERY. CAPABLE OF HANDLING THE LARGEST MARINE ENGINEERING WORK



VIEW OF YANGTSZEPOO DOCK

PARTICUARS OF DOCK
LENGTH ON BLOCKS 455′0″
„ OVERALL - 469′0″
WIDTH, ENTRANCE 74′0″
„ SILL - - 64′0″
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21′0″
DEPTH ON 3′0″ BLOCKS (H. W. O. S. TIDES) 19′0″
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
WORKSHOPS LOCATED AT HEAD OF DOCK

OFFICE, DOCK & WORKS, 37 YANGTSZEPOO ROAD, SHANGHAI

TELEGRAPHIC ADDRESS: "SPEEDY." CODE: A.B.C., 5TH EDITION — TELEPHONE 703. — MANILA AGENT, F. L. STRONG

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Telephone No. 7

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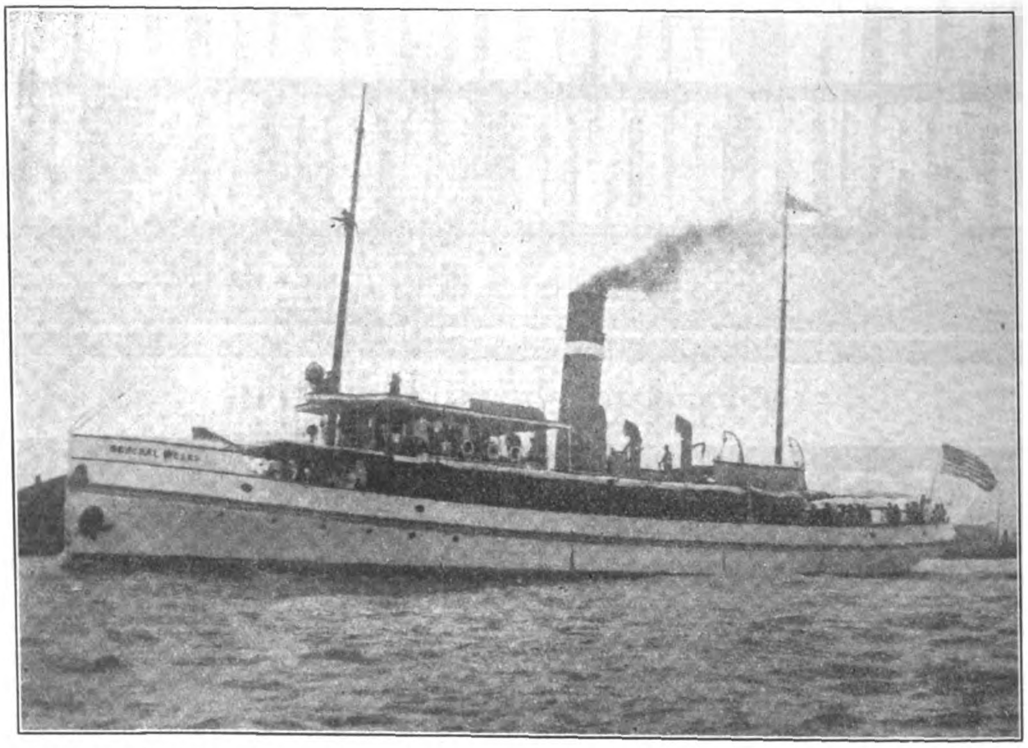

DESPATCH STEAMER GENERAL WEEKS CONSTRUCTED TO ORDER FOR THE U. S. GOVERNMENT

The Docks are five in number, ranging in length from 355 feet to 532 feet on the Blocks, and breadth of entrance from 53 feet to 77 feet, with a depth of water on the sill of from 16 feet to 24 feet.

The Dock charges are very moderate.

The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops are provided with the latest improvements in tools, traveling cranes of 60 tons' capacity, hydraulic and pneumatic machinery.

Lit up by Electric light with railway lines through workshops and yards.

A Staff of Divers, and powerful salvage appliances, can be supplied at short notice. Enquiries immediately attended to.

Estimates given for all classes of work; Coast Steamers, Side and Stern-Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

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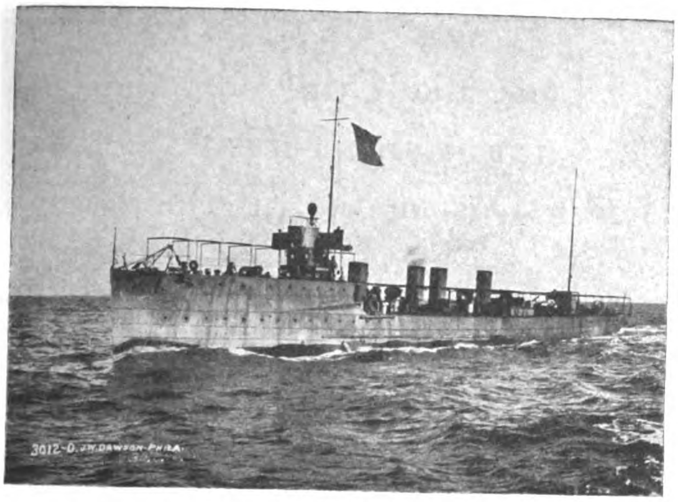

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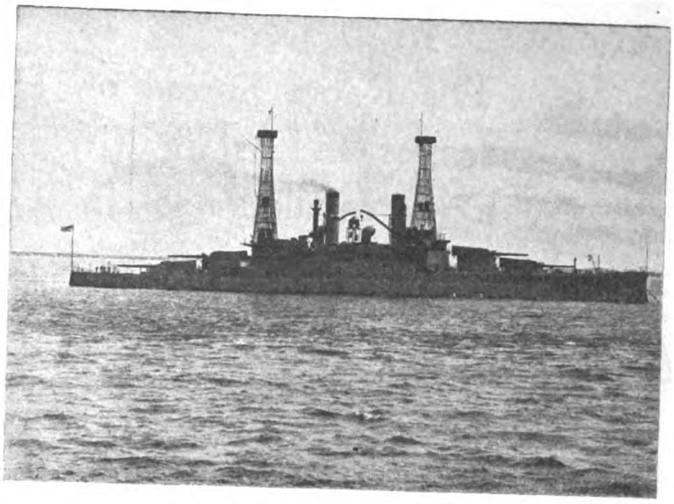

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For Allaying the Dust, Preserving the Surface and Binding the Road

Experience and experiment have demonstrated that asphalt or oil with an asphaltum base are the *only* substances successfully applied to roads to insure *permanency of dust relief* and to *maintain the roads in perfect condition.*—In our three preparations we offer products that are suitable for road construction or road maintenance.—Adapted for all conditions of roads and for use in all localities. Our free book treats of each of these three products at length, explaining the uses for which they are particularly prepared, and furnishing information which will be found invaluable to Public Works Officials, Road Engineers, Government, Colonial and Municipal authorities, and to owners of private estates.—A copy will be mailed free on request.

Asphalt Road Oil is an asphalt-bearing oil and is intended for use on well-made roads as they are. One application, if properly applied, suffices for a season. Specially adapted for the Roads and Streets of the Cities of North China.

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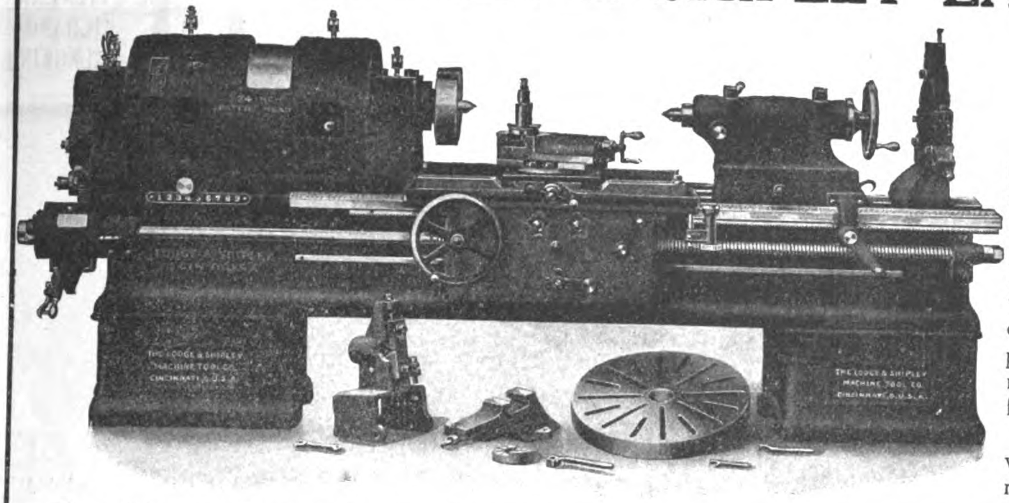

Always give a greater daily output.

These lathes contain certain construction features that mean more work with longer life in alignment and wider range of usefulness than is found on the ordinary engine lathe.

The "Patent Head" is driven by a wide belt over a single pulley of large daimeter, which furnishes great power under all conditions. There is never a particle of belt pull upon the spindle, yet there is a wide range of the open belt speeds so necessary for fine finishing cuts.

When we adopted the "Patent Head" with its increased possibilities we found it necessary to proportionately strengthen the other parts of the lathe; we made the bed wider and deeper; substituted drop forged steel for cast iron in the feed gears; shortened and widened the bridge; increased the weight of the tailstock and provided additional means for securing it in position.

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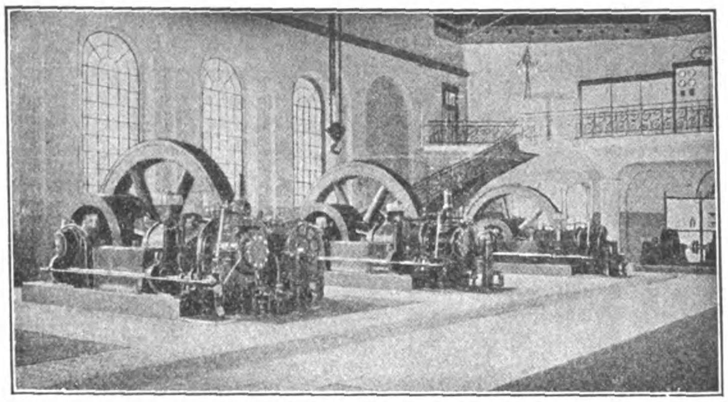

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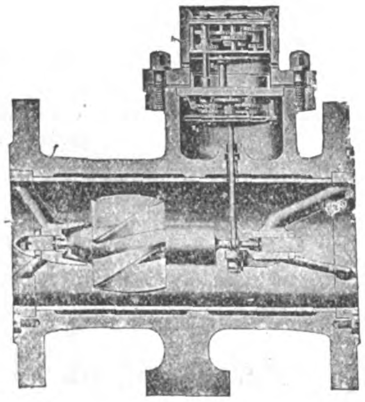

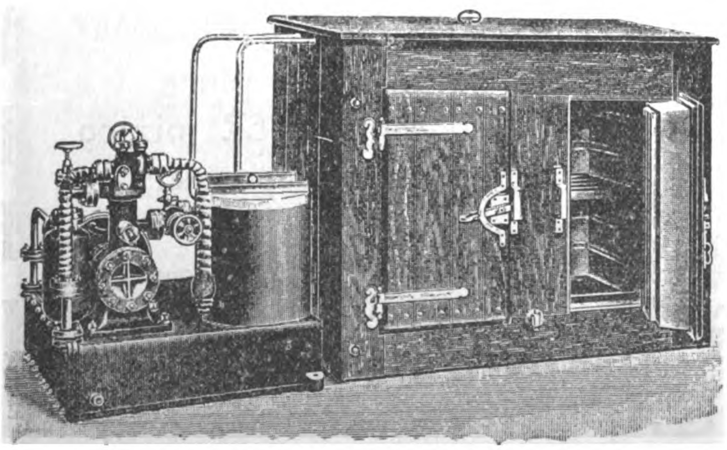

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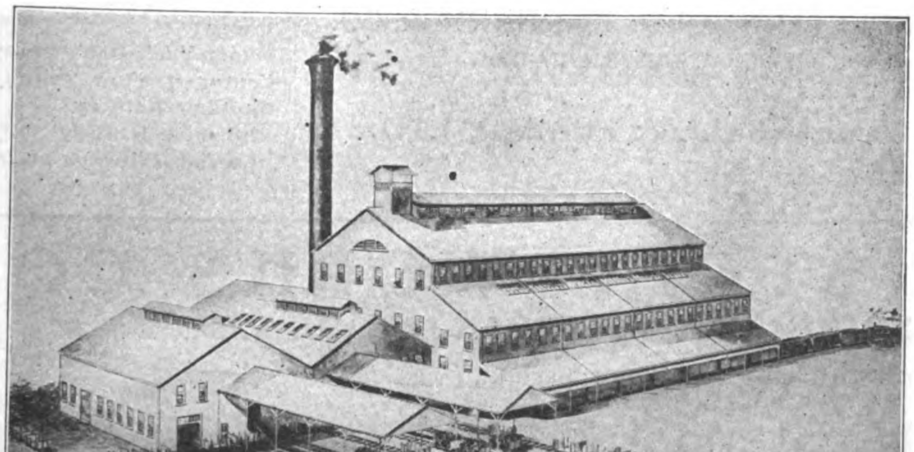

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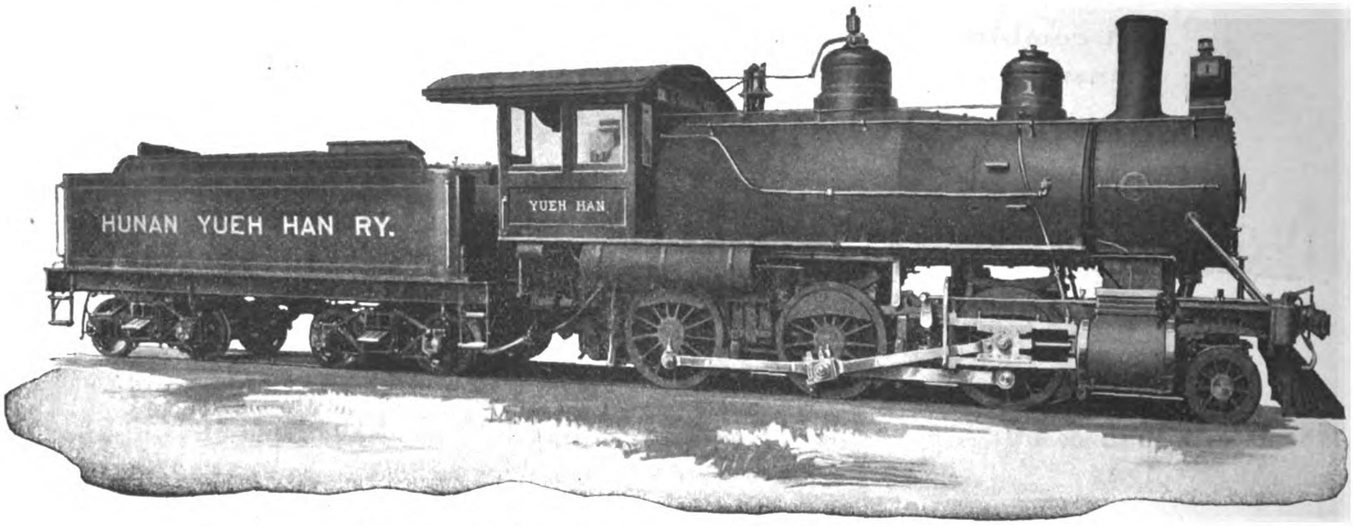

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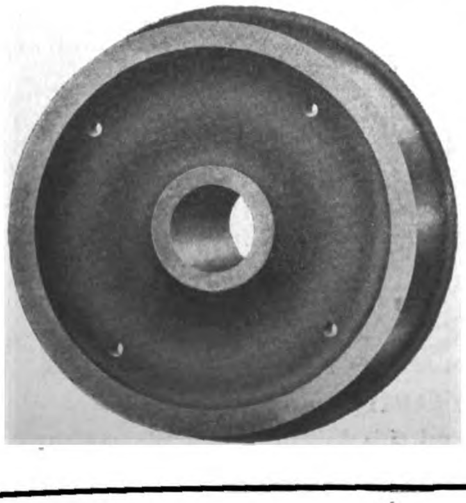

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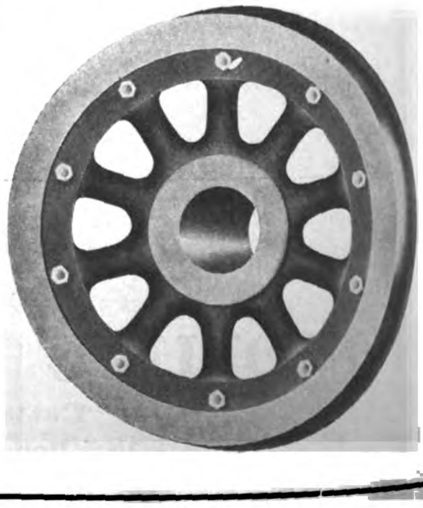

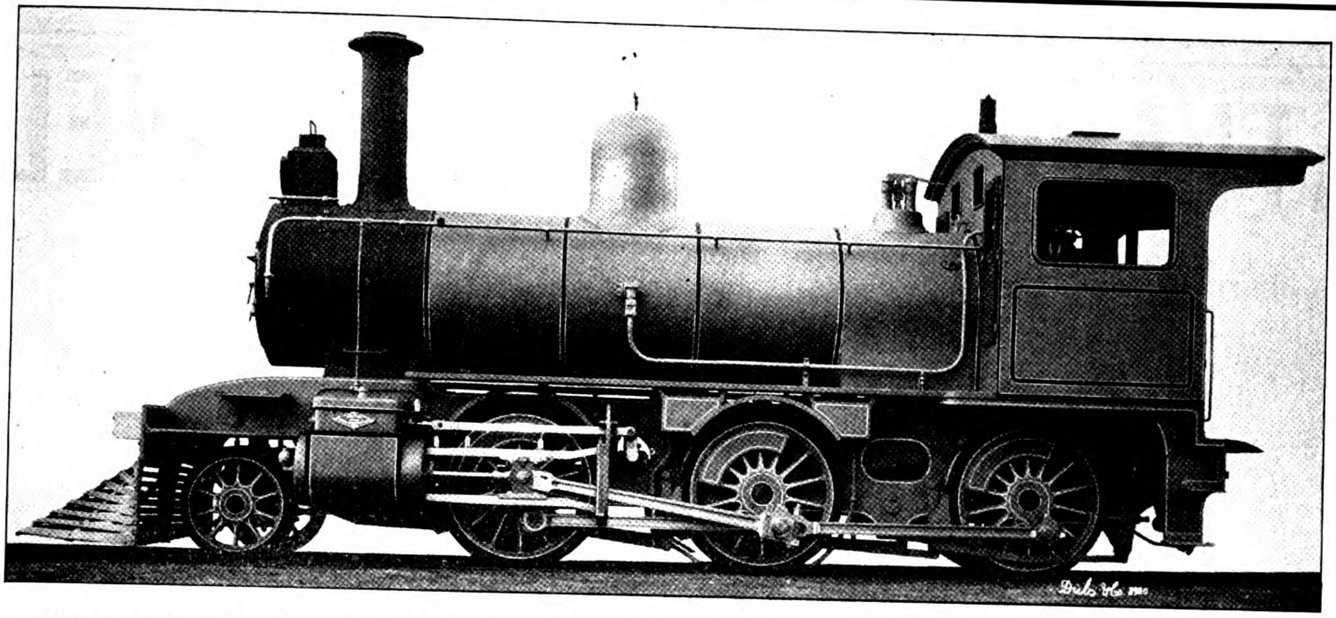

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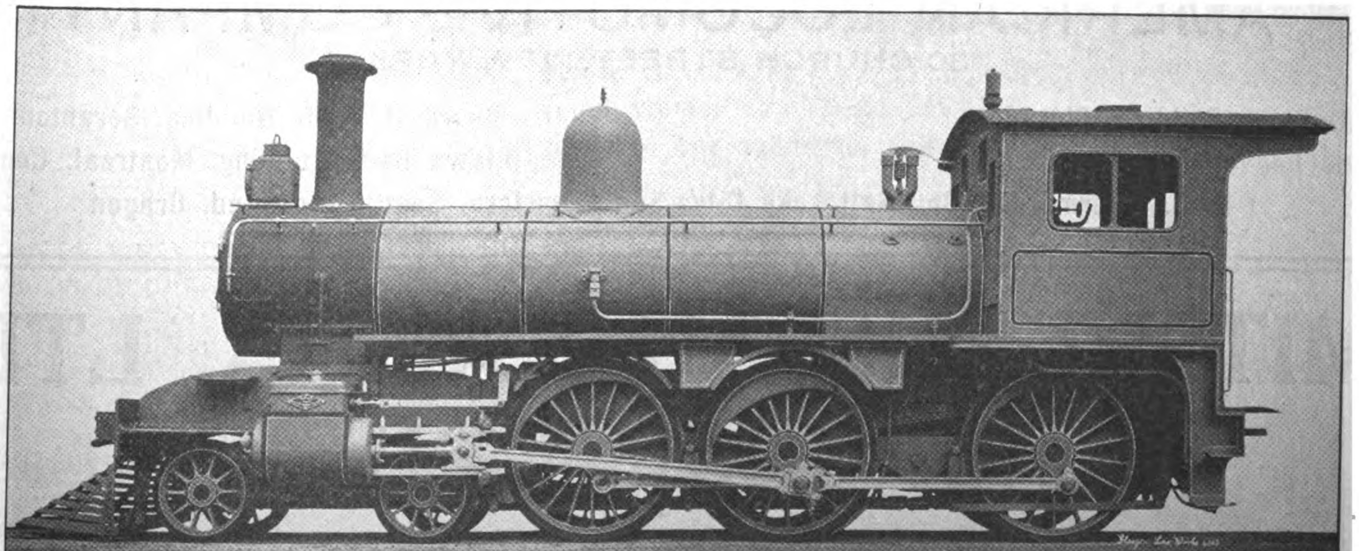

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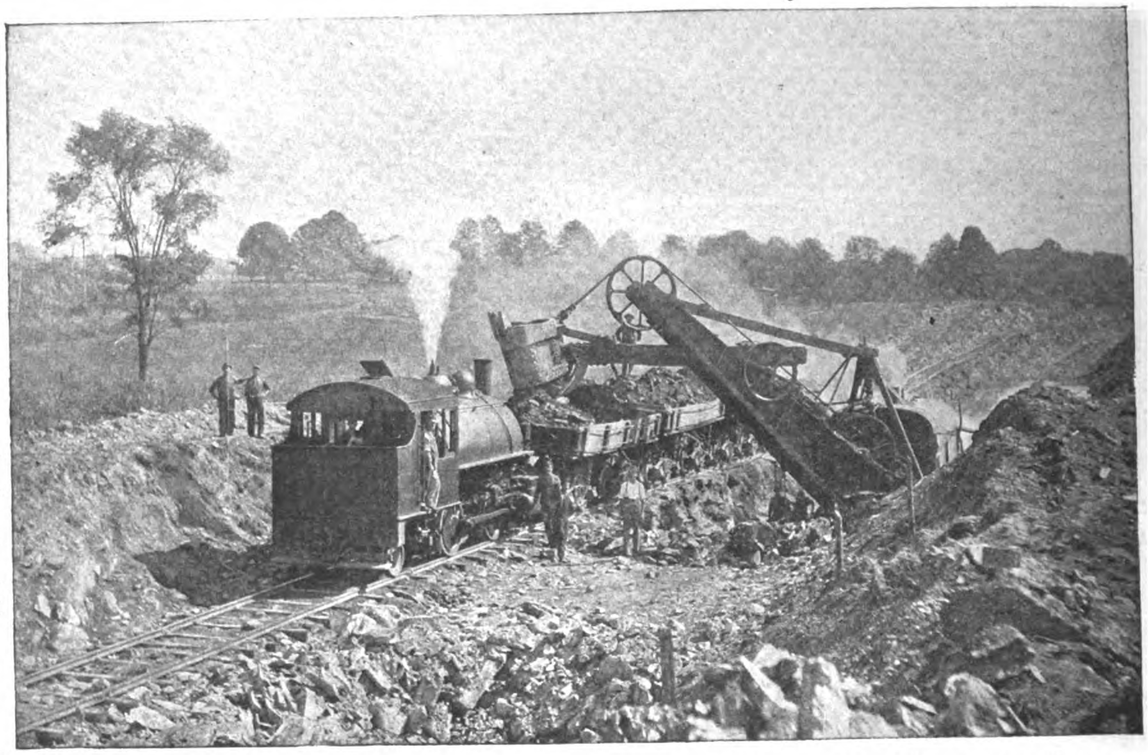

Class 80-18-4½ Atlantic Shovel, Built for Henry Steers, Incorporated. At work at White Plains, N. Y., on the Construction of the Boston and Westchester Railroad

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Atlantics are built to dig the most for the least cost. They are rugged, powerful and quick.

Atlantics have a wire hoisting rope with only one large sheave between the dipper and the drum. We know this to be better than a chain with 5 or 6 sheaves. Each sheave means more friction. The friction of a chain is also greater than that of a rope. In the Atlantic all the power consumed in overcoming this extra friction is saved from digging. We have records showing what this means in a day's work. Each additional dipper full means more "velvet" for the contractor.

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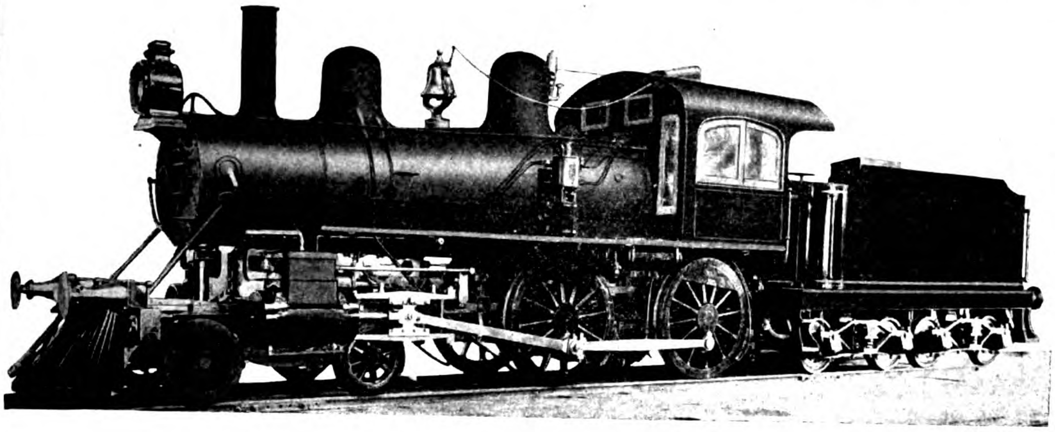

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Tractive power 13770 lbs.

Built for
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100 Ton.

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Built for
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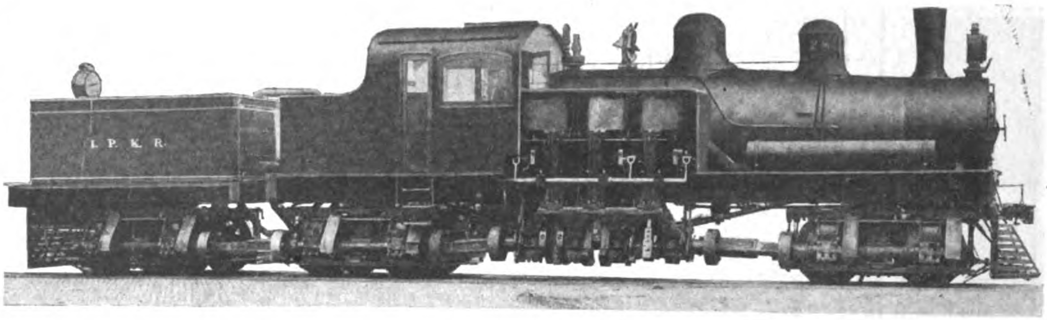

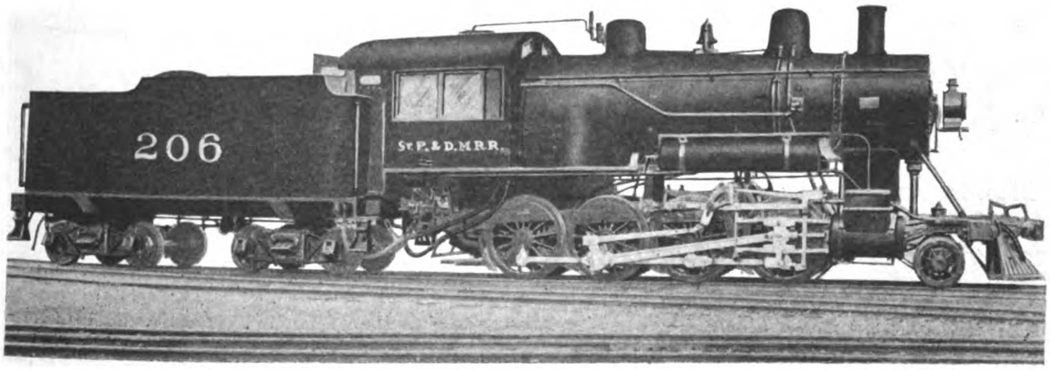

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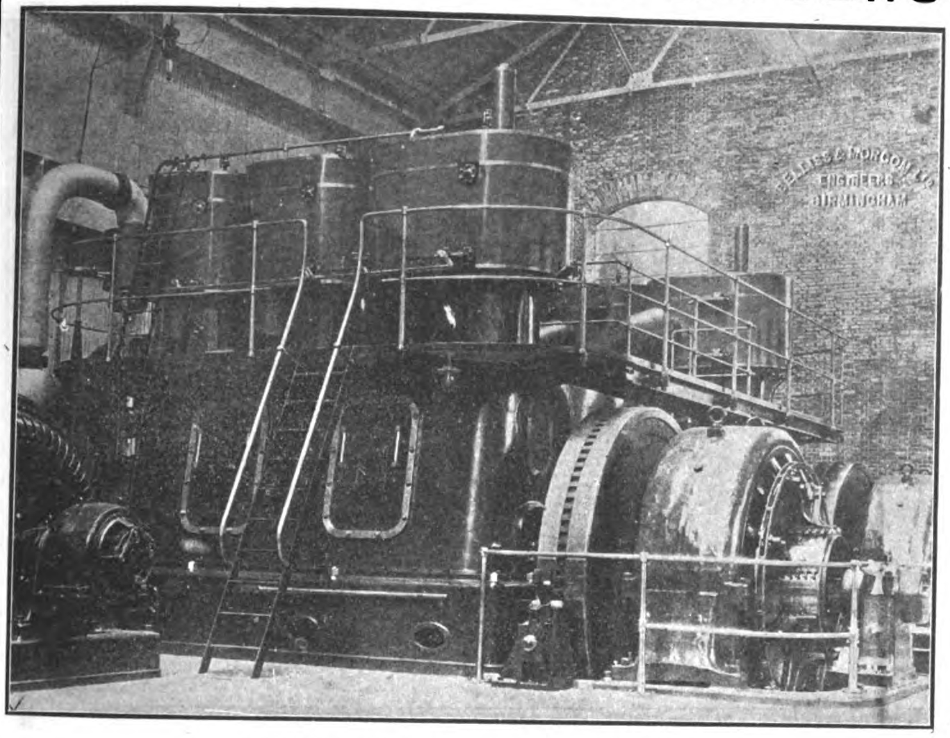

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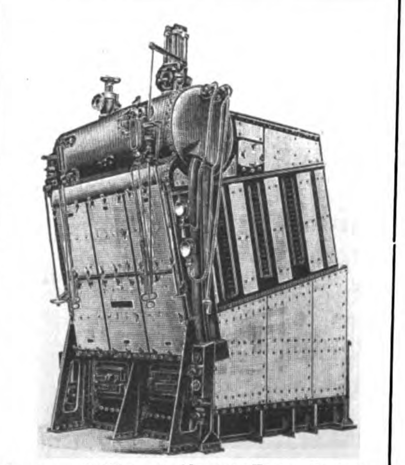

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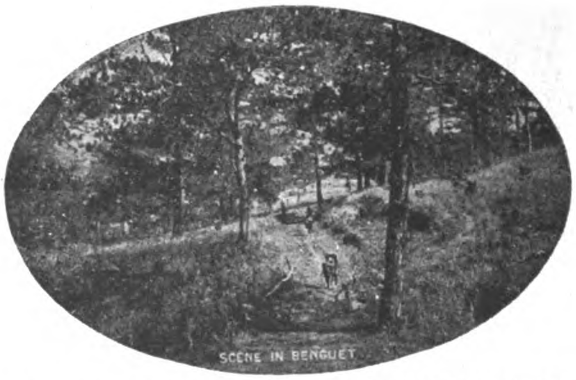

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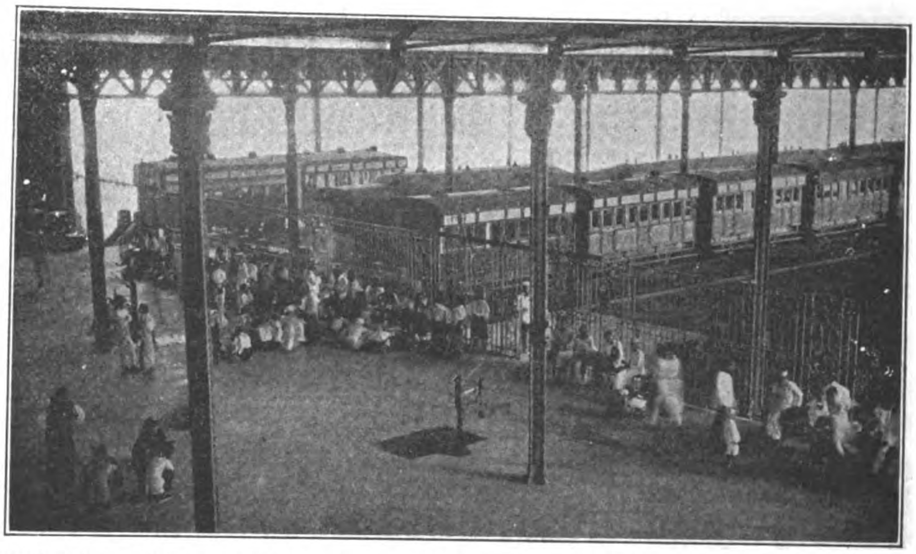

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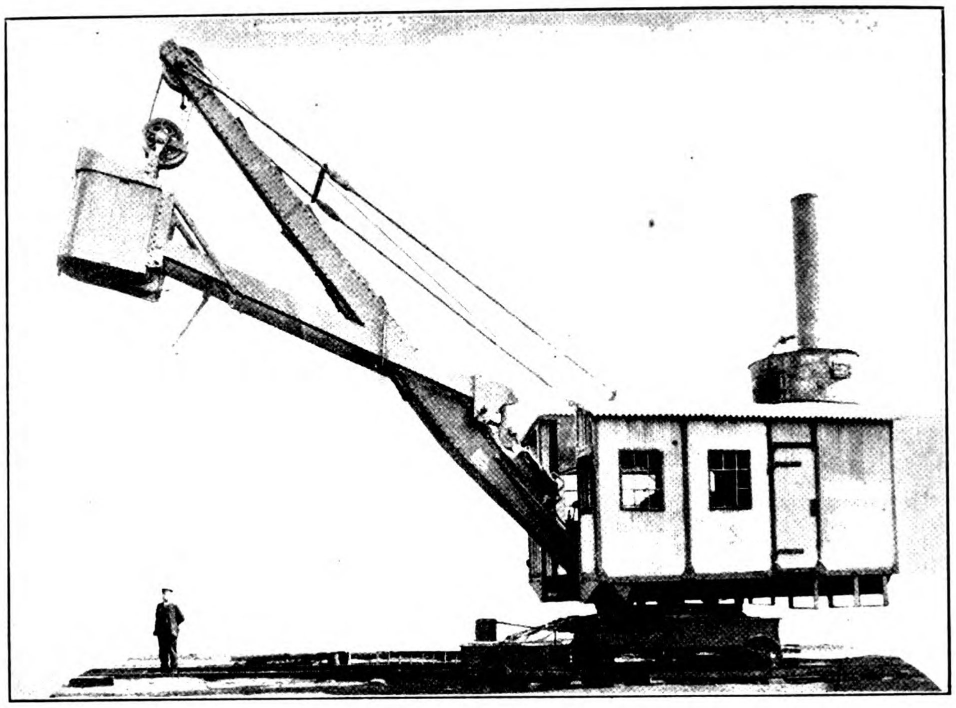

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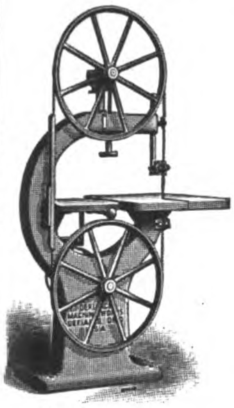

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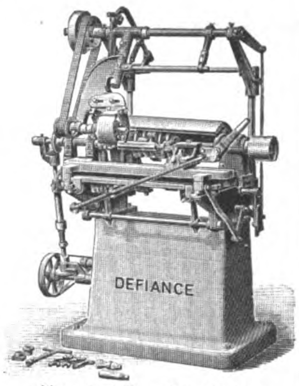

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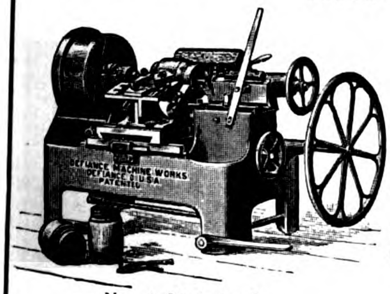

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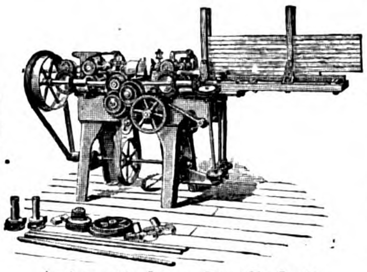

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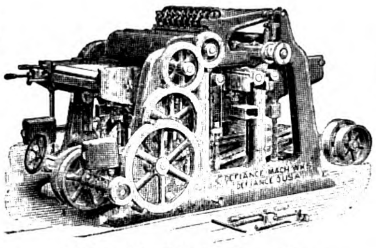

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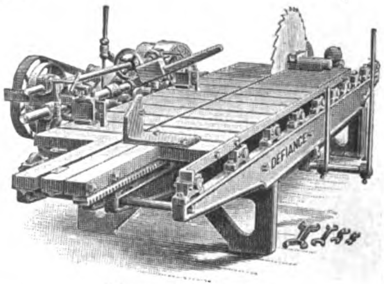

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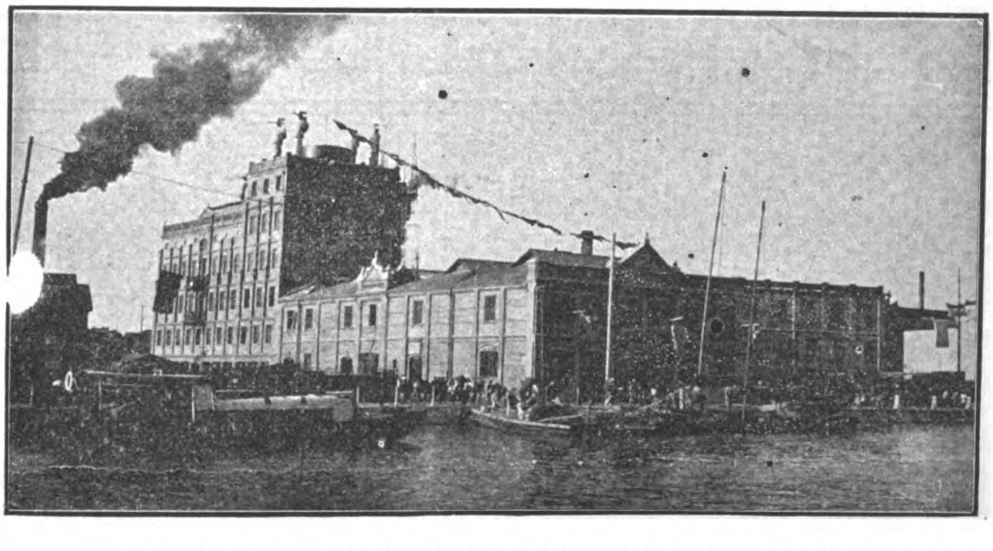

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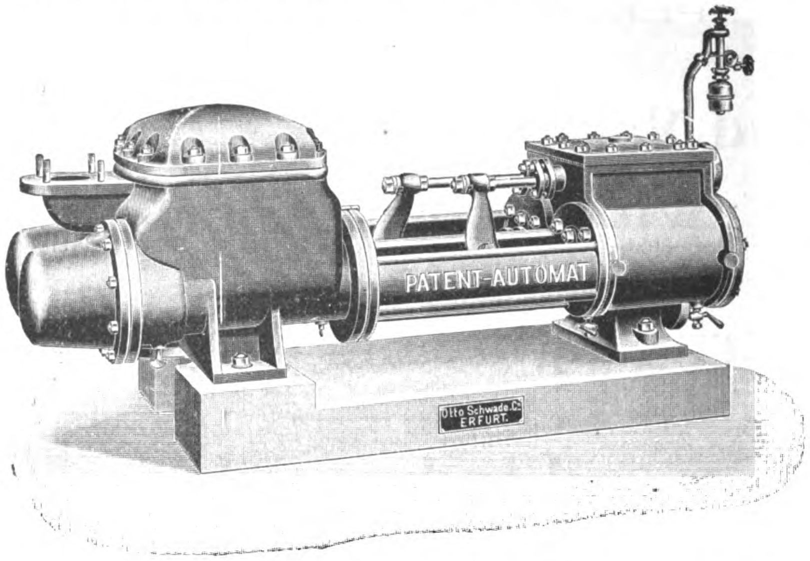

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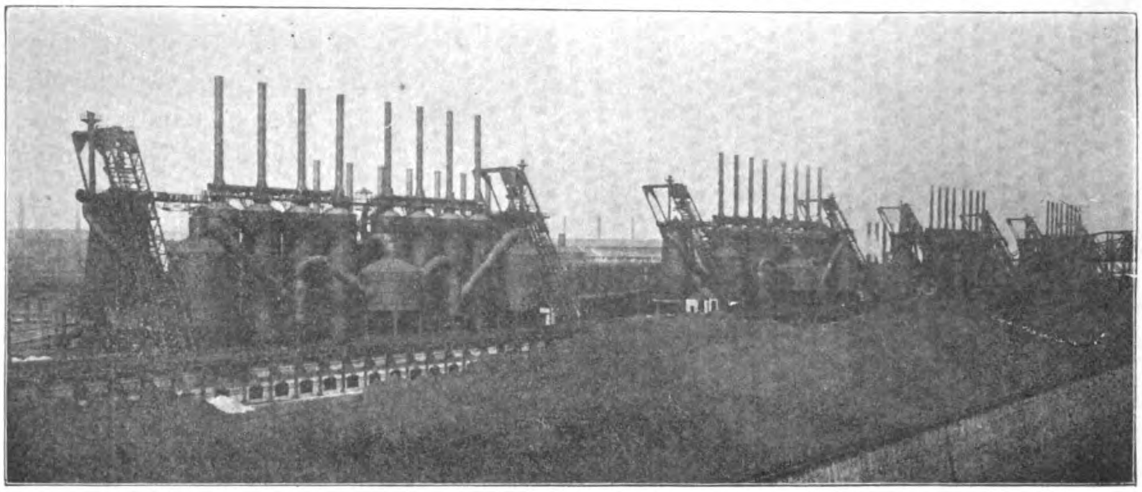

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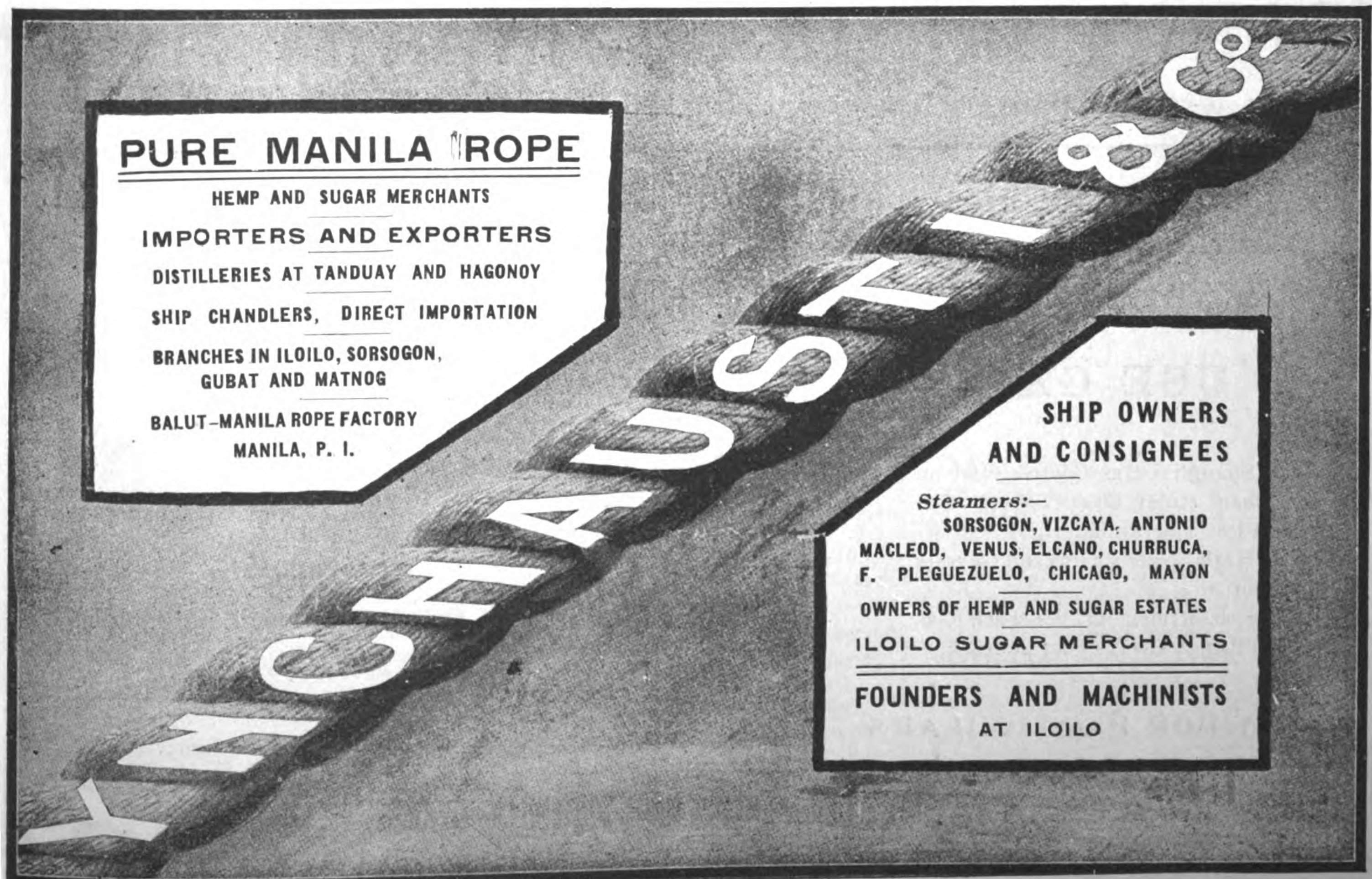

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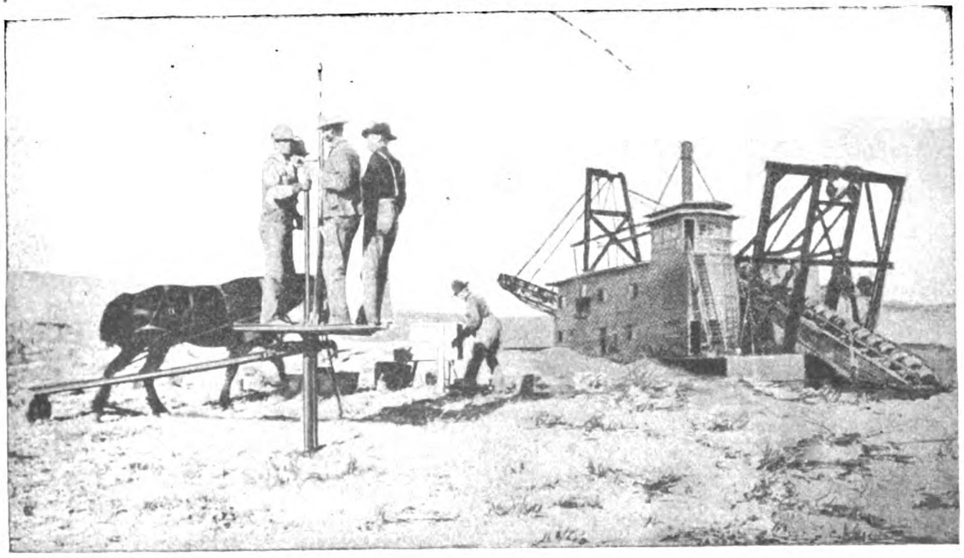

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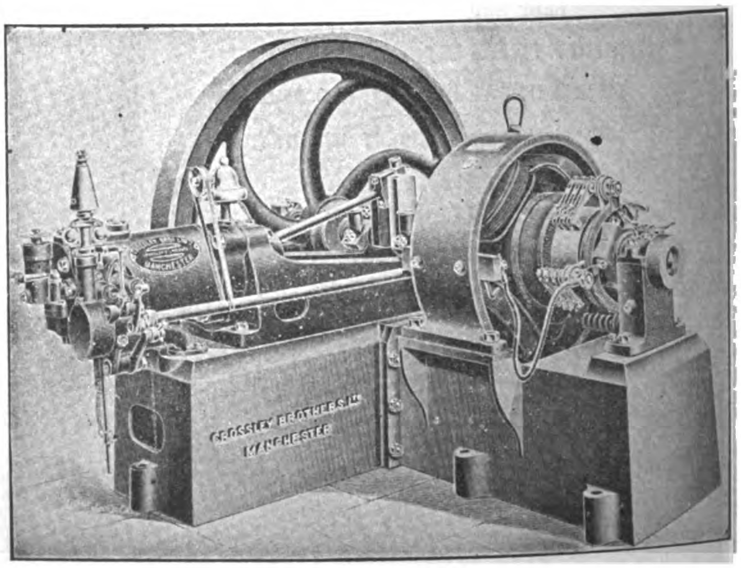

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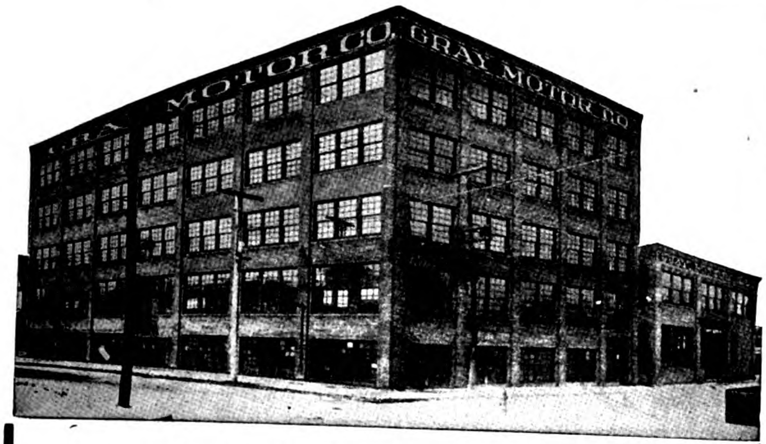

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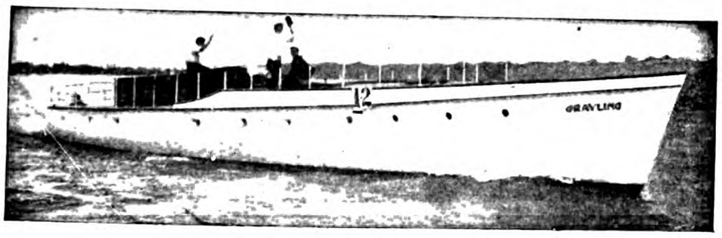

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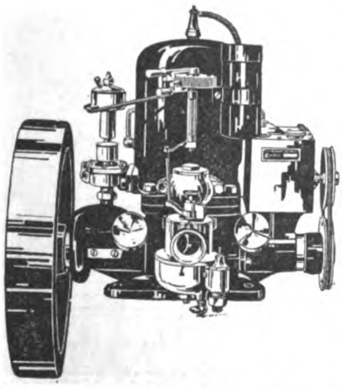

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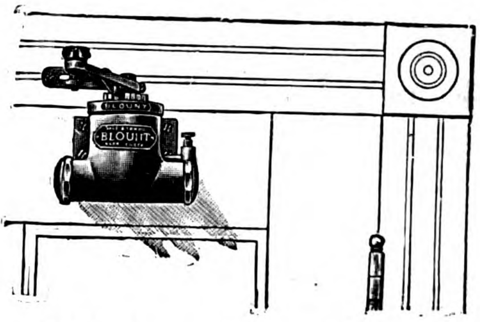

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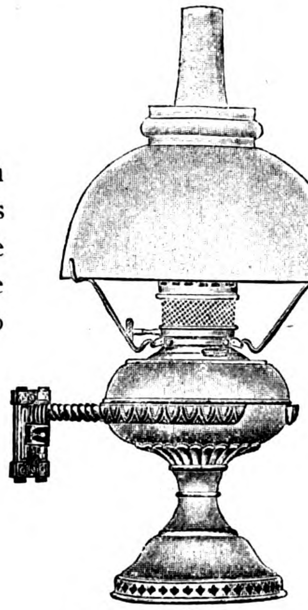

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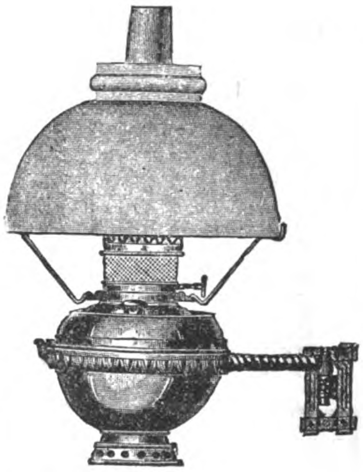

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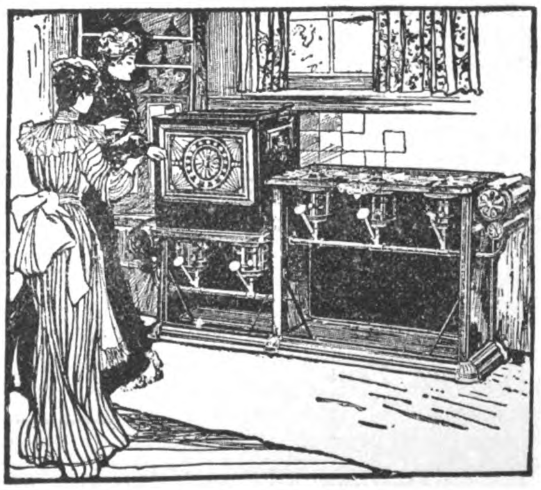

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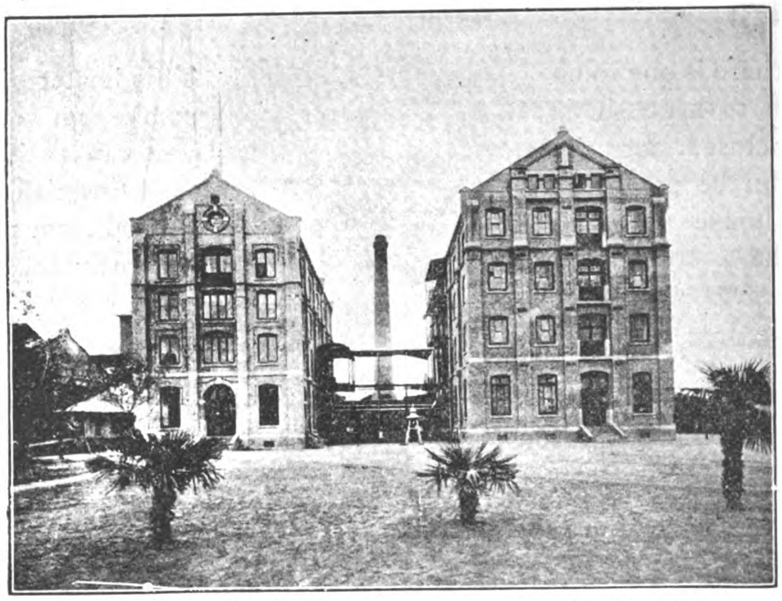

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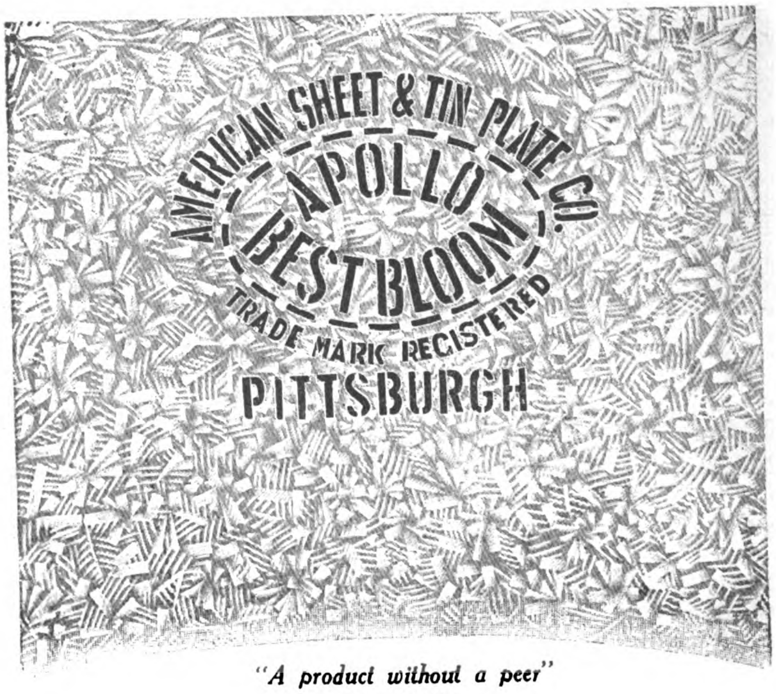

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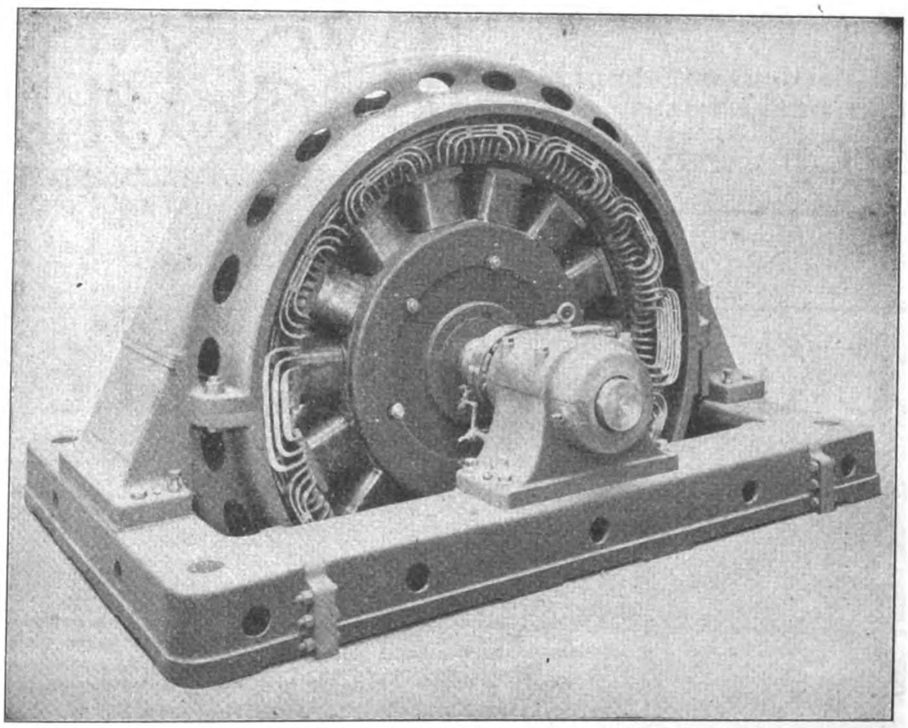

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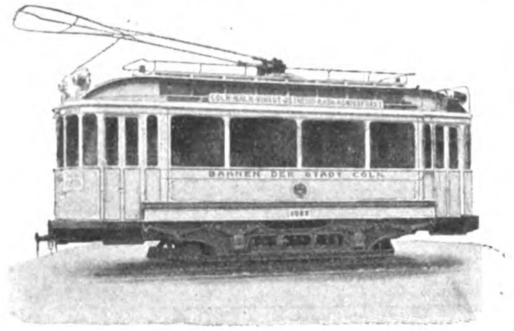

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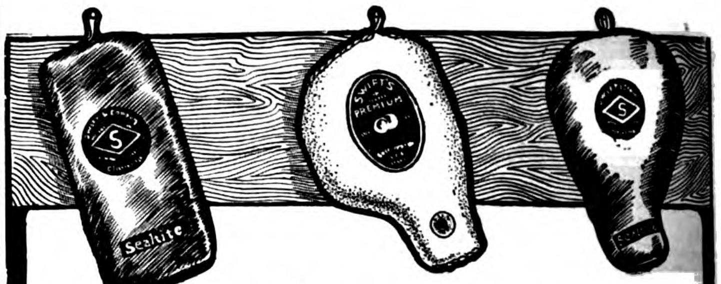

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THE ACKLEY ADJUSTABLE BRAKE

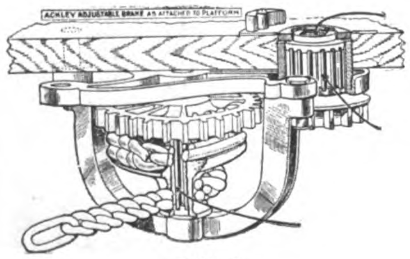

FIG. I

FIG. 3

The ACKLEY ADJUSTABLE is the only gear brake that can be attached to the platform at any angle, owing to the adjustable yoke.

It requires no machine fitted bearings on the staff—(Fig. 2) simply square the staff in blacksmith shop for loose fit—reducing cost of labor to less than one-fourth required to fit any other geared brake staff.

All movable parts revolve on roller bearings (B, C, Figs. 1 and 3), eliminating friction, thereby giving ease of action in applying brake shoes and releasing.

Three different gear ratios, 12×36. 14×34 and 18×30, all interchangeable in same frame, can be obtained with different sized winding drums, as desired, to take up required amount of slack chain, according to type or weight of car.

It is the only gear brake which has no staff bearing in the frame. The journaling of the pinion (Fig. 4), in the frame (Fig. 3 at D), independently of the staff (Fig. 2), places the gears at a fixed position, preventing **BINDING,** which occurs to gear brakes having staff bearings in frame. (See THE OLD—Figs. 5 and 6, G and I.)

Here is the conclusion: It is EASY AND INEXPENSIVE TO INSTALL; POWERFUL, YET EASILY APPLIED; RELEASES QUICKLY; NO BINDING OF STAFF OR GEARS; ADAPTED TO ANY AND SUITABLE FOR ALL KINDS OF CARS.

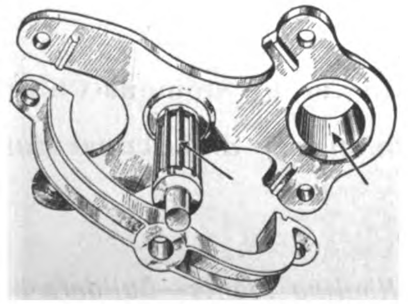

FIG. 2

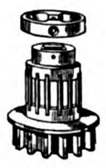

FIG. 4

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VOL. VIII. MANILA, P. I., SHANGHAI, AND YOKOHAMA, OCTOBER, 1911 No. 5.

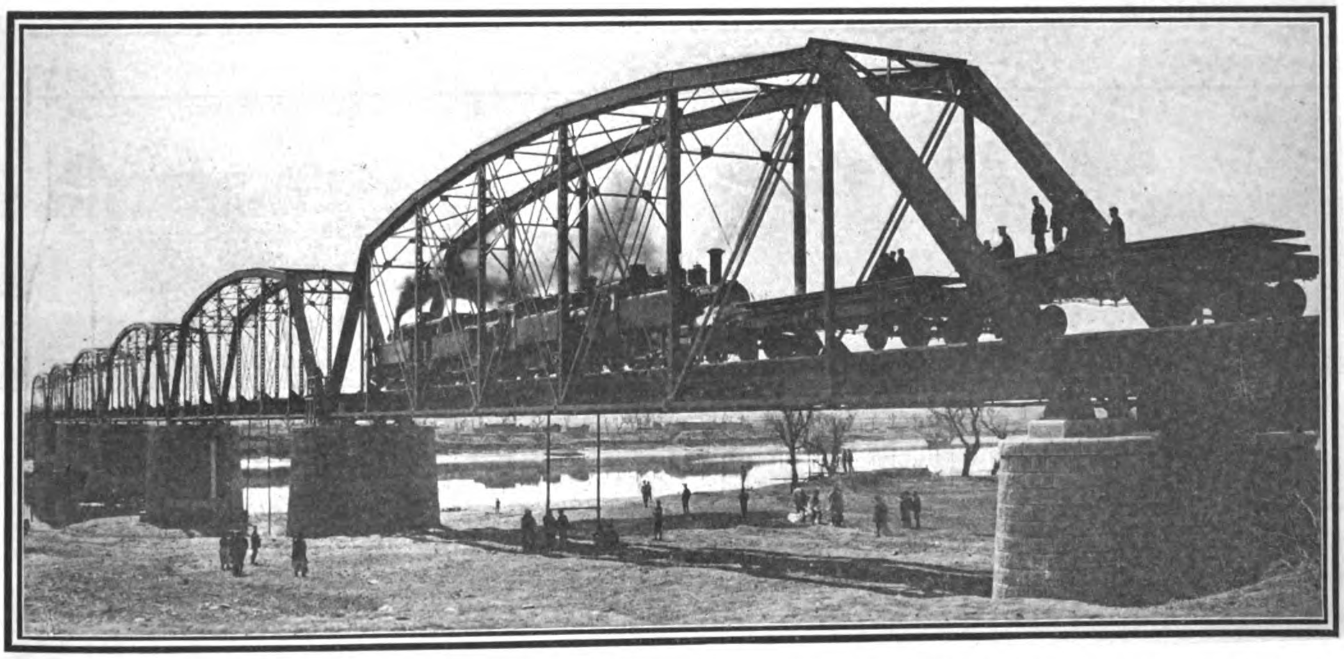
THE IMPERIAL CHOSEN (KOREAN) RAILWAYS

GENERAL INFORMATION

The Chosen Railway line begins at the Port of Fusan situated on the southeastern extremity of the peninsula and running in a north-western direction, terminates at Shingishu (Shin Wi Ju) on the bank of the River Yalu which divides the country from China,

The Governor General of Chosen with the aim in view of improving the condition of the country is endeavouring to adjust traffic facilities for the developement of the country's industry and commerce. To attain this purpose, the construction of two new lines has been taken in hand by the Railway Bureau since the year 1910. One is the Konan line and the other the Keijyo Gensan (Seoul-Wonsan) line.

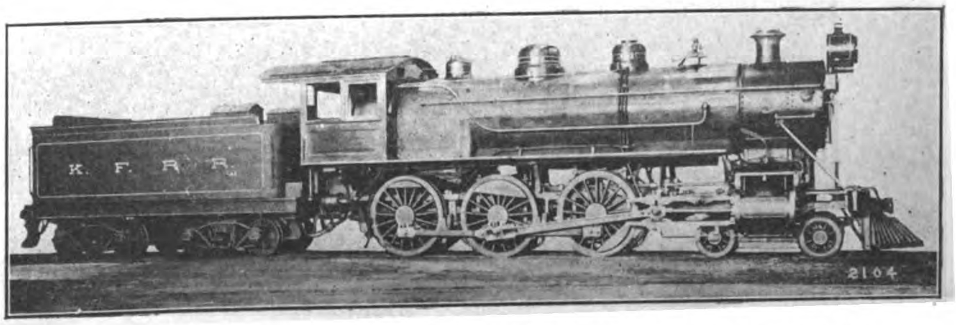
The Konan (Honan) line diverges from Taiden (Taichon) on the Keijyo-Fusan (Se-



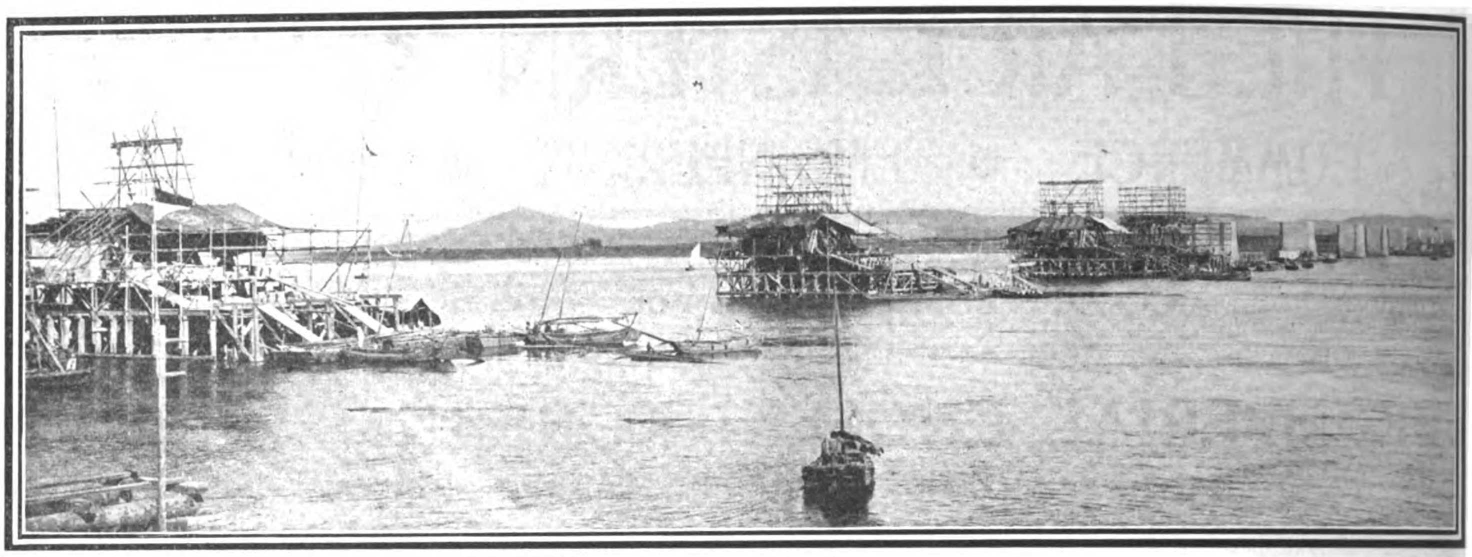
THE IMPERIAL CHOSEN RAILWAYS.—THE SECOND DAI DO RIVER (TAITONG KANG) RAILWAY BRIDGE.—THREE SPANS, 60 FEET LONG EACH, AND SIX SPANS, 200 FEET LONG EACH, TOTAL LENGTH, 1,436 FEET, DISTANT 161.77 MILES FROM RYUZAN STATION ON THE RYUZAN-SHINGISHU LINE

after touching Taikyu (Taiku), Keijyo (Seoul), Heijyo (Pying Yang), and other important cities and towns on its course. It is under the control of the Railway Bureau of the Governor General of Chosen.

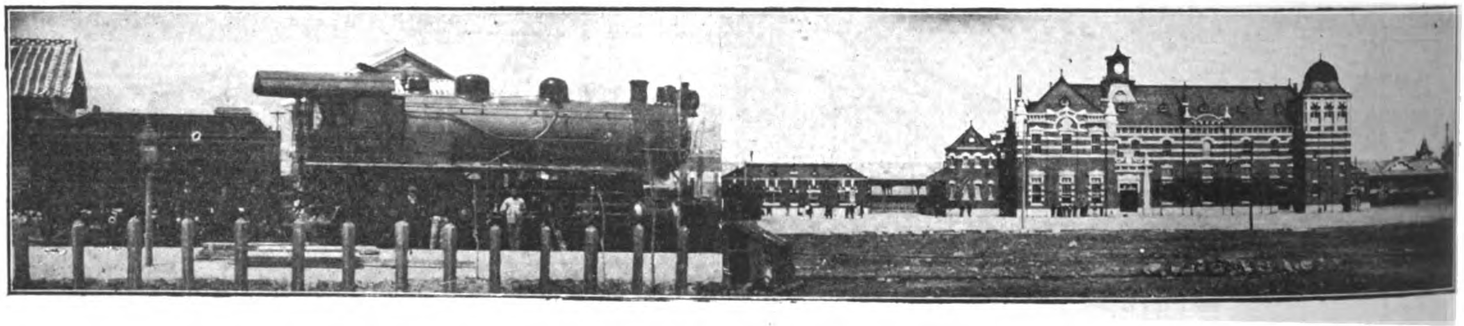
It consists of two trunk lines—the Keijyo-Fusan line and the Keijyo-Shingishu line—which pierce the peninsula, besides several branch lines leading to the ports of Masan, Jinsen (Chemulpo), Chinnampo, Kenjiho (Keum E Po), and the town of Hekirando (Pyoklan to), with an aggregate length of 675 miles. It is the shortest overland route joining Japan, Korea and South Manchuria, as well as Siberia and Europe and will undoubtedly become one of the most important stock lines for the round the world traffic upon the completion of the building of the bridge over the River Yalu which will be finished by the end of this year, as well as of the reconstruction of the Mukden-Antung line under control of the South Manchurian Railway Company.



TYPE OF BALDWIN LOCOMOTIVES USED ON THE IMPERIAL CHOSEN RAILWAYS



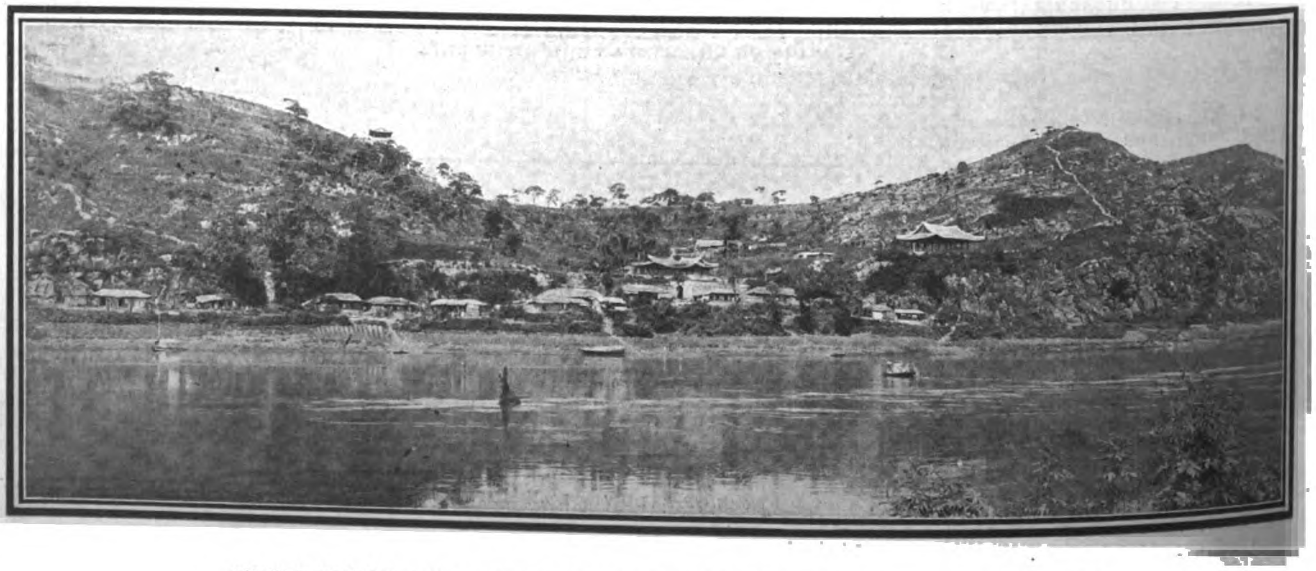
IMPERIAL CHOSEN RAILWAYS.—YALU RIVER BRIDGE UNDER CONSTRUCTION.—TOTAL LENGTH 3,100 FEET.—SIX SPANS, 200 FEET LONG EACH, AND SIX SPANS, 300 FEET LONG EACH.—ONE OF THE LATTER SPANS IS BEING BUILT TO SWING AT THE MIDDLE PART OF THE BRIDGE FOR THE PASSAGE OF VESSELS.—IT MARKS THE TERMINUS OF THE RYUZAN-SHINGISHU LINE.—WORK WAS COMMENCED IN AUGUST, 1909, AND IS EXPECTED COMPLETED BY DECEMBER OF THIS YEAR.



THE IMPERIAL CHOSEN RAILWAYS

FUSAN-SEOUL EXPRESS ENGINE, BUILT BY THE AMERICAN LOCOMOTIVE COMPANY, HAULING TRAIN OF EIGHT PASSENGER CARS OVER A TWO PER CENT GRADE

THE STATION AT FUSAN. THE UPPER FLOORS ARE ARRANGED AS A FIRST CLASS HOTEL, TO BE OPERATED IN CONNECTION WITH THE THROUGH SIBERIAN EXPRESS SERVICE, TO BE INAUGURATED NEXT SPRING ON THE COMPLETION OF THE ANTUNG-MUKDEN LINE.



AN OLD BATTLE FIELD OF THE SINO-JAPANESE WAR NEAR HEIJYO (PYANG-YANG)

oul-Fusan) trunk line and leads to the port of Mokpo through an extensive rich plain in the Zenra (Chol-la) Province. It is so planned as to branch to the port of Kunsan from the neighborhood of Zenshu (Chon-Ju), and the centre of a fertile region. The total length of the line is 176 miles. As the above mentioned two ports are open to foreign trade and the districts along the line, populous and fertile, produce a variety of products, construction is being expedited and is expected completed in the year 1913.

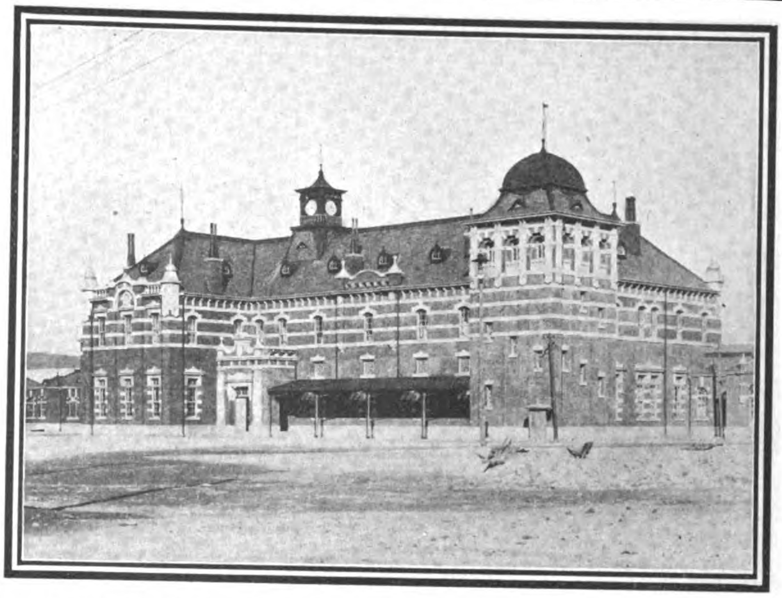
The Keijo–Gensan (Seoul-Wonsan) line starts from Ryuzan (Yongsan) on the Keijyo Fusan (Seoul-Fusan) trunk line and crossing the Kogen (Kangwon) Province, reaches the port of Gensan (Wonsan) in Kankyo (Hamkyung) Province. The line passes through mountainous districts and in consequence considerable difficulties are being encountered in the construction work. It is 136 miles in length and will be completed in the year 1914.

General Outline of the Lines.—All railway lines in Chosen are of the standard gauge, 4' 8-1/2", rails weighing 75 lbs. being chiefly employed. The lines are all of a single track with the exception of Fusan-Soryo section and the Yeitoho-Nandaimon section where a double track is laid. The heaviest grade on the Keijyo–Fusan (Seoul-Fusan) line is 1/50 and on the Keijyo–Shingishu (Seoul–New Wiju) line 1/40. The latter is now being reconstructed and the grade will be reduced to 1/100 in the near future.

The curve of 15 chains in radius is the sharpest on the whole line and corridor trains of a bogie system hauled by locomotives of 100 tons or more are run on the Seoul–Fusan trunk line as well as on a portion of the Seoul–New Wiju line. However, locomotives of over 100 ton engines will shortly be operated on the whole line upon the completion of the reconstruction work.

The Shoken Tunnel measuring 3,948 ft. is the longest tunnel on the trunk line.

The Seisen River (Chyung-chyon-gang) railway bridge, measuring 2583 ft., is the longest bridge, but that over the River Yalu now under construction measures 3,100 ft. It is being built with a swinging span of 300 ft. at the middle part of the bridge to accommodate vessels. It will also be provided with footways on both sides of the bridge.

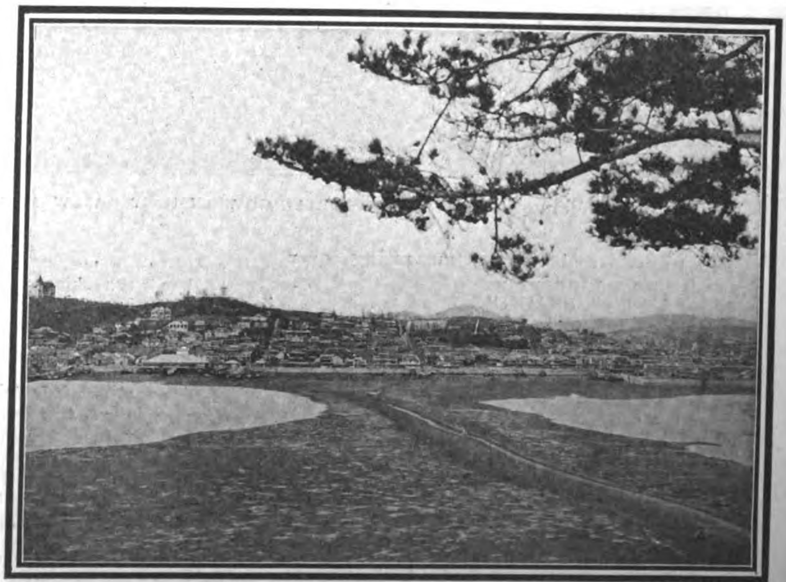


IMP. CHOSEN RAILWAYS—RAILWAY STATION AND HOTEL AT FUSAN.

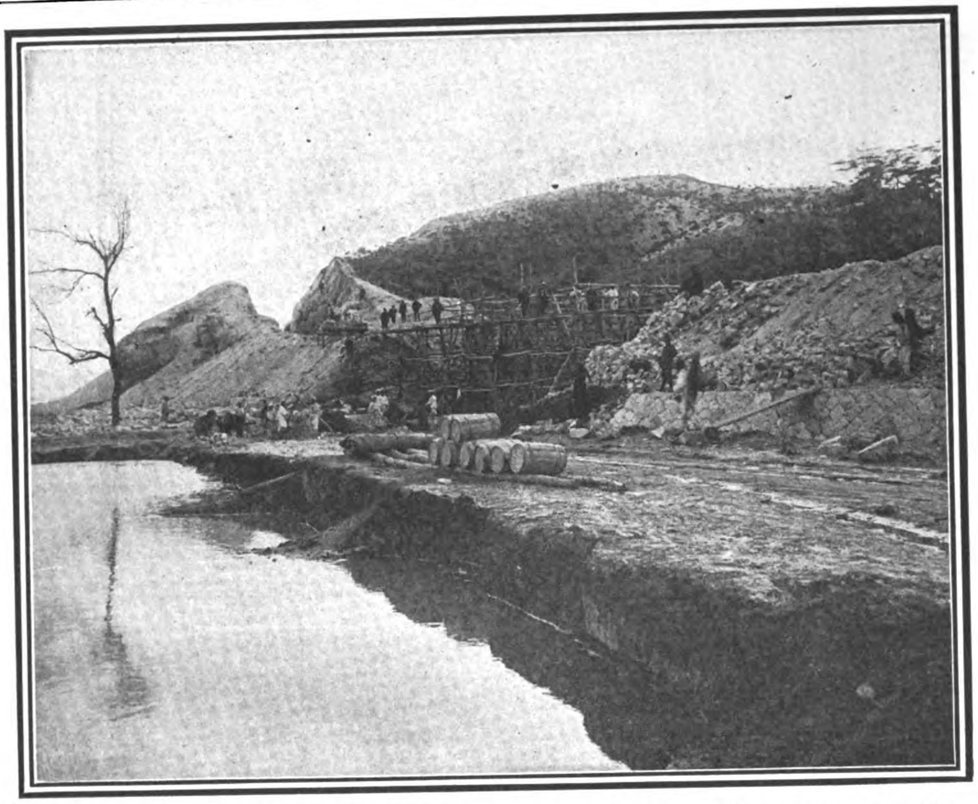
THE TRUNK LINES AND THEIR BRANCHES OF KOREAN RAILWAY

LINES OPEN TO TRAFFIC	KEIJYO-FUSAN (Seoul-Fusan) Line.	Keijyo-Fusan Trunk. Fusan-Seidaimon (Fusan-Seoul)	274.9
		Masan Branch. Sanroshin-Masan (Samaranjin-Masan)	24.8
		Jinsen Branch. Yeitoho-Jinsen (Yongdunpo-Chemulpo)	18.4
			318 1
	KEIJYO-SHINGISHU (Seoul-New Wiju) Line.	Keijyo-Shingishu Trunk. Ryuzan-Shingishu (Yongsan-New Wiju)	309 7
		Chinnampo Branch. Heijyo-Chinnanpo (Phyong Yang-Chinnampo)	34 3
		Kenjiho Branch. Koshu-Kenjiho (Hoangjyu-Keum E po)	8.9
		Hekirando Branch. Dojo-Hekirando (Tosong-Pyoklanto)	3.6
		(for goods only)	356 5
		TOTAL	674.6
LINES UNDER CONSTRUCTION	KONAN (Honan) Line	Taiden-Moppo. (Taichon-Mokpo)	161.0
		Gunsan Line. (Kunsan) Diverges at midway of the Taiden-Moppo Line	14.8
			175 8
	KEIJYO-GENSAN (Seoul-Wonsan) Line	Ryuzan-Gensan (Yongsan-Wonsan)	136.3
		TOTAL	312.1
		GRAND TOTAL	986.7

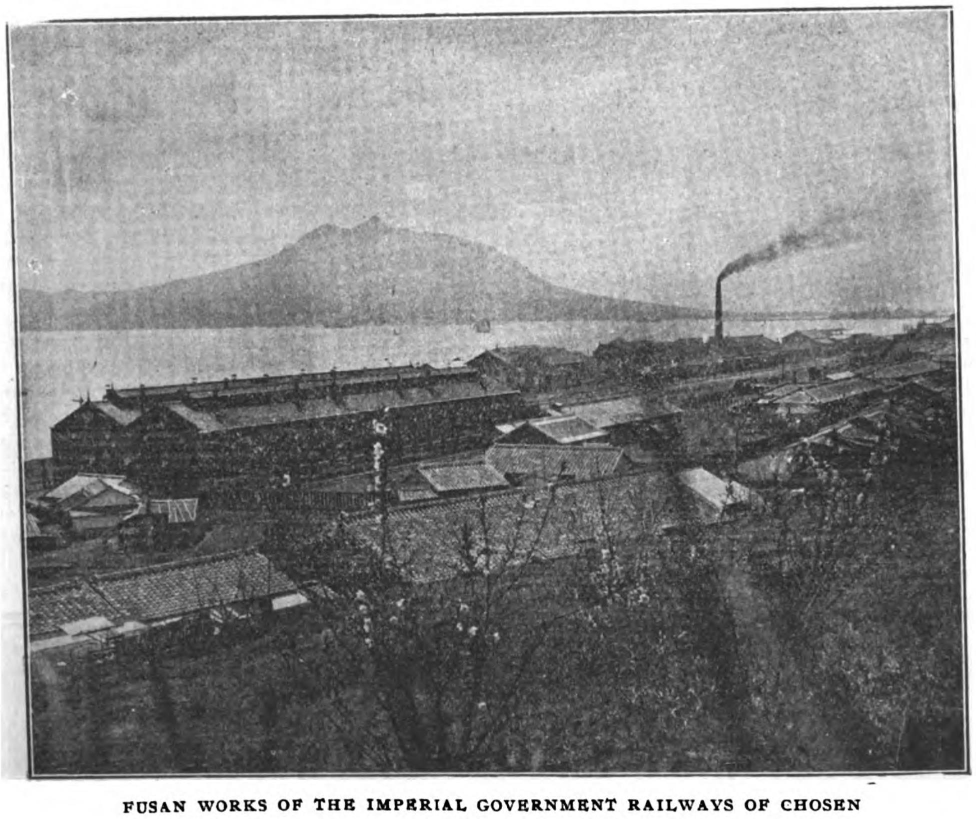
UNLOADING AMERICAN LOCOMOTIVES AT FUSAN



THE PORT OF JINSEN (CHEMULPO)



IMP. CHOSEN RAILWAYS: CONSTRUCTION WORK ON THE KEIGEN (SEOUL-WONSAN) LINE



FUSAN WORKS OF THE IMPERIAL GOVERNMENT RAILWAYS OF CHOSEN

The tunnels and bridges measuring over 1,500 ft. are as follows:—

BRIDGES.

Name	Length	Position
Chyong chyon-Gang Railway Bridge.	2,582' 6"	Shin an ju Reibi (Yong-mi)
2nd Han Gang Railway Bridge.	2,059' 3"	Noryangjin-Yongsan
Mitsuyo River Railway Bridge.	1,928' 8"	Mitsuyo (Milyang)-Yuchon.
Naktoko (Naktong-gang) Bridge	1,838' 3"	Nagtong Gan Chin Yong
Im jin gang Railway Bridge	1,786'0"	Bunsan (Munsan)-Chyangdan.
Daineiko Railway Bridge	1,643' 6"	Shinan jyu-Reibi (Yong-mi).
Rakutoko (Nagtong) Railway Bridge	1,544' 11"	Waikan-Jakuboku.
Taidoko (Taidong-gang) Railway Bridge	1,501' 6"	Rikiho-Heijyo (Phyongyang)

TUNNELS

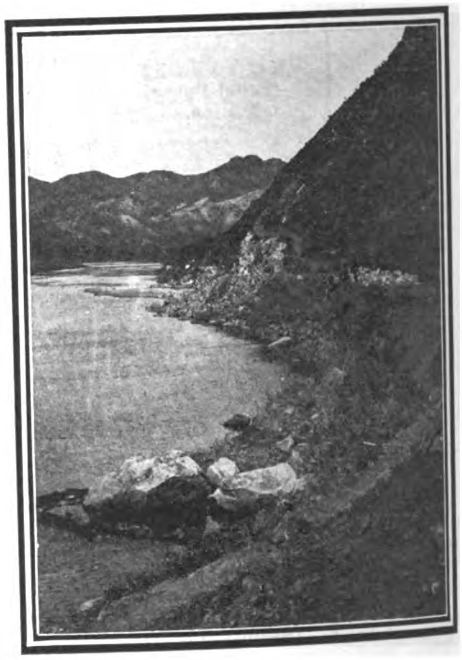
Shoken tunnel		
Shoken (Phyekma) Railway	3,948' 8"	Seido-Keisen.
Habuka (Phyekma) Railway	1,782' 0"	Hakuba-Sekika.
Gyoha Railway	1,740' 0"	Gyoha Shukusen.

General Outline of the Traffic Business.—Connections at Termini.—Beyond Shigishu (New Wi Ju), the north terminus of the trunk line, connection is made across the River Yalu by steam boats (by sleds in winter) with the Antung-Mukden line of the South Manchuria Railway. In the South, ferry steamers plying between Shimonoseki and Fusan connect the Chosen Railway with the Main lines as well as the Kyushu line of Japan. Between Jinsen and Dairen (Dalny) traffic is maintained by the liners of the Nippon Yusen Kaisha and the Osaka Shosen Kaisha—six times a month.

Joint traffic for passengers and parcels is managed between all stations on the Chosen Railway and the principal stations on the Imperial Japanese Government Railways as well as the South Manchuria Railway.

Train Services.—Between Fusan and Keijyo (Seoul), express trains are run daily from either direction and the distance is covered in about 9 hours. A dining car where European meals are served on the a la carte plan is attached to each of these. Between Keijyo and Shingishu, express trains are run once a day from each point and cover the distance in about 12 hours. European meals are also obtainable on these trains. Waiters and guides are provided for the benefit of passengers on all express trains. Besides, night trains start every other day from Keijyo to Fusan, or vice versa, the distance being covered in about 11 hours.

Between Keijyo and Jinsen (CHEMULPO), 18 through trains (including 4 express) are run daily, covering the distance of about 25 miles in 1½ hours (express trains take one hour). Between Sanroshin and Masan, trains run 4 returns a day and cover the distance in 1½ hours. Between Keijyo (Phyong Yang) and Chinnampo, 2 return trains are run.



IMP. CHOSEN RAILWAYS: CONSTRUCTION WORK ON THE KO-NAN (HONAN) LINE

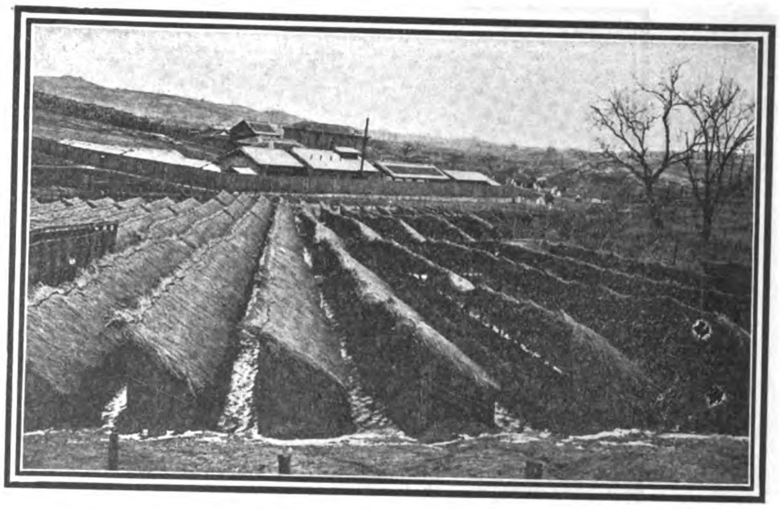
All above trains on branch lines make satisfactory connections with the trains on the trunk lines.

The number of carriages and locomotives employed is as follows:—

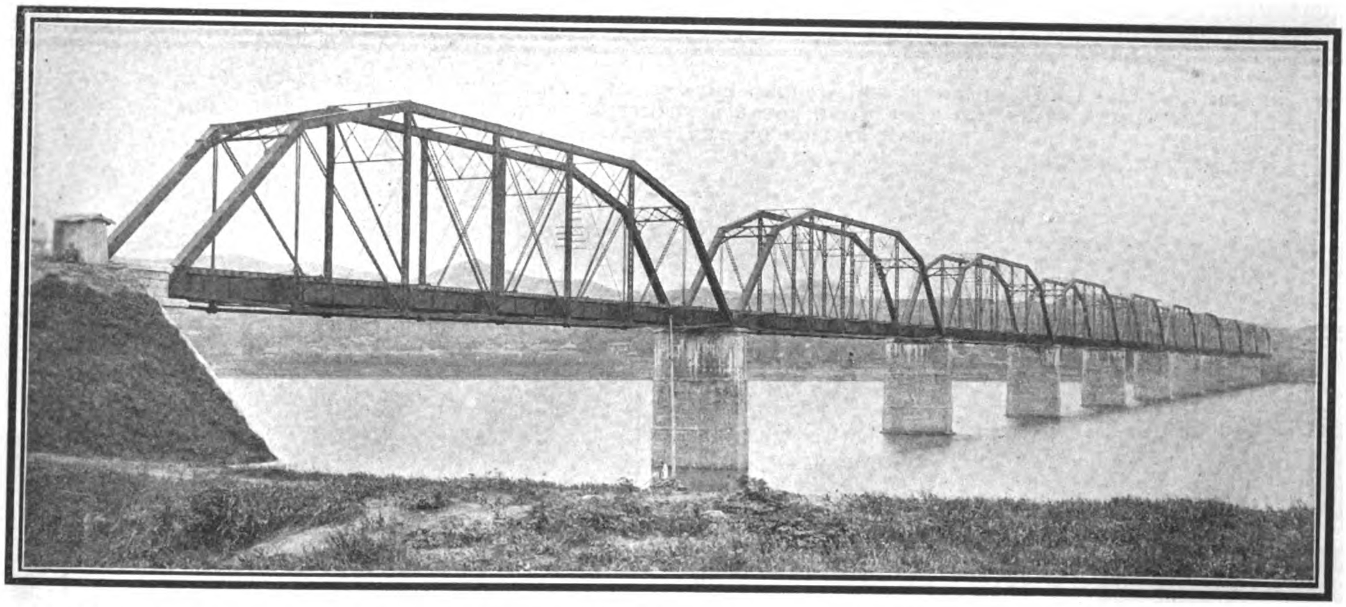
Locomotives......	118	tender engines	44
		tank engines	74
Carriages..........	165	(all bogie system)	
Wagons..................		26 ton wagon	485
		22 " "	305
		20 " "	50
		14 " "	4
		10 " "	342
			1186

Fushun coal is chiefly used for fuel, Japanese coal being used occasionnally.

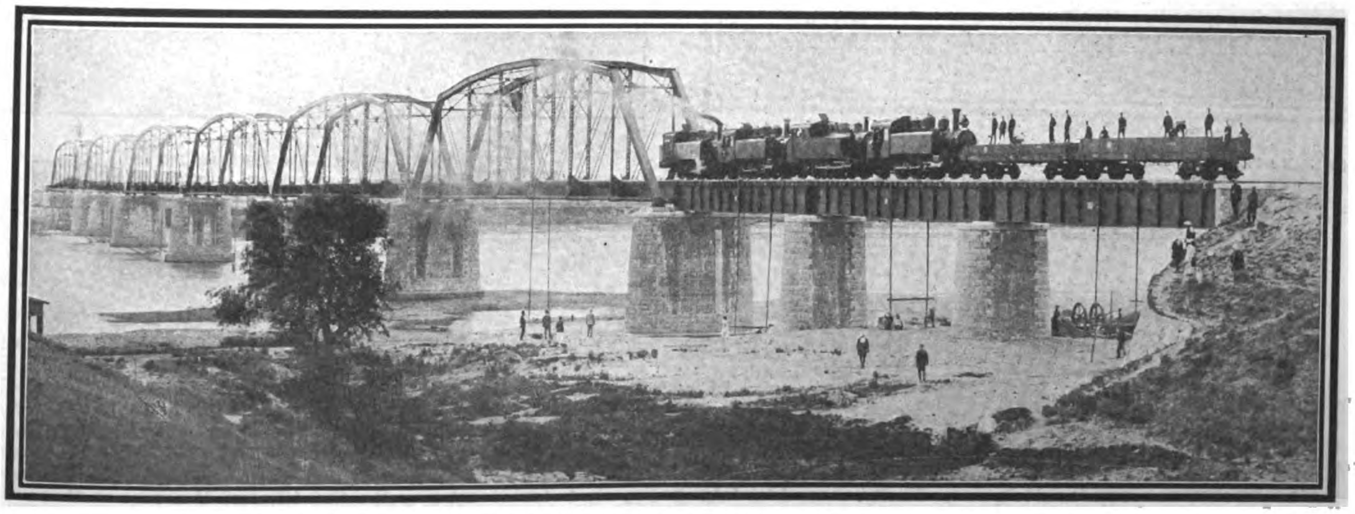
A STREET IN SEOUL



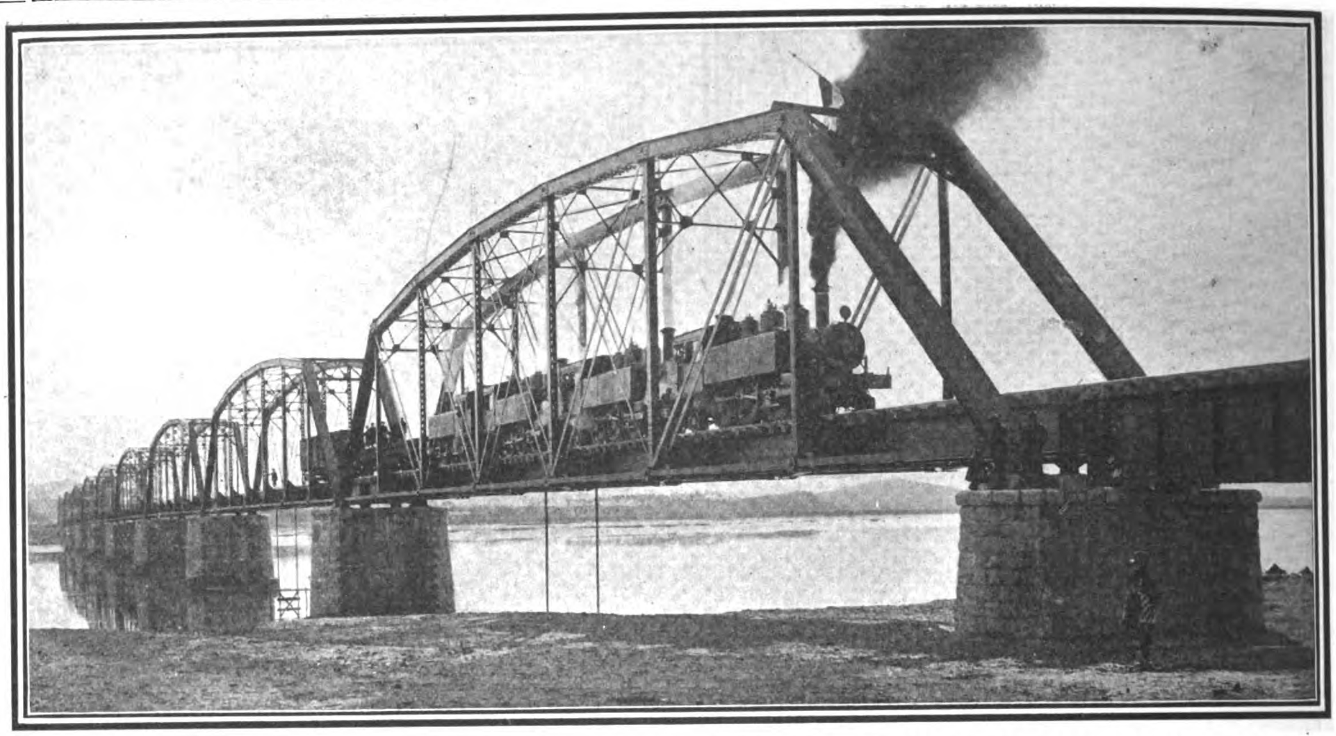
A GINSENG PLANTATION NEAR SEOUL



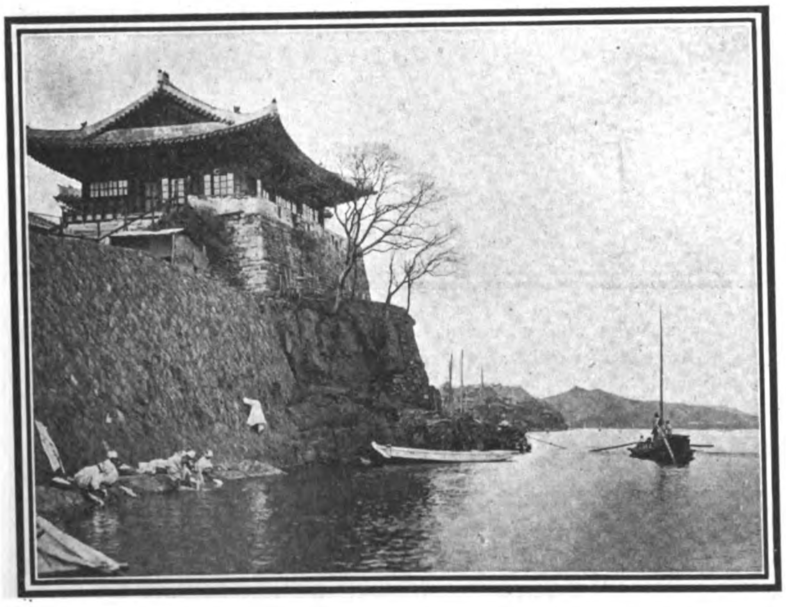
IMP. CHOSEN RAILWAYS.—THE SECOND KAN KOW (HANG KANG OR HAN RIVER) RAILWAY BRIDGE. TEN SPANS, 200 FEET LONG EACH, TOTAL LENGTH 2059 FEET, SITUATED 271.1 MILES FROM FUSAN STATION ON THE KEIJYO-FUSAN LINE.



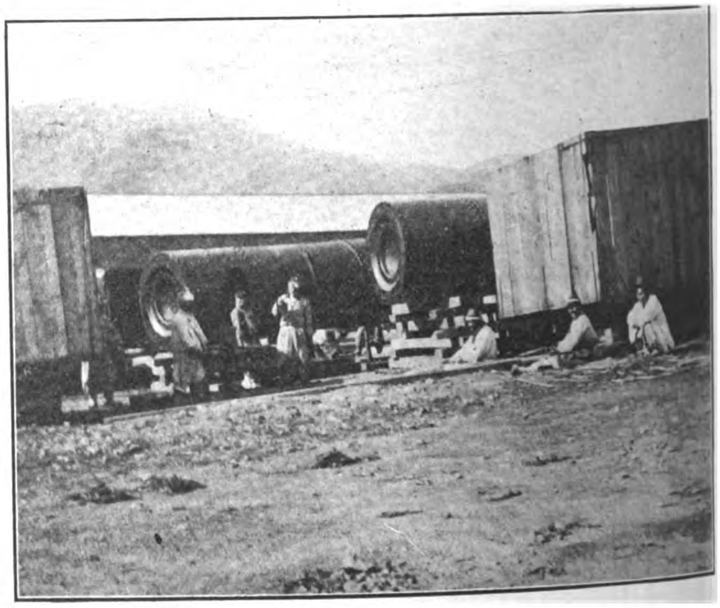
IMP. CHOSEN RAILWAYS.—THE FIRST DAI DO RIVER (TAITONG KANG) RAILWAY BRIDGE.—FOUR SPANS, 60 FEET EACH, AND SIX SPANS, 200 FEET EACH, TOTAL LENGTH 1,502 FEET, SITUATED 161.27 MILES FROM RYUZAN STATION ON THE RYUZAN-SHINGISHU LINE.



IMP. CHOSEN RAILWAYS.—THE SEISEN RIVER.—(CHUNG CHUN KANG) RAILWAY BRIDGE—ELEVEN SPANS, 60 FEET EACH, AND NINE SPANS, 200 FEET EACH, TOTAL LENGTH 2583 FEET, SITUATED 211.13 MILES FROM RYUZAN STATION ON THE RYUZAN-SHIN-GISHI LINE.



IMP. CHOSEN RAILWAYS.—THE RENKOTEI; AN ANCIENT TOWER AT HEIJYO (PYONG-YANG)



UNLOADING AMERICAN LOCOMOTIVES AT FUSAN.

FARE AND FREIGHT.—FARE BASIS.

(3rd class)

Up to 50 mile	3	sen per mile.
51-100 miles	2½	sen per mile.
101-200 ,,	2	,, ,, ,,
201-300 ,,	1½	,, ,, ,,
over 3 1 ,,	1	,, ,, ,,

Computation of the fare will be made separately for each distance above mentioned and aggregated.

1st and 2nd class tickets are sold at the increased rate of 150% and 75% of a 3rd class ticket respectively.

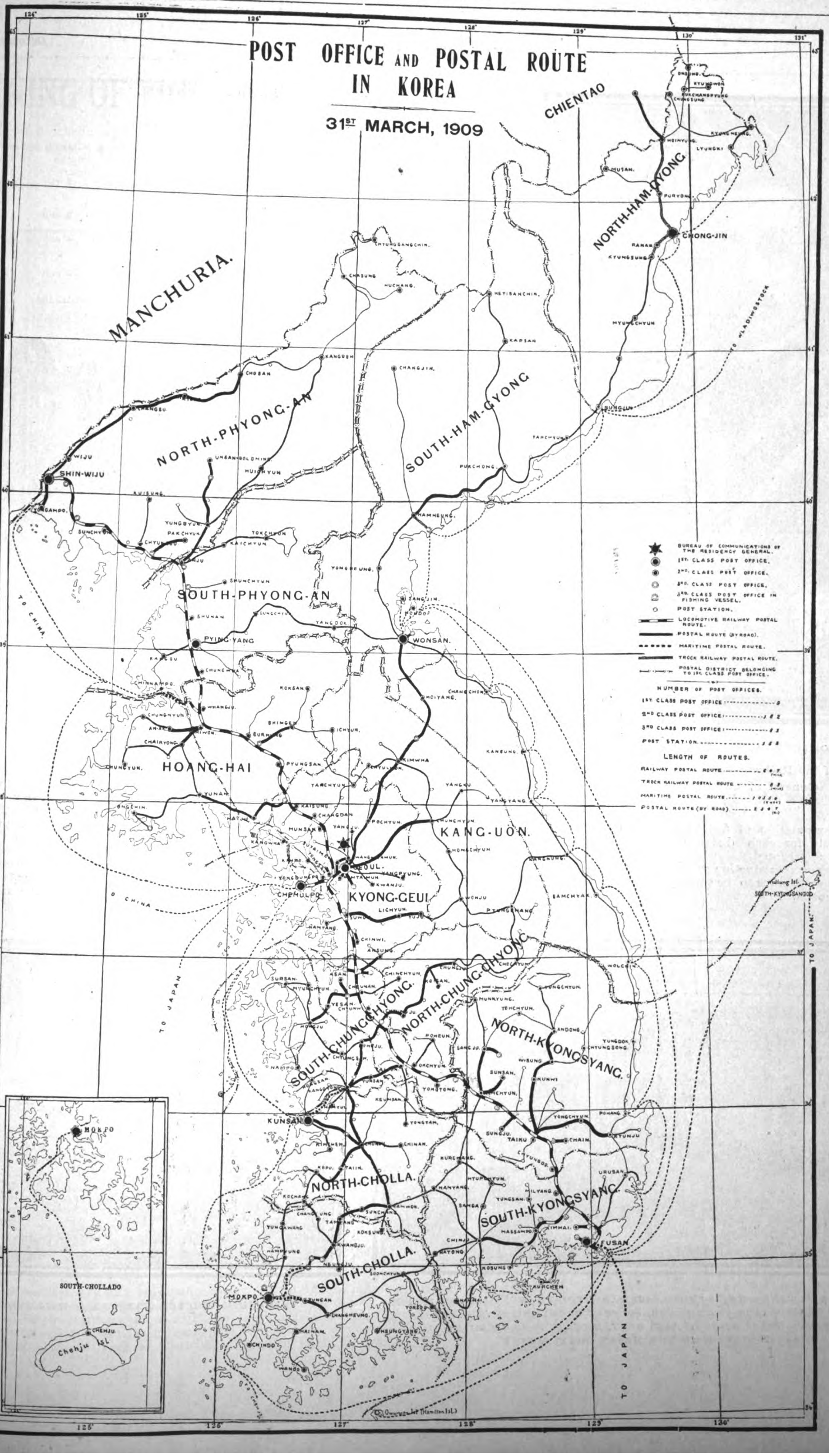
For passengers in party, a reduction of fares is allowed according to their number and the distance they travel.

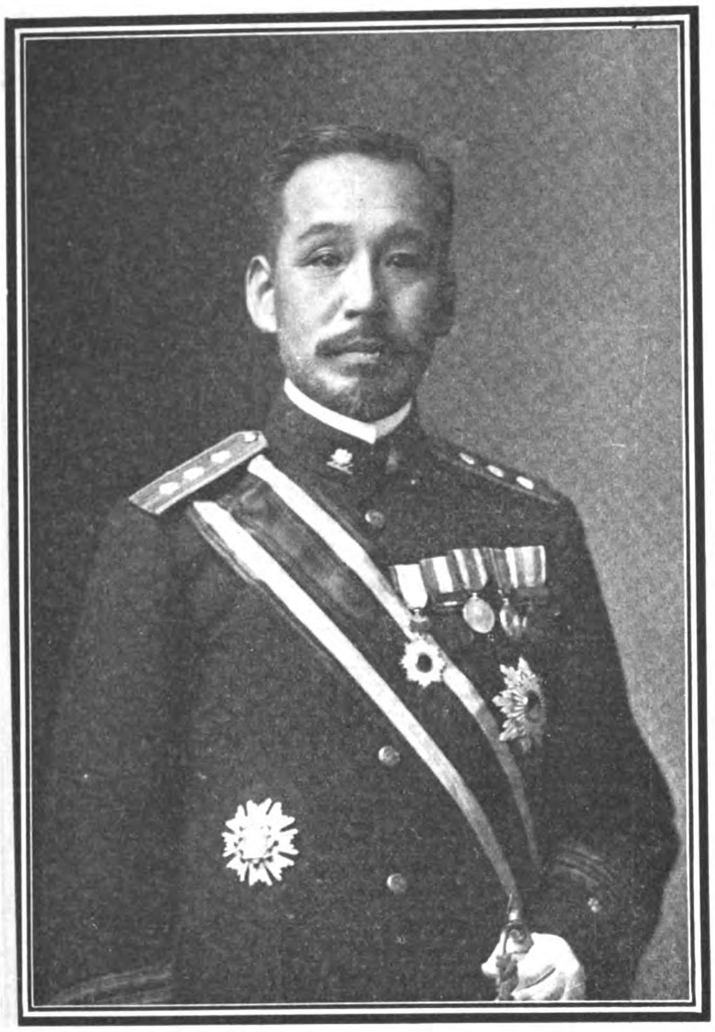
Luggage conveyed free.—Luggage is conveyed free of charge with the following limits:—100 kin (about 133 lbs) for a 1st class passenger; 60 kin (about 80 lbs.) for a 2nd class passenger; 30 kin (about 40 lbs.) for a 3rd class passenger.

Children up to four years of age are free of charge, and those over four and under twelve are charged half fare.

Agents for the sale of tickets.—The Railway Bureau is now under agreement with Messrs. Thomas Cook & Son and the International Sleeping Car & Express Train Company for the sale of passenger tickets for the Chosen Railway at their agencies in Japan, China, and other parts in the Far East as well as in Western Countries.

Freight Basis.—The freights for wagon goods are as follows:


POST OFFICE AND POSTAL ROUTE
IN KOREA
31ST MARCH, 1909
MANCHURIA.
CHIENTAO
NORTH-HAM-GYONG
SOUTH-HAM-GYONG
NORTH-PHYONG-AN
SOUTH-PHYONG-AN
HOANG-HAI
KANG-UON
KYONG-GEUI
NORTH-CHUNG-CHYONG
SOUTH-CHUNG-CHYONG
NORTH-KYONGSYANG
SOUTH-KYONGSYANG
NORTH-CHOLLA
SOUTH-CHOLLA
SOUTH-CHOLLADO
Chehju Isl.
SHIN-WIJU
PYING-YANG
WONSAN
SEOUL
CHEMULPO
CHONG-JIN
KUNSAN
MOKPO
FUSAN
TO CHINA
TO JAPAN
TO VLADIWOSTOCK
BUREAU OF COMMUNICATIONS OF THE RESIDENCY GENERAL.
1ST CLASS POST OFFICE.
2ND CLASS POST OFFICE.
3RD CLASS POST OFFICE.
3RD CLASS POST OFFICE IN FISHING VESSEL.
POST STATION.
LOCOMOTIVE RAILWAY POSTAL ROUTE.
POSTAL ROUTE (BY ROAD).
MARITIME POSTAL ROUTE.
TROCK RAILWAY POSTAL ROUTE.
POSTAL DISTRICT BELONGING TO 1ST CLASS POST OFFICE.
NUMBER OF POST OFFICES.
1ST CLASS POST OFFICE
2ND CLASS POST OFFICE
3RD CLASS POST OFFICE
POST STATION
LENGTH OF ROUTES.
RAILWAY POSTAL ROUTE
TROCK RAILWAY POSTAL ROUTE
MARITIME POSTAL ROUTE
POSTAL ROUTE (BY ROAD)



H. E. GOMPEI OYA, KOGAKUHAKUSHI

Director General of the Railway Bureau of the Government General of Chosen.

FREIGHT RATES

Class	Goods	Unit	Freight 0-20 m.	21-50 m.	51-100 m.	101-200 m.	Over 201 m.	Min.
goods dealt in kin....	....	100 kin per 1 m.	9 rin	4 rin	4 rin	2 rin	1 rin	9 sen
goods dealt in ton....	....	1 ton per 1 m.	5 sen	4 sen	3 sen	2 sen	1 sen	50 sen
animal.....	ox, horse	1 head per 1 m.	10 sen	8 sen	6 sen	4 sen	2 sen	4 yen
animal.....	pony, calf, sheep, pig.	,, ,, ,, ,,	5 sen	4 sen	3 sen	2 sen	1 sen	4 yen

10 rin—1 sen   100 sen—1 yen   1 kin—1.333 lbs.

Computation of freight will be made separately for each distance above mentioned and aggregated.

A special reduction will be made according to the distance to be conveyed and the nature of goods.

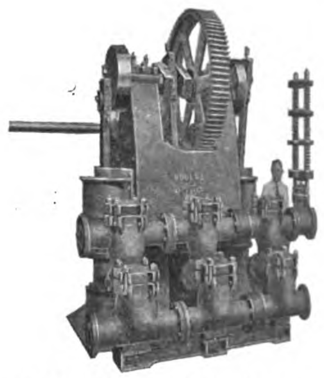
TRAFFIC BUSINESS.—The following table shows both the number of passengers and the tonnage of goods conveyed during the last three years and the receipt:—

Fiscal year	1907	1908	1909	1910
Receipt........	3,262,686	3,956,854	3,817,304	4,562,904
Number of Passengers.......	2,625,772	2,172,741	1,930.442	2,024,490
Tonnage of goods........	391,175	737,693	712,137	888,723
Receipt per day per mile.....	yen13 942	yen16.899	yen16.326	yen19.060

Mechanical Enterprise.—Three workshops are in existence at Soryo, Ryuzan and Kenjiho and meet the requirements for manufacturing and repairing the rolling stock, machinery, tools, etc. The Ryuzan Shop covering an area of about 3,700 tsubo (1 tsubo—6 ft. square), is the largest of the three and the artisans and workmen (both Japanese and Korean) employed in the shop number 700. Besides supplying railway materials, orders from the general public for the manufacture and repair of machines and machinery are executed by all the shops. The motive power used is generally steam but in Ryuzan Workshop electricity in addition to steam is employed.

NEW GOULDS SINGLE-ACTING TRIPLEX PLUNGER PUMP FOR HIGH PRESSURES 215 TO 1500 POUNDS.

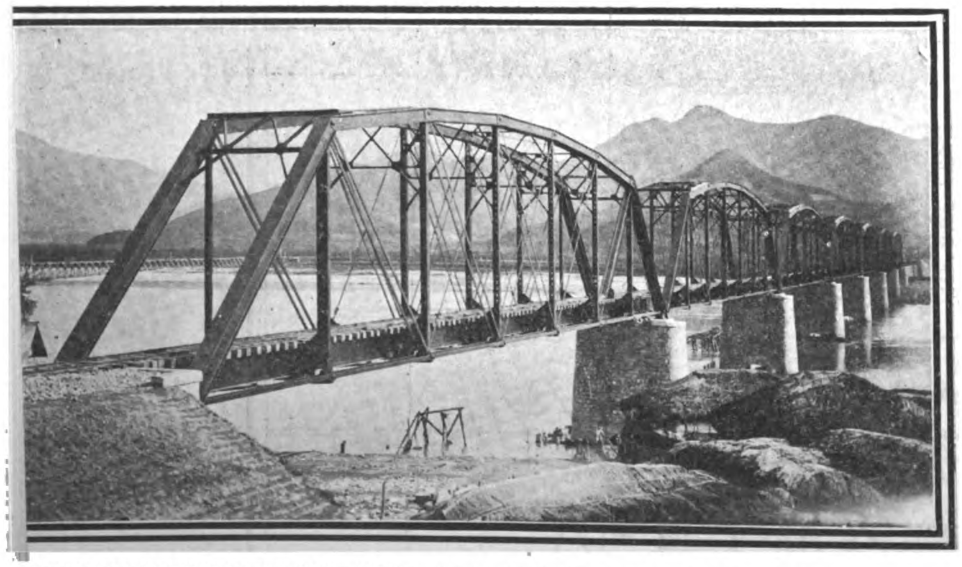
The Goulds Manufacturing Company, Seneca Falls, N. Y., have just placed a new high pressure Triplex Power Pump on the market. This pump, known as Fig. 1585, is similar to the Fig. 1283 type, which is in general use in mines, water works, and with hydraulic elevators, fire protection systems, hydraulic presses, oil pipe lines, etc.



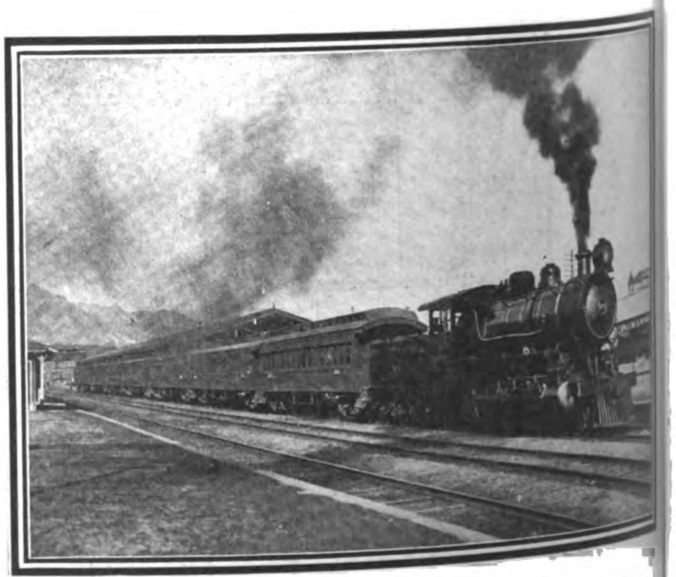
The chief difference is in the gearing. As shown by the illustration, the new pump has only one gear and pinion, which are located between the standards. Figure 1283 had two sets, one on either side of the standards.

Placing the gearing between the standards necessarily lengthened one side of the pump somewhat, and increased the distance between the two valve boxes on that side. Instead of lengthening the pipe connection between the valve boxes on one set and making each set of a different shape as they are in many pumps, a distance piece is put in as shown. In this way the three sets of valve boxes are kept identical in form and interchangeable.

This duplication of parts is a feature of Goulds Pumps, which is greatly appreciated by the purchaser, and one that saves valuable time when repairs are needed. It also reduces the number of parts kept in stock by the large user who may be located at a great distance from the factory.



IMPERIAL CHOSEN RAILWAYS.—THE RAKUTO RIVER (NOKTONG KANG) RAILWAY BRIDGE ON THE MASAN BRANCH LINE.—SIX SPANS, 60 FEET EACH, AND SEVEN SPANS, 200 FEET EACH, TOTAL LENGTH 1838 FEET, SITUATED 22 83 MILES FROM MASAN STATION ON THE MASAN BRANCH LINE



IMPERIAL CHOSEN RAILWAYS.—THE SEOUL-FUSAN EXPRESS

OPENING OF THE CHINESE SECTION, CANTON-KOWLOON RAILWAY

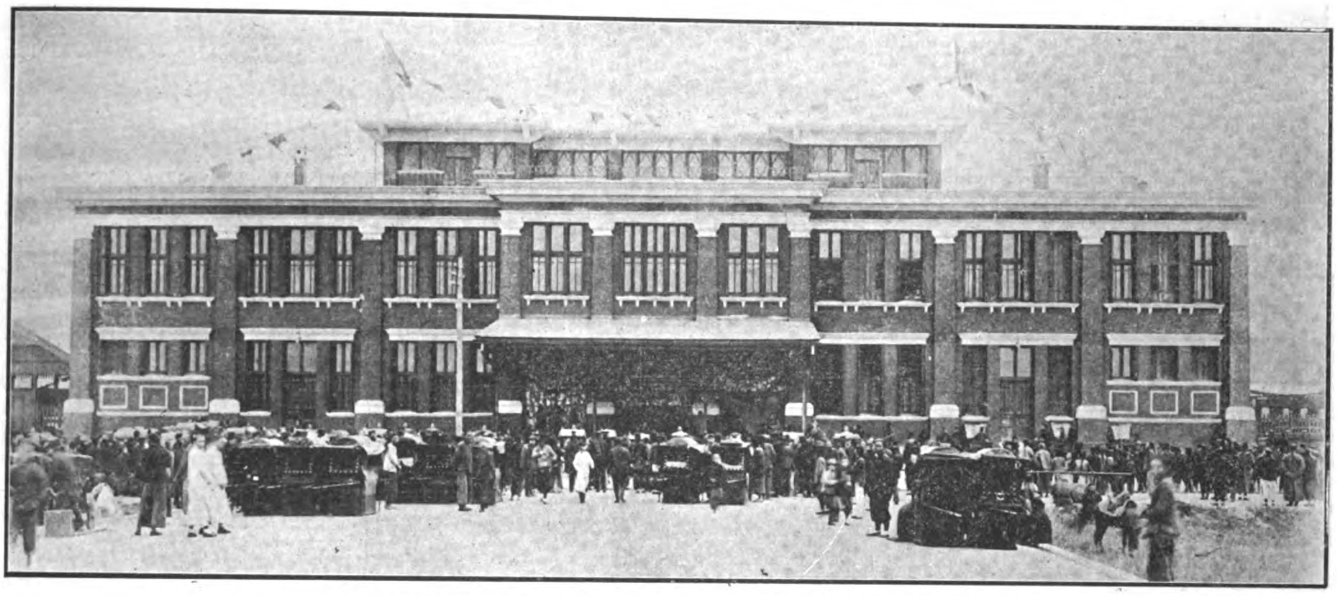
An official luncheon at the station at Sam Chun at the boundary of British and Chinese territory British and Chinese officials participating, at noon, October 4, celebrated the completion of the Chinese Section of the Canton–Kowloon Railway and inaugurated a through service between Kowloon and Canton.

An official train from Canton with the Chinese railway officials and their guests left Canton at 8:45 a. m. arriving at Sam Chun at 12:20, a total distance of 98 miles.

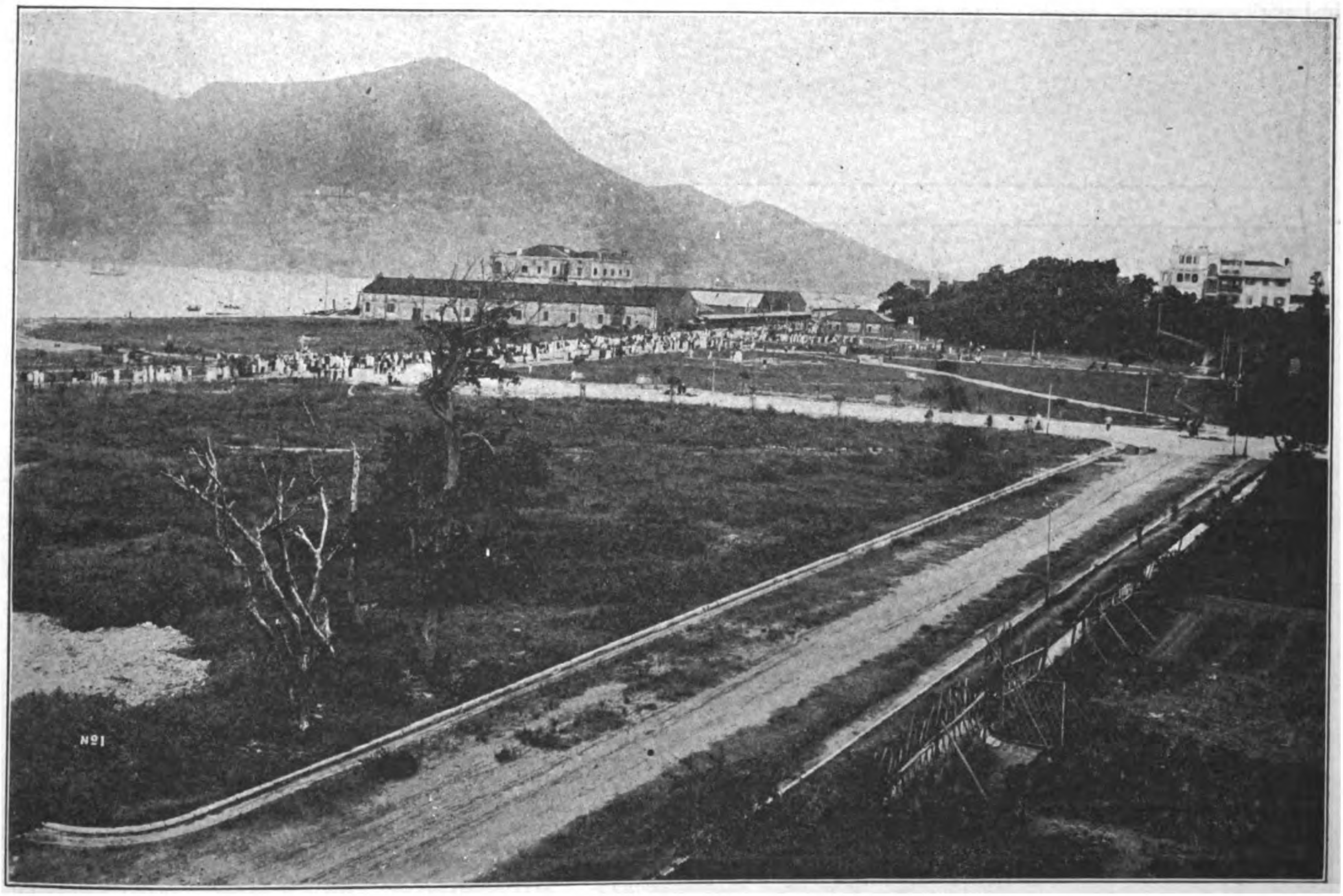
Another special carrying the guests of the railway from Hongkong arrived at Sam Chun about the same time.

H. E. Li Ching Feng, Commissioner of Foreign Affairs, in proposing the toast "Success to the Canton-Kowloon Railway: British and Chinese sections" concluded his remarks by officially declaring the two sections connected and open for traffic.

In response the Hon. Warren B. Barnes, Colonial Secretary of Hongkong, stated that the occasion was one in celebration of the success of Anglo-Chinese co-operation and referred to the satisfactory conclusion of a working agreement for the two sections. He expressed belief that the line would pay from the start. Local traffic alone would, he believed, cover operating expenses and a fair sum towards interest on capital while as



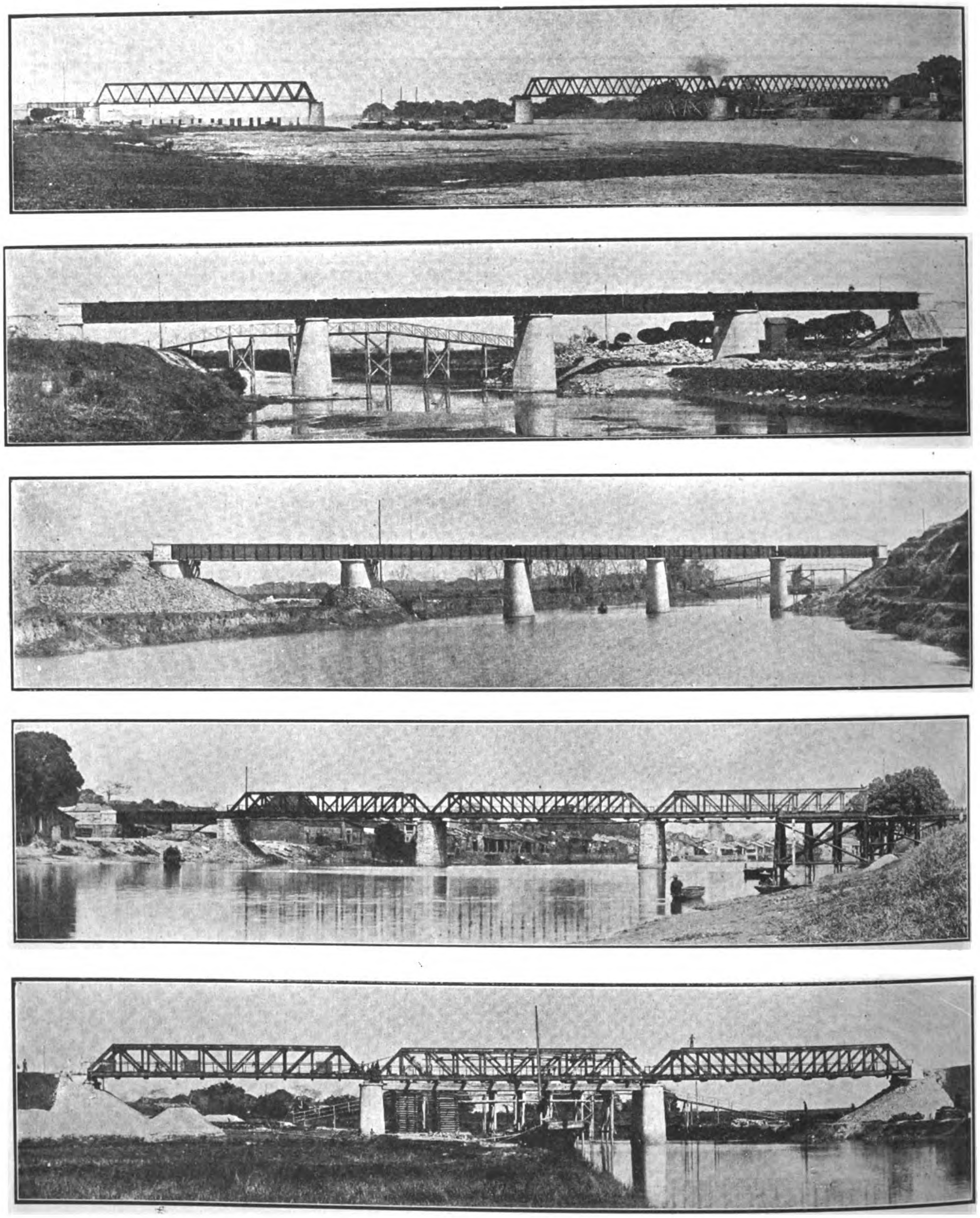
CANTON-KOWLOON RAILWAY.—TAI SHA TOU (CANTON) STATION



THE KOWLOON TERMINAL OF THE BRITISH SECTION

the long distance traffic developed with the lines proposed towards Peking the revenues would steadily increase. He said:

"I anticipate in the next five years, passing through Samchun with a ticket in my pocket for London, and a return ticket at that."



TYPES OF BRIDGES ON THE CHINESE SECTION, CANTON-KOWLOON RAILWAY

His Honor Chao Ching Hua, Managing Director of the Imperial Chinese Section of the Canton-Kowloon Railway, stated that the function marked the strengthening of the close friendship between China and England. He paid a tribute to his predecessor and expressed his appreciation of the services of the local authorities, foreign and Chinese staffs. He also made special reference to the splendid services of Mr. Frank Grove, Engineer-in-Chief.

Mr. E. S. Lindsay, Chief Resident Engineer of the British section, was optimistic as to the future of the line. He said:

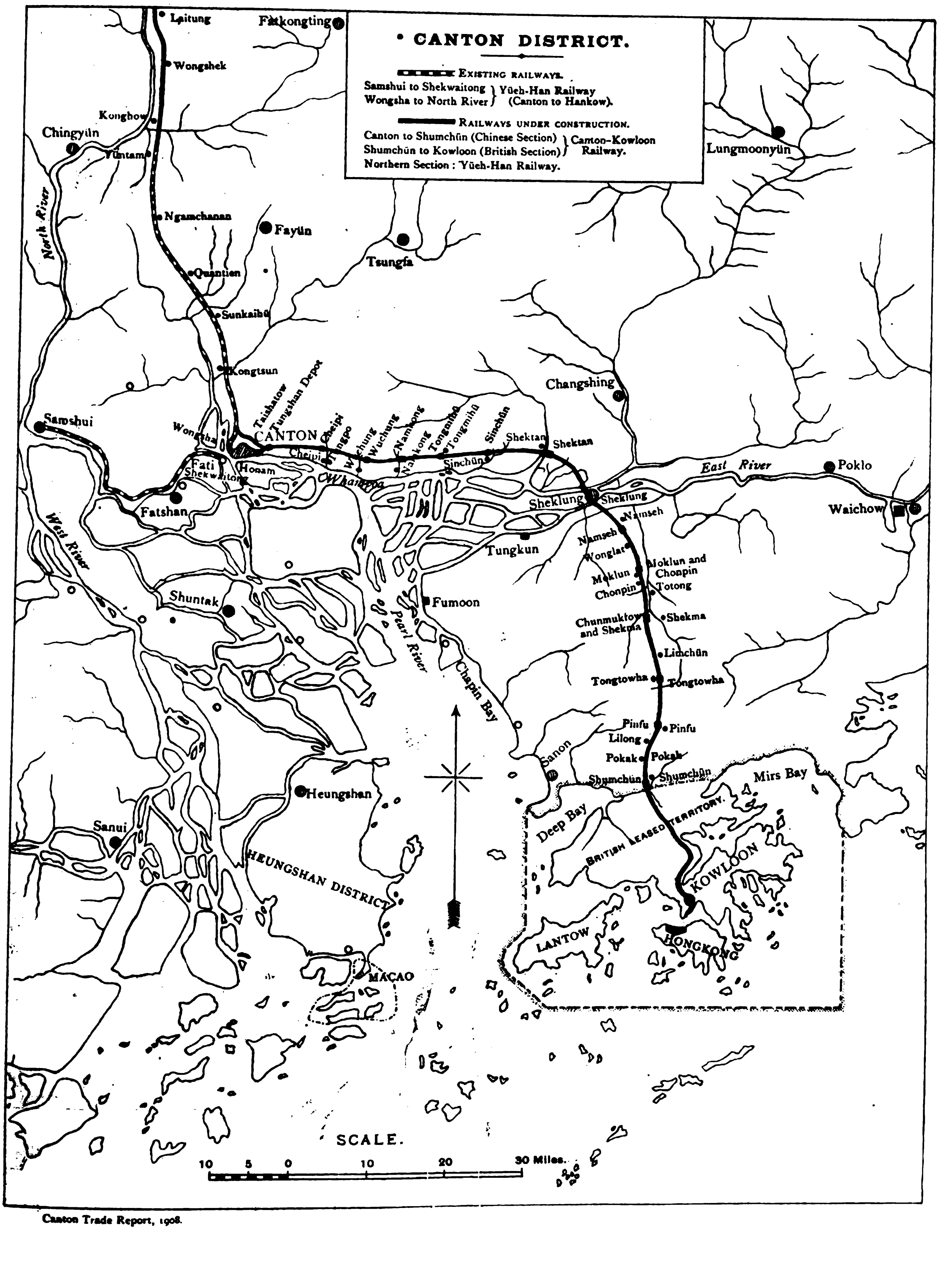
"It is just a year since the British section was opened for traffic and the fact that the result of the past year has greatly exceeded our expectations may be taken as a happy augury of success in the future. If a line 22 miles in length running from Kowloon to Lowu, nowhere in particular, and passing through a thickly populated district of the New Territory can earn enough to almost pay its fair working expenses during the first year's operation, what possibilities must there lie before a line five times as long connecting two centers such as Hongkong and Canton and passing through a province whose average population is 450 to the square mile?" He also referred to the

promise of increased traffic as the Canton-Hankow and branches were completed. He expected that the distance between Honkong and Canton would soon be made in four hours.

Mr. Frank Grove, Engineer-in-Chief, who has been identified with the Chinese section since its inception and to whom credit is due for the high standard construction and the expedition with which the line was built, was the next speaker. In reviewing the history of the road he said:

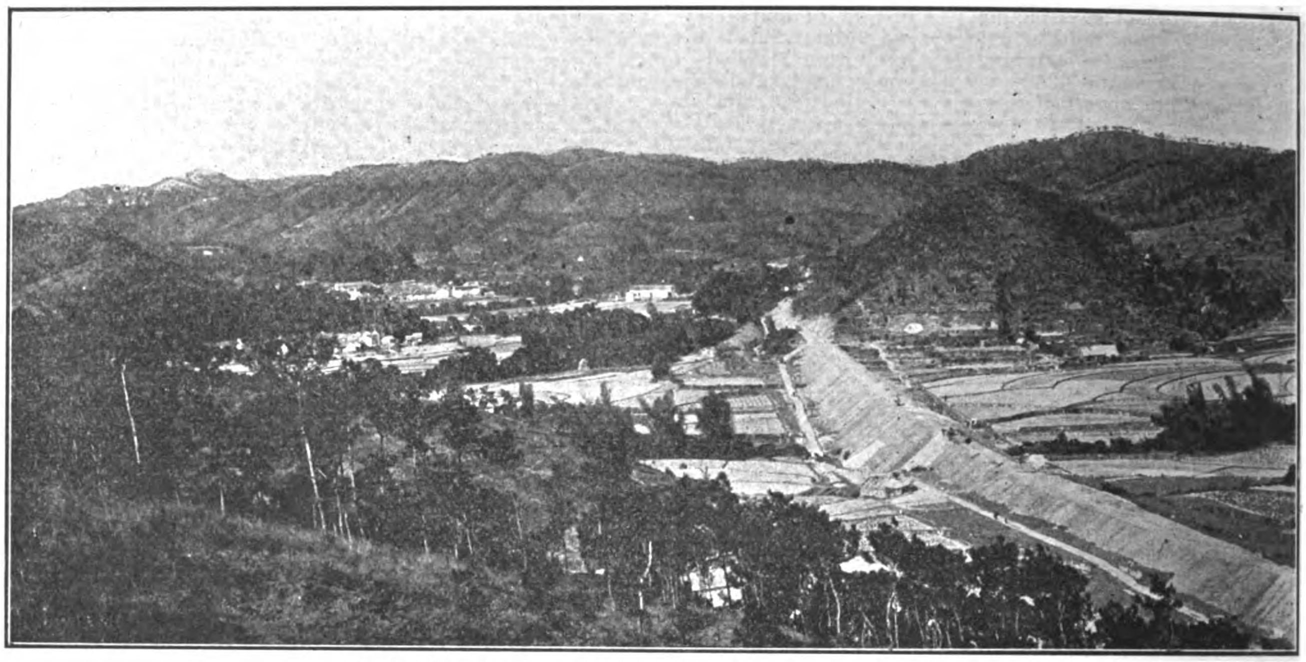
"The survey commenced in August of 1907. Land purchase commenced early in 1908 and construction of works may be taken to date from June of 1908. We have, therefore, taken 3 years and 3 months to build this Railway, or, adding the first few months of survey, just a little over four years altogether. I do not claim that there is much, if any, credit attached to this length of time. One would have liked to say three years instead of four years. Things move slowly in China; but I do claim that the work has been pushed forward continuously, energetically and successfully on the different districts and that many physical and engineering difficulties have been overcome.

"It generally falls to the lot of an Engineer-in-Chief to defend the cost of the railway he builds, but this railway is in the happy position of having been spared criticism and, therefore, I can approach the subject in a light spirit. In September, 1908, I produced, as a result of the detailed survey, an estimate of cost and length of time probably required to complete this line; the former in round figures was 12½ million dollars, including administration charges, police, cost of land, etc., but excluding the interest and service on the loan; and the time I named was three years and ten months, the date for completion being given as June 1911.



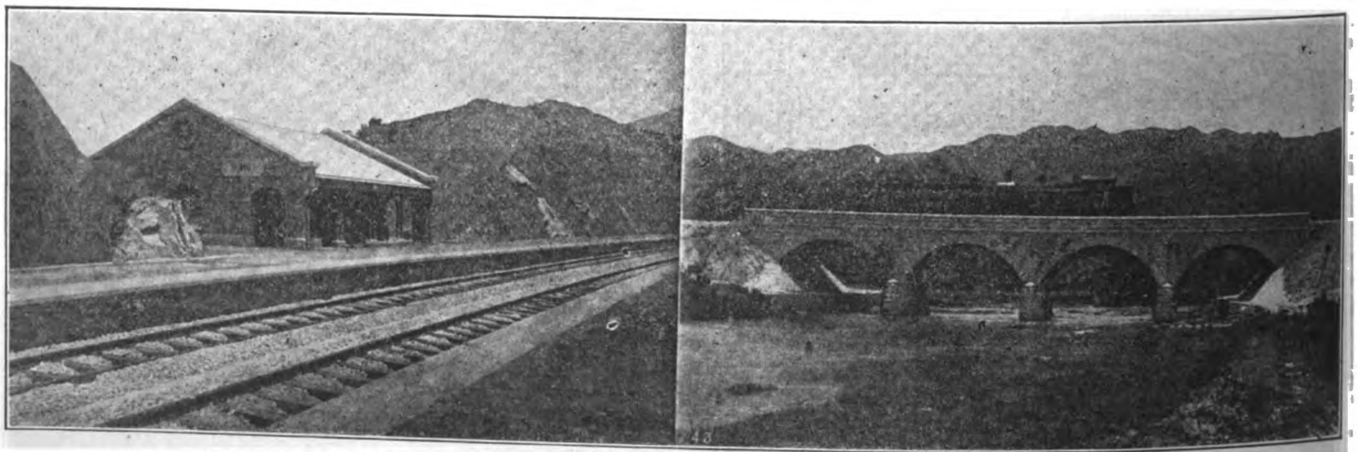
Canton Trade Report, 1908.

We have taken a few months longer to complete the line, but the cost will be within the limits of my estimate. (Applause.) This, gentlemen, is, I believe, a satisfactory condition of things, but it has been attained present to-day. May I mention Mr. Boothby, who had charge of the East River Bridge section; Mr. Fraser, who made an excellent location of the l ne from Mile 50 to Mile 89, mostly through difficult and hilly country. Mr. Moore proud of his locomotives and rolling stock; Mr. Hall, our active Chief Accountant; and Mr. Fischer, whose store department has always been kept in good order. I wish I had time to give more references to our staff,



MILE 83, LOOKING NORTH, CANTON-KOWLOON RAILWAY.

TAI SHA TPU STATION (CANTON).



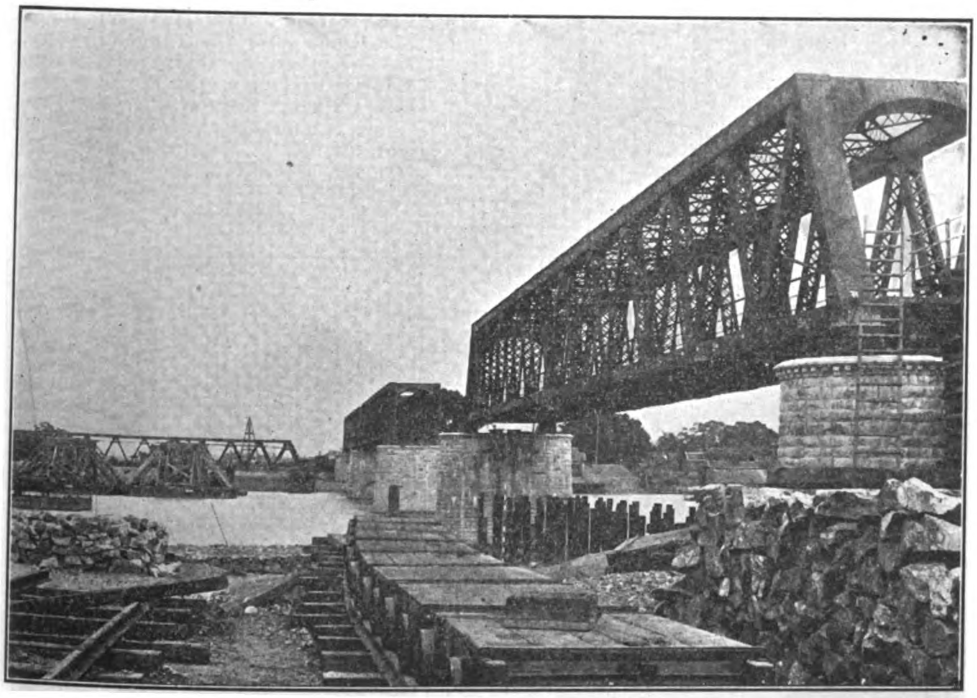
TYPICAL STATION ON BRITISH SECTION KOWLOON-CANTON RAILWAY. BRIDGE CONSTRUCTION ON THIS LINE.

only by the active and loyal help of all departments.

"Some of the heaviest work has been carried out by engineers unfortunately not is still with us, fortunately. He has successively had charge of No. 1 and No. 3 Districts and has done excellent work on each. I must also specially mention Mr. Thompson, who is so but time forbids. But we have been fortunate in both foreign and Chinese staff, and that means everything for economy and efficiency. (Hear, hear.)

FRANK GROVE, M. I. C. E., ENGINEER-IN-CHIEF

TAOTAI CHAO CHING-HUA, MANAGING DIRECTOR

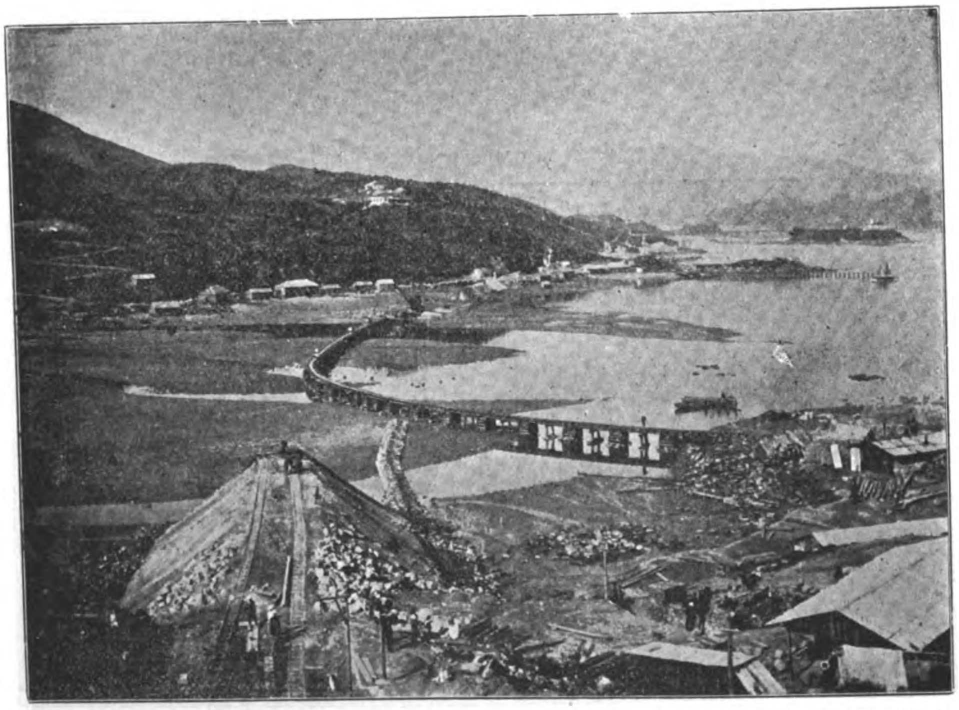


THE TUNG KUN RIVER BRIDGE, CANTON-KOWLOON RAILWAY.

C. T. LIU, TRAFFIC MANAGER.

"Until recently the idea was generally held that the Chinese section went through level paddy fields and had a few bridges. This is not quite a correct description. The hilly portions of country passed through present interesting features and some of the cuttings have given considerable trouble. Our ruling grade is 1 in 150, of which we have over 17 miles; 56 per cent. of our total length is on grade and 44 per cent. on level. Curvature of the line is 24 per cent. of the total length. The earthwork is on the whole what is termed 'heavy.' It has cost $20,700 per mile, which includes all charges for rock, earth, and protection works. The volume is equal to a bank of our type section 11 feet high throughout for 89 miles. Sufficient has been already stated and published with regard to the large bridges. We have 46 girder bridges with a clear opening of 4,868 feet and 39 arched bridges over 5 feet span with an opening of 546 feet. There are an unusual number of culverts under 5 feet, namely 140, with an opening of 544 feet. The total opening therefore, provided by these bridges, arched bridges and culverts is 5.958 feet, or 67 feet per mile. In addition there are 265 barrel or pipe drains with an opening of seven square feet per mile. As an instance of the comparative amount of large bridge work on the Chinese section, I may say that the total weight of steel work in girders and foundations is 4,725 tons, or 53 tons per mile, while that used on the Shanghai-Nanking Railway amounted to 9¾ tons per mile only. There

IOWU STATION AT THE BOUNDARY LINE BETWEEN BRITISH AND CHINESE TERRITORY AND TERMINAL OF BRITISH SECTION.



VIEW FROM NORTH PORTAL OF TUNNEL NO. 5 ON BRITISH SECTION DURING CONSTRUTION.

are 27 stations, 13 of which are halts or semi-permanent stations until traffic justifies their recon-truction on more permanent lines. We have four watering stations and three running sheds under construction and shortly to be finished, with workshops and such other equipment as is essential for present needs. The track and ballasting, I think, will be admitted to be up to a first class standard. There are 89.04 miles of main line and 11.46 miles of sidings and loops, making 100½ miles altogether of single track A depot has been provided at Tungshan for the eventual junction with the Yueh Han Railway, and sufficient land with sidings and sheds are ready, but the junction station will not be undertaken until the loop line passing to the north of the city is under construction. Finishing touches are here and there required, but I have every confidence that our Chinese section will prove itself equal to what is expected of it, at first to deal satisfactorily with the important traffic between Hongkong and Canton, and later on as a link in the great Southern Trunk Line. (Loud App'ause.)

The Hon. C. H. Ross, representing the British and Chinese Corporation, proposed the toast "Success to Railway Enterprise in China." He reviewed the history of railways in China and of the future of proposed lines. He said:

"What about half a century ago was merely a 'great need' has to-day become an 'imperative necessity,' which I am glad to say is now clearly recognised by all the leading statesmen of the Empire, and it is pleasing to note that no less than three great trunk lines (Tientsin-Pukow, Canton-Hankow, and Hankow-Szechuen) are now in active progress. For the present, however, China cannot construct her railways without the assistance of foreign capital, and this can only be obtained subject to an Imperial guarantee. I think, therefore, that the recent decision of the Imperial Government, that all the important truuk lines shall be State-owned, is a wise and far-seeing policy, and though it may now cost considerable sums to fully satisfy the claims of the various local and provincial companies, yet in the end the money will be well spent, as China will be saved from evils which would result from lack of central control, and from the friction which would inevitably arise when local considerations clashed with Imperial requirements. (Hear, hear.) For years to come also, China must look mainly to foreign engineers to superintend the construction of her railways, and, in this connection, I would, with all respect, venture to remind her that the better the class of engineers employed, so much the better will the experience be of the numerous young Chinese engineers now being trained, and to whom in the not distant futnre she must look to control and carry on these great enterprises.

"Finally—and perhaps to China the hardest task of all—she must realize that efficient maintenance of her railways is the only sound policy, and that to allow a well constructed line to go to rot and ruin for lack of efficient maintenance or supervision is a suicidal policy, which must react to the great detriment of the Empire.—(Applause.) All the world knows that China has conceived and carried out great enterprises,—some of them perhaps on a greater scale than any hitherto attempted by other nations,—but alas, which of her many great works has been efficiently maintained? As an instance witness the Grand Canal and that magnificent conception, the Tungchow Road."

The other speakers were Taotai Cheng Yung, Director of the Police Department of the Chinese Section, H. E. Lung Chien Chang, Councillor, Board of Communications and Mr. J. W. Jamieson, H. B. M. Consul General at Canton.

GERMAN DUMP CAR USED ON BRITISH SECTION.

THE SHINYO-MARU, THE TOYO KISEN KAISHA'S NEW PACIFIC GREYHOUND

When the Toyo Kisen Kaisha gave the order for three 13,500-ton passenger steamships, capable of steaming 19 knots and driven by turbine engines, to the Mitsu Bishi Dockyard & Engine Works, Nagasaki, considerable astonishment was expressed in shipping circles and the result was awaited with much interest, says the Nagasaki Press. Two of the vessels, the Tenyo-Maru and the Chiyo-Maru, have been in service some time and are regarded as among the most comfortable liners on which to cross the Pacific. Yesterday the third, the Shinyo-Maru, left Nagasaki on her maiden voyage but without passengers, the scheduled trip commencing at Kobe. The turbines of the Tenyo-Maru and Chiyo-Maru were made in England but those of the third vessel are the product of the Mitsu Bishi Company, which possesses the patent rights in Japan for Parsons' turbines, and to that extent the Shinyo-Marn is more completely Japanese than her elder sisters. The success attained by the Mitsu Bishi Dockyard & Engine Works in the construction of these three vessels is, we believe, regarded abroad as the most convincing proof of Japanese industrial development and for many years to come as they speed across the Pacific these ships should prove splendid advertisements for their builders.

The new boat is double-bottomed throughout, with ten water-tight bulk-heads, and numerous water-tight doors automatically arranged so that all or any one of them may be instantly closed from the bridge. Her wireless apparatus is the finest and most up to date of any on the Pacific, having a working range of over three thousand miles. The automatic sounding apparatus with which she is equipped is the last word in navigation safety appliances. This little instrument works to perfection in thick fogs, as it enables the navigator to find his position by picking up land noises and bells that cannot be heard with the ear. It works automatically and always correctly. It is well to mention that this will be the first sounding instrument of its kind to be introduced on Trans-Pacific ships.

The dimensions of the vessel are as below:—

	Feet.	In.
Length	575.	
Breadth	63.	
Depth up to D deck	38.	6.
Depth up to C deck	46.	6.
Height between B & C decks	9.	

CAPACITY IN TONS:—

Cross	13,377.38
Displacement	21,600.
Cargo capacity	9,262.

ACCOMMODATION:—

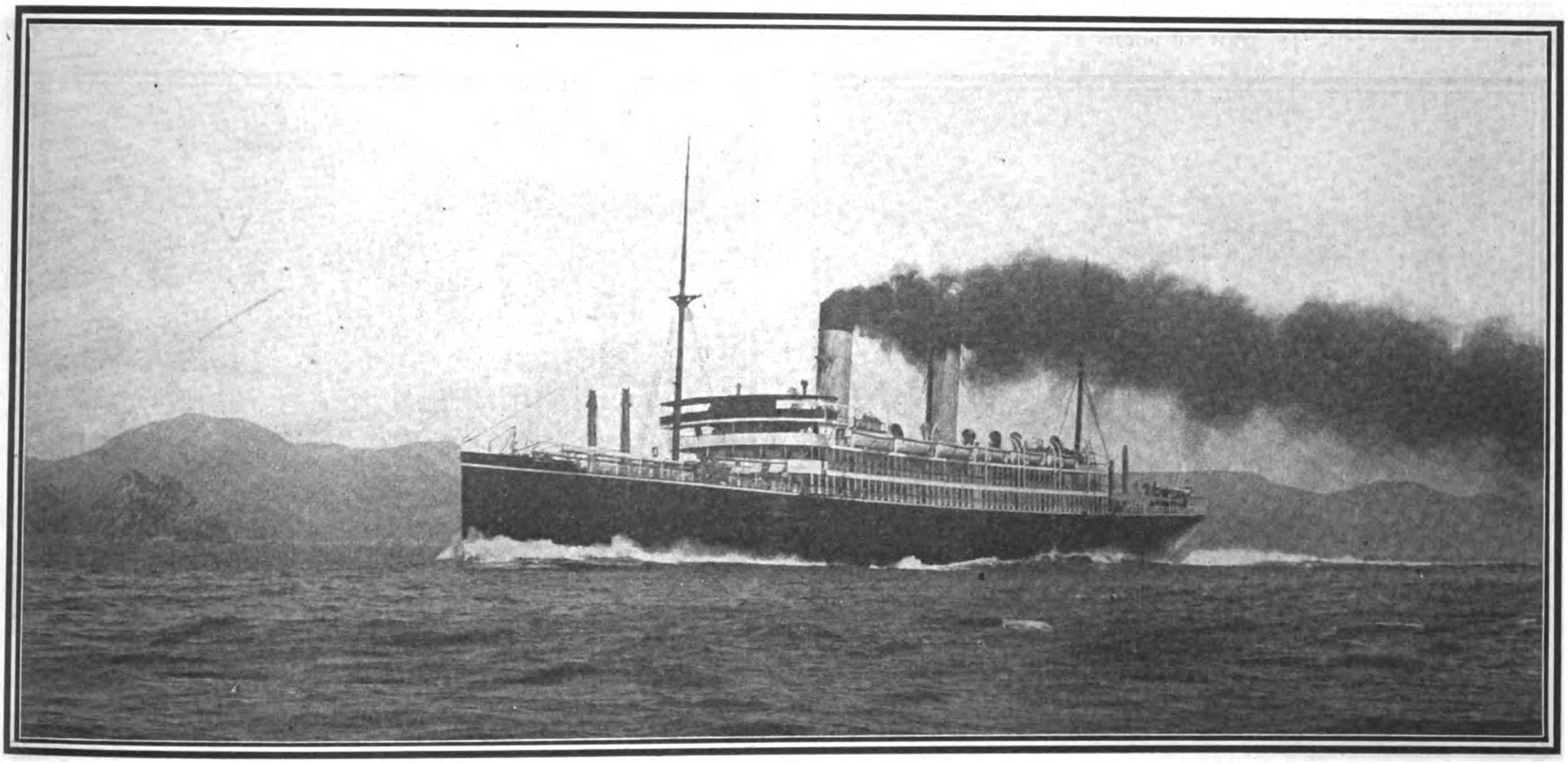
1st class	210
2nd class	57
3rd class	754
	1,021

The speed attained on her trial trips is 21 knots.

An electric reading lamp is attached to each berth in addition to the usual cabin lights. For wealthy travellers, or invalids, two suites of rooms are provided, each consisting of sitting-room, bedchamber, and bath. Electric fans cool and ventilate each cabin and there are heating arrangements for use in winter.

The first-class dining saloon, as is usual with the latest type of ocean liners, contains only small tables each seating six or eight persons. It is a commodious and well ventilated apartment with windows opening on to the C deck. The grand stairway entering into the saloon is decorated in magnificent style. A large brocade panel forms the principal decoration, the subject being Cherry Blossom, significant of the Spring and emblematic of the steamer's name "Shinyo" or "Spring Ocean".

Immediately above the dining saloon is the drawing-room which is decorated and upholstered in excellent taste. It abounds in easy chairs and cosy corners. A grand piano, made in Japan, by the way, and said to possess a splendid tone, suggests pleasant musical evenings and concerts. On the same deck are the writing-room, the lounge, and the smoking-room. In the latter we noticed a most comfortable-looking fireplace, à l'Anglaise; as we looked an attendant touched a button and immediately the dead cinders became red-hot, presenting a cheerful, wintry appearance; there may be such fireplace in the other saloons but we did not notice them.



THE NEW TOYO KISEN KAISHA'S PACIFIC GREYHOUND,—THE "SHINYO-MARU," BUILT AND ENGINED BY THE MITSU BISHI DOCKYARD & ENGINE WORKS AT NAGASAKI.

RECEPTION ON BOARD THE "SHINYO MARU."

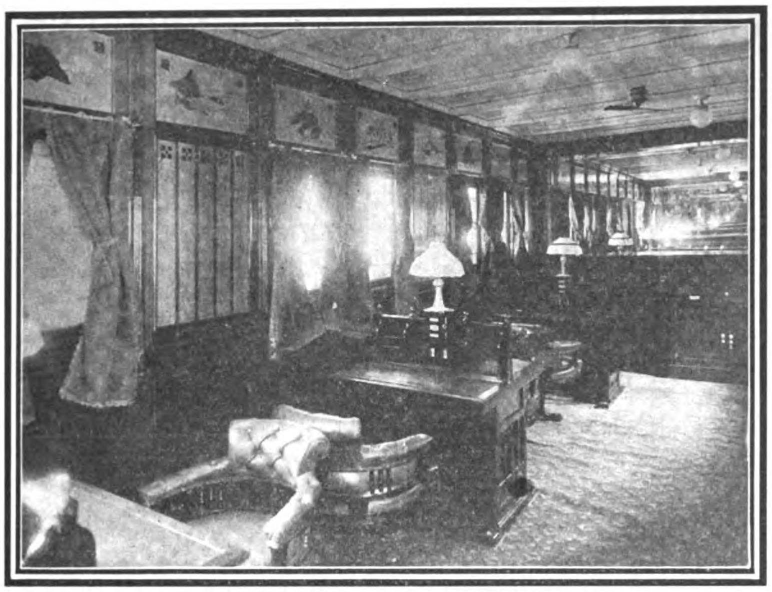
On Sunday morning, at five o'clock, the "Shinyo-Maru" left the harbour for consumption trials, to test compasses, etc., and returned shortly after three o'clock in the afternoon after a successful trip. From 3.30 to 6 a reception was held on board, a large number of residents foreign and Japanese having been invited by Mr. Hara, the superintendent of the Toyo Kisen Kaisha.

On arrival the guests were welcomed by officers and then allowed to wander about at their pleasure, inspecting the cabins, saloons, etc. The bulk of the cabin space is devoted to first-class requirements and no trouble has been spared to make the traveller comfortable. All the latest inventions and innovations have been applied and the furnishing has been done in excellent taste, both comfort and health being studied. The berths were made by a London company and are more roomy than those usually found on steamers.

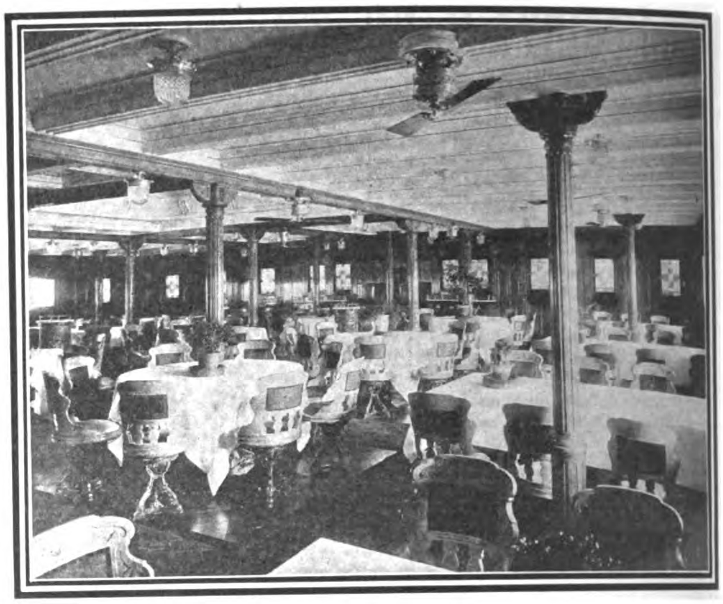
On what is known as A deck—the boat deck—there is a palm-house, with beautiful palms and ferns, forming a pleasant observation saloon. Arrangements have also been made for passengers to dance and swim if they wish to do so—a space being left on the B deck for dancing and a swimming tank of large dimensions being placed forward of the dining saloon.

The second-class accommodation is on D deck. The cabins are very fine and even

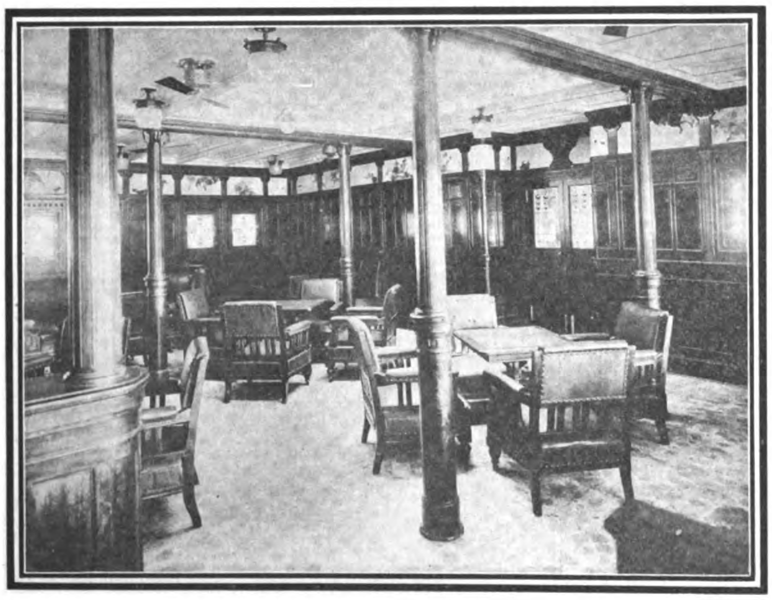
(Continued on page 159)



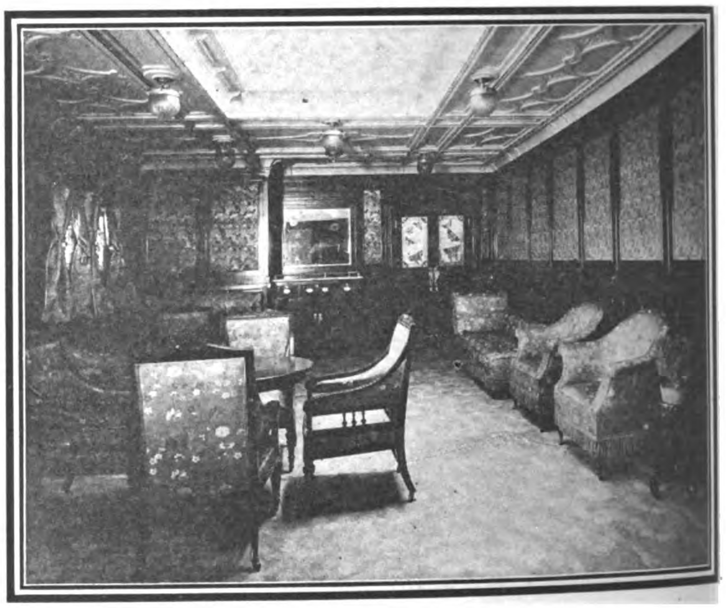
WRITING ROOM



DINING SALOON

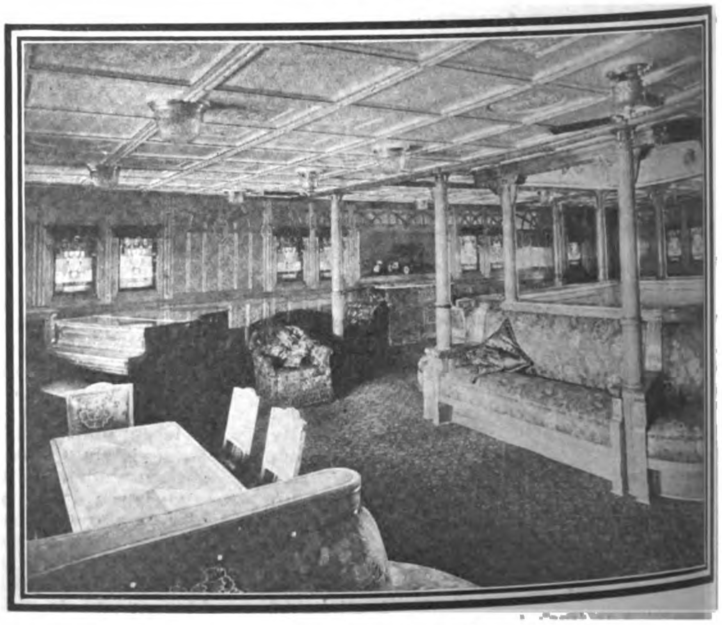


THE SMOKING ROOM



THE LOUNGE

THE PALM GARDEN



SOCIAL HALL

Interior Views of the S. S. Shinyo Maru

THE FAR EASTERN REVIEW

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JAPANESE VIEW ON OPENING OF THE PANAMA CANAL

The effect of the opening of the Panama Canal on the trade routes of the world has been widely discussed by western publicists. They have dealt with its advantages from the Occidental viewpoint and especially with reference to the commanding position it will accord the United States when once in operation. As it will greatly affect the foreign trade of the Orient by creating more active interest in Europe and America in commercial expansion in Eastern Asia, in view of the more direct route available between large trade centers, Eastern opinion on the subject of advantages to be realized will be of interest at this time.

Japan with its growing shipping trade is perhaps more greatly interested in the opening of the canal than any other eastern country. We have before us an article by Baron Kenko Kimotsuki appearing in the *Japan Financial and Economic Monthly* which may be taken as an authoritative Japanese expression on this subject.

The Baron believes that as a direct result of the opening of th canal the increased purchases of coal and water by steamers docking, etc., together with tourist trade will reach 300,000,000 yen annually by the year 1935. Baron Kimotsuki writes:

"In diplomacy and politics, as well as in military affairs, there is witnessed great activity and therefore no room for indulgence. Since Japan has come to occupy a part of the active world, Japan could no longer remain in the state of inglorious ease. Passing through the Japan-China and the Japan-Russian wars, Japan has come to rank herself among the first class nations of the world, and therefore her responsibility is cosmopolitan. In order to retain this position, and to maintain the history of the unbroken Imperial line, there must be provided defensive power. Up to the 19th century, by the defensive power is understood as the military and naval strength. Subsequent to the Imperial despotism, the defence has grown to be national affair. It has come to include not only the military power but the financial strength as well.

"The military strength may be classified into two classes, namely, direct and indirect. The former signifies the combined force both of the navy and army, while the latter implies every thing but the military and naval strength, and hence it may be called the power of wealth. The military strength as well as the st ength of the wealth are equally indispensable to the interests of the country. One can hardly do without the other. The state devoid of such provisions may not exist in perfect state. The present condition of Japan shows that it attained well-nigh military perfection, but in the respect of wealth, it has still sad defects. It is desirable that the wealth of the country should be increased so as to make the defensive power complete.

"How could we enrich this country? Scholars may cherish different opinions, but Japan being surrounded by seas on all sides, the best course that she must take is to utilize the sea. There are comparatively few Japanese who make efforts to enrich the country by sea, because the people pay much attention to the land.

"It is to be seriously considered that there is such a defect for the Japanese who should utilize the advantages afforded by the sea. The opening up of the Panama canal is, therefore, looked up with the greatest interest by the people.

"Before judging the utilization of the Panama canal, of its effect upon our economic circle and advancement of our national wealth, it is necessary to note the position occupied by us in relation to other powers of the world.

"The total number of the standing army of the 1st class nations of the world is figured at about 5,000,000 of which Russia has the largest force, the number being about 1,100,000 which is about 20% of the total number of the standing army of the 1st class nations of the world. The standing army of Japan is about 250,000 so that our force is about one quarter of that of Russia. Excepting Austria, the naval tonnage of the 1st class naval countries of the world is about 5,200,000 tons of which England has 1,800,000 tons which is about 38% of the total naval strength owned by the 1st class nations of the world. Japan's naval strength is about 500,000 tons which is a little over one quarter of the force of England. Both the navy and the army of Japan combined forms one quater of the strongest power of the world. Let us form a comparison of the wealth. The volume of the trade done by the 1st class nations was 44,700,000,000 *yen* in 1905 of which 17,200,000,000 *yen* was done by England that is about 40% of the world's trade. In 1868, Japan's trade amounted to 26,000,000 *yen*. in 1907 900 400 000 *yen*, in 1908 840,000,000 *yen* and in 1909 950,000,000 yen.

"Thus it will be found that both in respect of wealth and naval strength, England occupies the most important place. Therefore England suffered very little economically although she spent over 2,300 000,000 *yen* in the war with the Boers. Had Japan not had the sympathetic pecuniary support from England and America, she would have found it almost impossible to have continued war. In order to make Japan's wealth correspond with her military strength, her trade should be swelled up from 4,000,000,000 *yen* to 4,500,000,000 *yen*. The wealth and military strength matches very poorly. The opening up of the Panama canal will produce some changes upon the main sea routes of the world, and Japan will enjoy a special privilege in making supply of coal and water as well as various conveniences connected with the mooring. The beautiful scenery of Japan will no doubt invite a large number of foreign visitors from all quarters of the world.

"The world's trade may be divided into that between Europe and Eastern Asia, that between Eastern Asia and North America and Europe. The freight exported from Europe to Asia is greater than that imported from Asia to Europe. The freight exported from Eastern Asia to North America is greater in volume than the freight imported to Eastern Asia from North America. Again, the freight exported from North America to Europe is greater in amount than that imported from Europe to North America. The world's trade in the West is superior to the East. Should the Panama canal be opened, the goods exported from Europe to Eastern Asia shall be sent to Eastern Asia while the goods exported from Eastern Asia to North America shall be conveyed to North America, and on the return trip, vegetables and flour will be brought back to Europe.

"It may be argued that European ships will return direct to Europe from Eastern Asia rather than *via* Panama canal because of the shortness of the distance, so that the number of those who will take the circuitous course will be very small. As already explained, the export from West to East is very large, and hence ships coming from Europe to East Asia will have to call at North America so that a greater amount of freight could be conveyed by this route. The dist nce may be larger but a great advantage will be given to the ships' owner. Such is the reason why we stated that the opening up of the Panama canal affects the world's sea route. Because of such a change, the supply of coal and water to the ships coming from Eastern Asia to North America is to be made from Japan. The coal from China is not so easily available as that of Japan owing to the problem of communication facilities. In respect of water, the same is true. Water in China is supplied at the rate of 1 *yen* per ton while that in Japan at the rate of only 25 *sen*. Let us figure out the exact amount of water and coal supplied. Ships entering Yokohama, Kobe, Nagasaki and Moji from 1901 to 1904 reached an average of 3.355 per year, and average tonnage was 3,830 tons. From 1905

to 1908, average number of ships entered the harbour per year was 3911 and average tonnage per vessel was 4,540 tons. When these figures are compared it will be seen that number of ships was increased by 16½% and the tonnage by 18½%. Should such a rate of increase be preserved, within the 20 years after the opening up of the Panama canal, that is, on January the 1st, 1935, the number of ships will be increased to 9,828 and the tonnage per steamer will reach 12,571 tons. Making every possible allowance for the variation in figures, the number of ships figured at 10,000, and tonnage per steamer reduced to 6,000 tons and average speed regarded as 10 nautical miles and speed of the vessel making 240 nautical miles day and night, it will take from Japan to North America 18 days to cover 1,320 miles. Thus at least the coal and water for 20 days will be needed. Supposing that the amount of coal needed per day and night ranges between 60 tons and 65 tons, the total amount of the coal required for the year will reach 12,000,000 tons. Figured at the rate of 8 *yen* per ton, the result will be 96,000,000 *yen* while figured at the rate of 10 *yen*, we will obtain such a large figure as 120,000,000 yen. The water needed for the steamer of 6,000 tons to cross the Pacific is in average 700 tons so that the total amount will reach 70,000,000 tons, sold at 50 sen per ton, the amount will reach 35,000,000 yen, and when both of these figures are combined, the total will reach 155,000,000 yen. Some of these ships may enter into docks, and seamen and passengers will spend their time and money on the land so that incidentally Japan will make the sum of 300,000,000 yen per year as the result of the opening of the Panama canal, and thus Japan's wealth will be greatly increased."

OZONE AS A PURIFYING AGENT

It is known that ozone is an uncolored gas having a peculiar odor. It may be considered as a condensed oxygen and is one of the most powerful of sterilizing agents. It is produced in the atmosphere by lightning discharges, a process of oxidation and water evaporation and is not found to any extent in the air of the streets of our cities and consequently a negligible quantity in the ordinary dwelling rooms of our great centers of population. But on the contrary it is found in the forests, sea-shores and mountains, especially during the spring and in agitated damp air, during gales and snowstorms.

The ozone oxidizes metals, whitens colored objects, destroys all kinds of organic matter found in dust, and other impurities of the air, as well as the microorganisms contained in water.

On account of the decomposition which accompanies this oxidation, the ozone gives out one third of its oxygen rendering most valuable help to modern sanitation and ozonating plants have been installed successfully in Europe and America.

Whenever there exists a surplus of ozone, the absolute absence of oxidizable matter, or impurity in the air, is guaranteed. It is a fact that oxygen is the only product of reaction, and is the gas of greatest importance in giving the ozone undeniable superiority as a sterilizer. It was not until very recently that the construction of proper ozonators made it possible to use ozone effectively in sanitation. The devices constructed by Siemen and Halske transforms the atmospheric oxygen into ozone by means of electrical discharges at high tension.

The city of St. Petersburg has just made an important application of this agent for the purification of water of one city, by installing a complete plant for ozonating water, writes Dr. Alfred Gradenwitz in *Cosmos*. The water in St. Petersburg was supplied by three great plants, of which only one (the greater one) had sand filters, while the other two were supplying water, such as it was, direct from the Neva.

The new plant for the supply of ozonated water was built on the premises of one of the two latter plants (that of Penkovaya) and it is capable of supplying 50,000 cubic meter per day.

Before applying the ozone, the water is subjected to a preliminary purification by passing through rapid filters into reservoirs where by means of sulphate of alumina the matter contained in the water is precipitated. After this process of clarification the water is subjected to ozonation.

There are eight reservoirs for clarification connected with each other by means of conduits and equipped with 38 rapid filters. These are made according to Howamtson system which is almost similar to the American method of Jewell. The principal difference between the two is that Howamtson uses flint especially prepared for filling the filters in place of ordinary fine sand. The output is approximately 4½ cubic meters per sq. m. per hour.

The filters are cleaned by washing them with filtered water and at the same time the flints are altered by means of special removers. The filtered water goes directly to the sterilizing towers, except a small volume diverted for cleaning the filters.

The ozonating plant proper is composed of two parts: the ozonator battery, and the sterilizing towers. The ozonator battery comprises 126 elements and there are five sterilizing towers, one of the latter being held in reserve. The tubular elements of the ozonator batteries are based as stated above upon the action of high tension discharges between two cylindrical ends of aluminum and glass respectively. It is operated with a relative elevated concentration of ozone (2.5 per cubic meter of air).

Before going through the ozonators the air is dried by refrigerating process in order to give the best results. Then it is blown through the ozonators by means of special conduits that absorb the ozonated air at an area of pressure of four meters of water, in order to mix it and pump it into the sterilizing towers. The absorption of ozone and the sterilizing of filtered water takes place partially in the conduits and partially in the sterilizing towers through which the ozonated air passes from the base to the upper part very finely pulverized, which prepares it for effective diffusion throughout the body of the water. After being aerated the ozonated water is deposited in special large reservoirs from which it is pumped at a high pressure for city distribution,

The plant is operated by an electrical plant equipped with boilers, steam engines, alternators, as well as three sets of high frequency converters through which the three phase current from the main generators are transformed into alternating current of 500 cycles per minute. The ozonators require for their operation a high frequency and high tension current of about 7,000 volts. The horse power capacity of the plant consists of two sets of steam engines of 150 H. P. each, connected directly with the three phase generators. A third set is kept in reserve.

From an architectural standpoint the plant is of special interest. All the large reservoirs for clarification, filters, as well as the columns and roofs of the buildings are built of concrete. The expenses of operation including the clarification and filtering is from 2.0 to 2.5 cents of Franc per cubic meter of which one-half is for the ozonating. This filtering and ozonating plant has fulfilled the hopes entertained as to the effectiveness of its purifying action from a physical and bacteriological standpoint. The dirty water from the Neva is transformed into a perfectly potable, pure, and transparent water, and is irreproachable from a sanitary standpoint, as it contains absolutely no typhoid fever, cholera, or other germs.

Two other installations of the same kind will be completed within this year for ozonizing the water supply of the City of Paris with a capacity of 46,000 cubic meters each.

The *Electrical World* directs attention to the effective electrolytic sewage disposal plant at Santa Mónica, Cal., and to a later installation in Oklahoma City, the latter being in operation since March 29 and which is an adaptation of the former, the first plant of its kind in the United States. Oklahoma City has also arranged for preliminary installations designed to manufacture precipitate capable of treating 40% of the water supply. The sewage purifying plant has a capacity to care for 20% of the present sewage. The agreement is with A. J. McMahon under patents issued Messrs. C. P. Chandler and L. C. Lautzenhiser of Santa Monica and under its terms the plant was installed without cost pending satisfactory operation and acceptance, and with the understanding that if accepted the process would be applied to the entire water and sewage disposal system of Oklahoma City.

The capacity of the water supply system of Oklahoma City is 10,000,000 gals. daily and the sewage flow which discharges at present into several different basins is approximately 3,750,000 gals. daily. The plant installed which treats one fifth of this flow includes installations on three flumes each of which includes electrodes of 10 inch by 24 inch by ⅛ inch iron plates, grouped in batteries of 27 adjacent plates being of opposite polarity. Ten of these batteries are installed in each flume and treats 250,000 gals. daily. Heavy copper busbars convey the current to the copper channel caps on each plate, the caps on the plates increasing their conductivity and aiding electrolytically in the purification process. The phenomena when the current is turned on the electrolyte over the plates is indicated by the appearance of fine milky bubbles of hydrogen and oxygen. The latter in its nascent form, attacks and destroys objectionable organic compounds present in the water and oxidizes other materials, while the ferric oxides also formed are said to exert chemical effects adding to the purification action. It is found that electrolytic action in one direction from twelve to twenty-four hours results in the collection of sludge about the cathodes. To clean the former cathodes and reduce unequal destruction of the anodes, the direction of the current flow is reversed.

The cost of operation of this plant using 900 amp. at 2.5 volts or 2.25 kw. to treat 750,000 gals. daily in three flumes at 4 cents per kw-hour would be $2.16 a day or $700 a year and if the total sewage was treated $3,500 a year.

THE FILIPINO AS A SKILLED OPERATOR

The recent extension of the plant of the United States Shoe Company of Manila representing a capital investment of ₱500,000 directed attention to another successful American enterprise in the Philippines that utilizes skilled Filipino labor exclusively throughout. Perhaps in no department of activity in the archipelago has there been developed from a very modest beginning such a large and thriving industry, not only returning fair revenue to capital but giving an object lesson of educational value in the development of an adequate force of trained and reliable operators from the raw material at hand.

The plant is equipped with the most modern machinery and is capable of turning out 300 pairs of shoes daily or 90,000 pairs annually. There are 125 operators of which 115 operate machines. The highest wage paid is ₱22 a week, while the lowest is from ₱6 to ₱8 per week.

Mr. R. A. McGrath, the president of the company, who was the founder of this modern industry in the Philippines and is familiar with its development, made the statement to the FAR EASTERN REVIEW that Filipino labor properly trained and supervised gives an efficiency almost equal to that secured by American plants with American operators.

"You may say," said he, "that the efficiency of the Filipino as a skilled laborer is measured by the care taken in his training and the standard of intelligent superintendence provided. My experience has been that the cost of superintendence in the company's plant here is from 30% to 50% higher than in similar shops in America where American labor is employed.

(Continued on page 159)

THE SHINYO-MARU, THE T. K. K. S. NEW PACIFIC GREYHOUND

(Continued from page 155.)

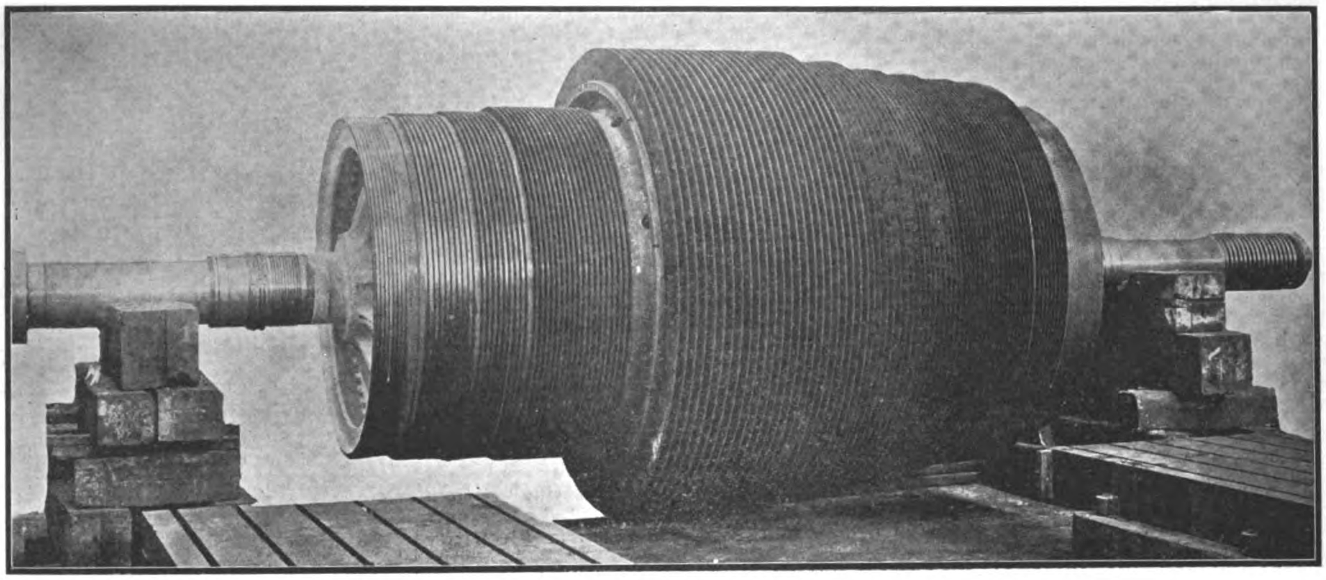
better than are found on many first-class steamers. The smoking-room and dining saloon are elegantly furnished for the comfort and pleasure of passengers who desire to travel at the cheaper rate. On E and D decks are the accommodation for steerage-passengers. These quarters are exceptionally neat, clean and well ventilated.

Freight, as well as passengers, is desired for the Shinyo-Maru and the vessel has been well-equipped for loading and discharging a cargo. She has 12 hatches, six derricks with 12 booms, also twelve 4-ton winches. The two foremost posts and booms are built for heavy cargo, having a lifting capacity of 25 tons each.

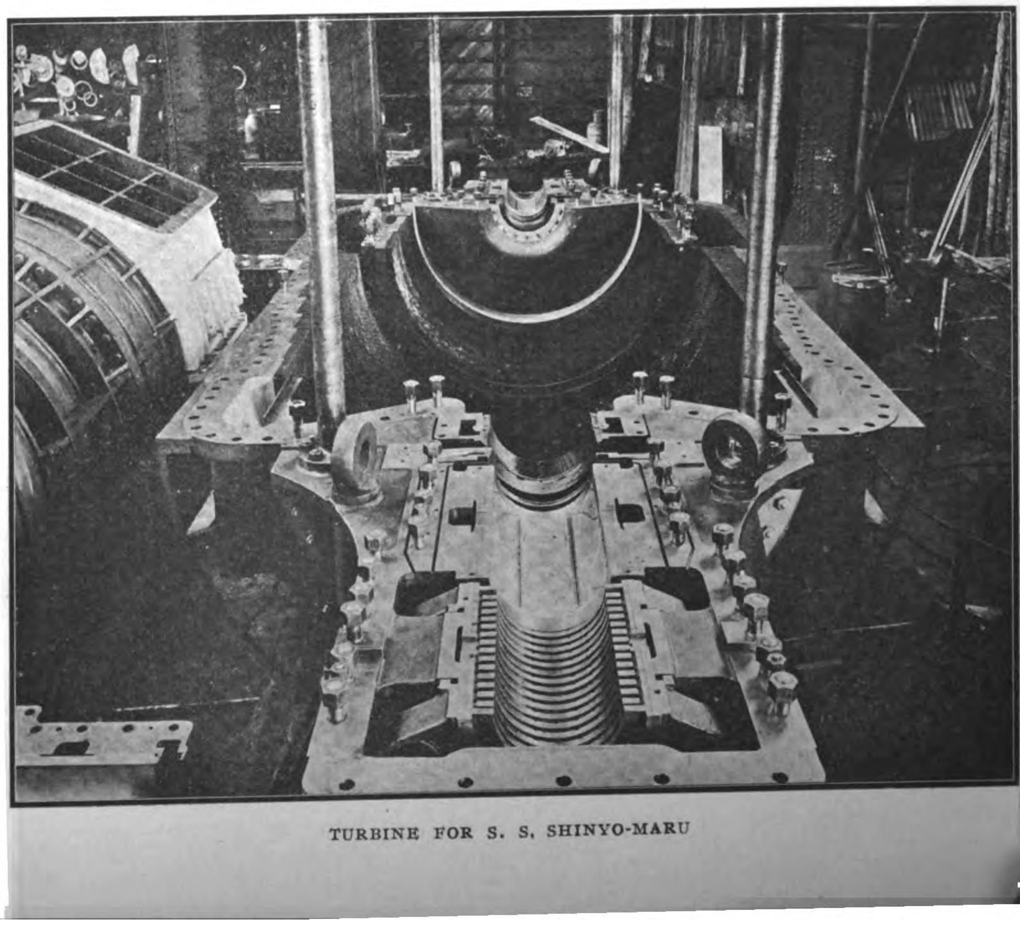
The inspection of an up-to-date liner is no easy task, so the host provided refreshments at each end of the vessel for the guests. Tea was served in the dining saloon and an opportunity given thereby to appreciate the table ware and the comfortable seats, also to wish continued success to the Toyo Kisen Kaisha and a useful career to the "Shinyo-Maru".

The turbine propelling machinery is of the Parsons type, having the three-shaft arrangement now usually adopted for mercantile work, with one high-pressure turbine coupled to the centre line of shafting and one low-pressure ahead and an astern turbine incorporated in the same casing, coupled to each wing-shaft. Each line of shafting drives one solid bronze propeller.

The turbines, manufactured at the Mitsu Bishi Works, accord with the most recent practice. The rotor-wheels are of cast steel, the spindles of a special forged steel, and the ca ing of cast iron. The blades, which number about half a million, are of hard drawn brass, and are fixed in rotors and casings, in accordance with Parsons' usual design, having separate caulking pieces between the blades. The tips have been thinned down to a very fine edge in order to eliminate the risk of stripping, should they by any means touch the adjacent casing or rotor drums. This has enabled the clearances between the blades and the casings and rotor drums to be materially reduced, and consequently a source of loss in steam consumption has been minimised. The adjusting gear for the thrust-blocks at the forward end of the turbines has been designed to admit of adjustments being made while the turbines are running. As is well known, the steam economy of the turbine is largely dependent upon the reduction of the working clearance of the dummy rings to a minimum. To this end the adjusting gear as fitted, in conjunction with a micrometer gauge, measures directly on the edge of the direct ring. It is found in practice that this clearance varies to a certain extent with the steam temperature, and final adjustment has therefore to be made after the rotor and casings are thoroughly heated, and after the turbines have been running for some hours. The difference of the thrust due to the steam pressure on the blades whe in excess of the propeller thrust is transmitted by collars, turned on the forward end of the rotor spindle acting upon the top half of the thrust-block; when it is the propeller thrust that is in excess, it is transmitted by the same collars to the bottom half of the block. At full powers the steam thrust is in excess of the propeller thrust; but at low powers it is found that the propeller



TURBINE FOR S. S. SHINYO-MARU



TURBINE FOR S. S. SHINYO-MARU

THE FILIPINO AS A SKILLED OPERATOR

(Continued from page 158.)

There is also the question of selection to be studied in securing the best results. As you know the company has been expanding from time to time and the development of raw material into skilled labor has been continuously in progress. In the initial work of organizing when we employed but twenty or thirty operators great pains were necesary to explain fully every detail. Foremen, familiar with the language and native characteristics, were directly in charge of these raw apprentices and the degree of efficiency developed was measured by the capacity of the foremen to instruct in an intelligent manner and to supervise closely every detail undertaken by each apprentice.

"At first these operators could not be relied upon to work continuously but they soon realized that promotion with better pay was the reward for those who reported for work every day and by application endeavored to equip themselves for higher grade work. It was not long until there was a waiting list of apprentices and the irregular worker soon found his place taken when he returned from his usual weekly vacation. The result is that the present force is comprised of operators who are rarely absent and their efficiency has increased proportionately.

"After ten years experience I feel free in stating that no company interested in creative enterprise in the Philippines has anything to fear for lack of labor, if its officers will take the pains to study local conditions, exercise reasonable patience in intelligent training, and provide the best possible supervision."

thrust usually predominates. The top and bottom halves of the thrust-block have independent gear for moving the rotor for the adjustment of clearances. This gear consists of external worms and worm-wheels operating an internal screw, engaging the thrust-block.

The manoeuvring valves are assembled in front of the engine, and are fitted to seatings built on the tank top. All the valves are of self adjusting double beat type having vertical spindles. This arrangement gives freedom from all obstructions, and enables the Engineer on watch to handle the whole engine in his hands, while keeping free observation to all the auxiliaries.

The condensers, two in number, with steel plate shells, are placed in the wings of the ship. Special buffling arrangement is provided in the condensers to increase their efficiency, and the Parsons vacuum augmentors are fitted to maintain high vacuum. The condensing water is supplied by two powerful circulating pumps of Mitsu Bishi design, and there are two Messrs. Weir's twin air pumps of latest design.

Owing to the low temperature of the hot-well consequent upon the attainment of high vacua it is becoming more important to consider the economy which may be attained by utilising the latent heat of the exhaust from the auxiliaries. With this end in view a large exhaust steam feed heater has been fitted, through which the feed water is circulated on its way to the boilers. The feed water is passed through four of List and Munn's patent gravitation filters, and is delivered to the boilers by Weir's four pumps.

Two of Weir's direct-acting pumps are fitted for supplying oil under pressure to the main bearings and thrust-blocks of the turbines. The forced-lubrication pumps draw from the drain tank and discharge the oil to the bearings through the tubes of a cooler, around which sea water is circulated by an independent pump of the Weir's type.

Steam turning gear is arranged on the aft bulkhead of the turbine room, and is capable of turning all three shafts at the same time, or each one separately as may be required.

The engineers' workshop is fitted with a number of modern machine tools, driven by an independent steam engine.

The auxiliary machinery consists of two dynamo engines, one Halls' Co. refrigerating plant, and pumps to supply salt and fresh water on deck, for bath, sanitary purpose and for wash deck and fire extinguishing. There are also powerful bilge pumps and ballast pumps. Two Weir's evaporator, each capable of making fifty tons of fresh water, are fitted in engine room, and two fresh water distillers are installed for making drinking water.

The boilers are arranged in two compartments, each of which has a separate funnel, and there are six large single ended Scotch boilers in the fore boiler room, while the aft boiler room contains seven boilers. The boilers are worked under Howdens' Forced Draft system, the air being supplied by four large fans each driven by an independent enclosed engine. The funnels are of elliptical section, each rising up to a height about 120 feet from keel, and consist of inner funnels and outer casings, the spaces between are utilised for ventilating the boiler room. The boiler rooms are almost similar except that the aft one has one more boiler, and as are arranged to have free supply of coal to every boiler. Four See's ash ejectors are fitted, two duplex pumps for actuating them being fitted in engine room, and there are also two sets of steam ash hoists for the disposal of ashes in harbour. Each boiler room, which is independent and water-tight by itself, is communicated with the engine room by positive motion telegraphs, having on its dials orders pertaining to the steam, feed, ash pump, etc.

THE CHAPEI WATER AND ELECTRICAL WORKS

The Chapei Water & Electricity Works started to supply water and electric light to the inhabitants of Chapei and Paoshan, the Chinese districts situated north of the foreign settlement of Shanghai on August 1, 1911.

The pumping station is situated in Chapei next to the chief depot of the Shanghai-Nanking Railway on Soochow Creek and the company's main pipes extend at present to the Szechuan building, north of the Hongkew Recreation ground. The source of the intake is Soochow Creek. To ensure an abundant water supply the creek has been bunded and dredged for a length of 200′ to an average depth of 12′ at lowest water level. An inlet pipe of 24″ diameter conveys the water from the creek into a suction well situated within the pumping house. The center of the inlet pipe is 16′ below the ground level and at lowest tide there is 6′ water above the intake rose. The suction well is 8′×6′ with a depth of 24′. From here the water is drawn by a centrifugal pump and forced into a settling tank. There are two centrifugal pumps driven directly by vertical steam engines. Each pump can deliver 3,250 liters per minute against a total head of 12 meters.

The settling tank has a diameter of 30′ and a height of 22′. The water is brought to the bottom of the tank and rises with a speed of 1 m/m per second to the top where it overflows and drops in a spray to a lower channel, whence it flows by gravity to the filterbeds. By the slow, upward motion of the water in the settling tank and the free fall through the air the greater part of the mechanical impurities is removed and the general quality of the water considerably improved. The tank was built by the Shanghai Dock & Engineering Co. from the designs of Mr. Max M. Engel. the Engineer in Chief of the Chapei Water & Electricity Works.

The Filterbeds:—There are three filterbeds each 90′×120′ with an average depth of 10′ built in masonry and cement mortar. The filtering material consists of yellow sand which is supported by subsequent layers of course sand, gravel, macadam, and big stone which are spread over the bottom of the filter. The clean water is collected by a number of cement drains which abutt into a central drain. The head of water in the filter is regulated by a telescopic outlet pipe and the filtered water is collected in the clean water tank.

The clean water tank is 80′×100′ with a depth of 16′, is built in masonry and reinforced concrete, and has a capacity of 800,000 gallons. This tank is covered by a flat reinforced concrete roof supported by 12 reinforced concrete pillars. The roof is covered with mud, and turfed serves as a tennis court.

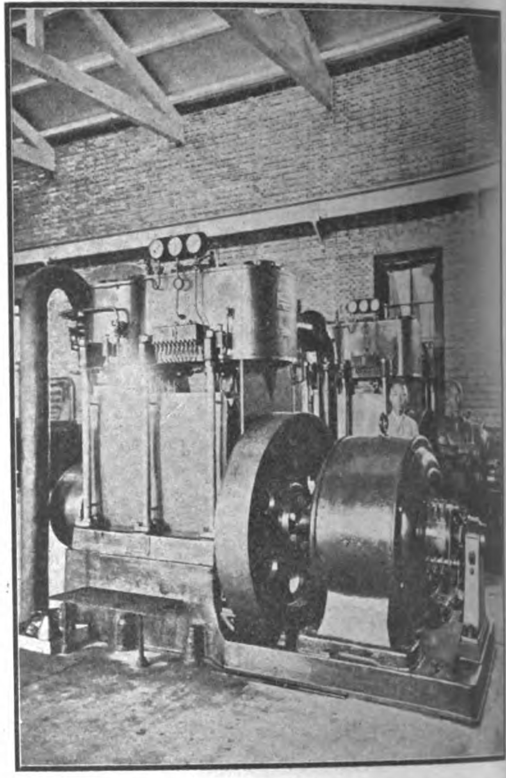
Engine plant:—The machine plant comprises three water tube boilers each with a heating surface of 60 sq. meters provided with superheaters built by Petri-Dereux, Duren, Germany.

The two main pumps are compound horizontal double acting plunger pumps built by A. Borsig, Berlin Tegel. They are capable of supplying one million gallons per 24 hours each against a total head of 140′ with 90 revolutions per minute. The electric light plant comprises two steam dynamos of 50 K. W. each with 440 volts.

All steam engines exhaust into a central condensing plant driven by separate steam engine and capable of condensing 3,000 Kg. of steam per hour.

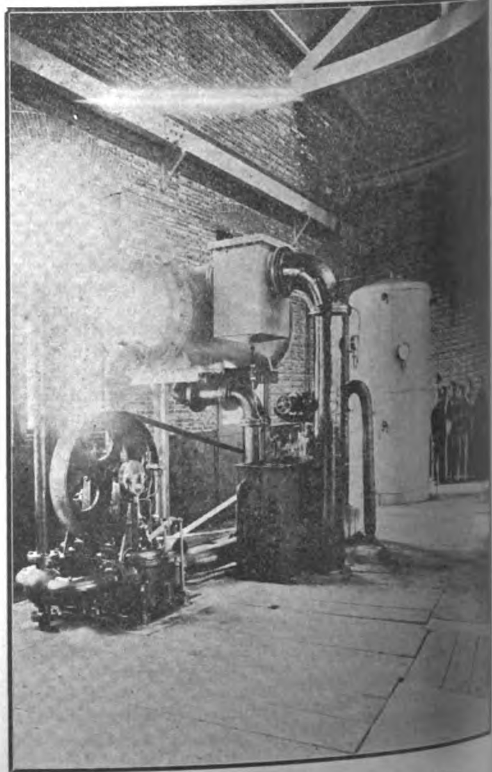
The chimney is an ordinary circular brick chimney with a total height of 140′. It rests on reinforced concrete foundations sunk 12′ deep and supported by 300 piles. At the completion of every five courses of bricks hoopirons are inserted in the masonry. Since the chimney was completed absolutely no settling has taken place. The distributing system has a total length of about seven miles of piping, the main pipe being 16″ in diameter.

The water tower which is in course of construction is situated on the North Honan Road extension 14,000 ft. from the pumping station and will have a capacity of 60,000 gallons and a total height of 130′. A pipe

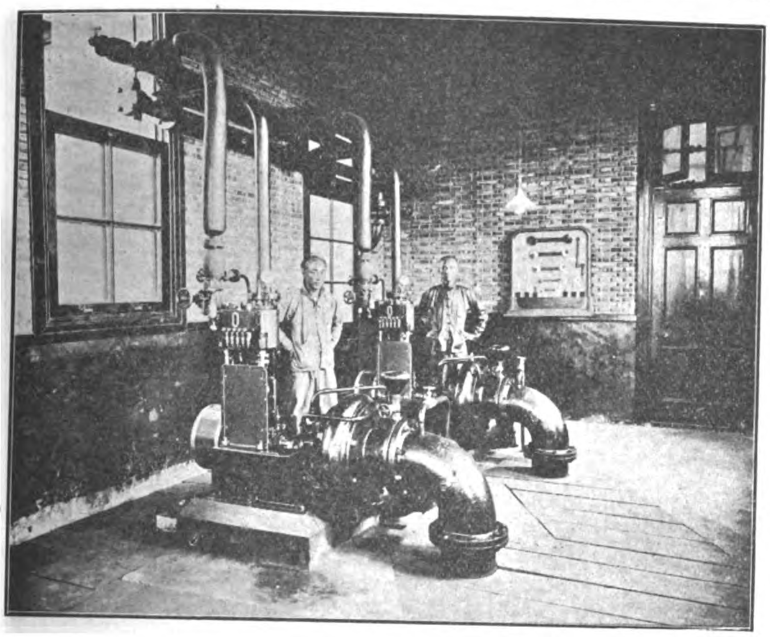


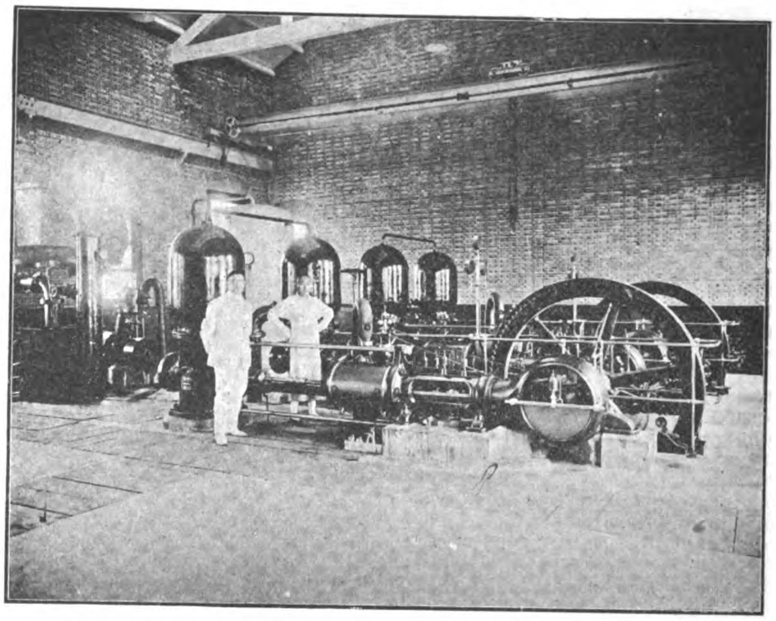
ELECTRICAL PLANT OF THE CHAPEI WATER AND ELECTRICAL WORKS

is being laid from the tower to the Kiangwan Race Course, a distance of over 20,000 ft. The whole piping was cast in China by the Kiangnan Arsenal, and with the excep-

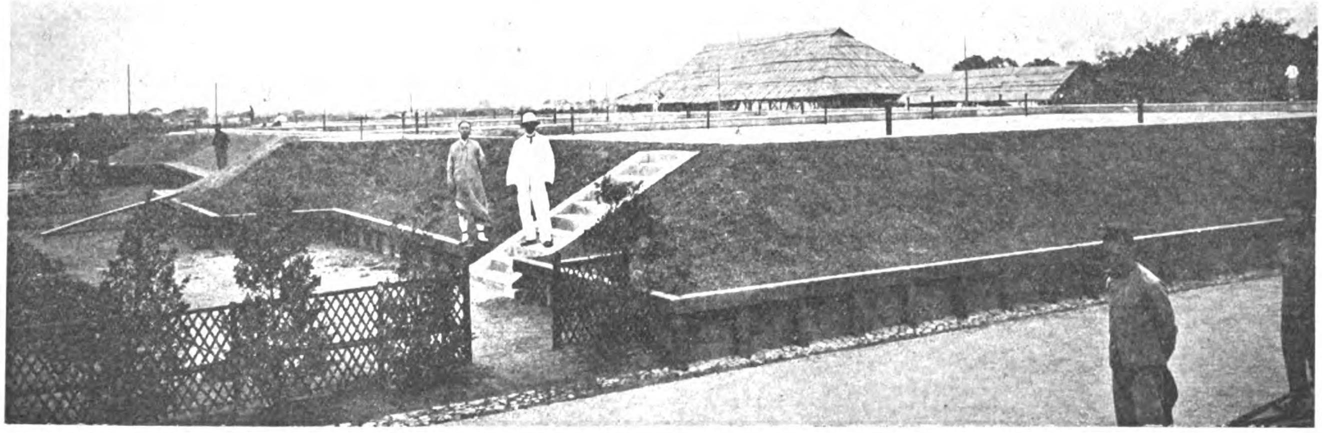


CONDENSER OF THE CHAPEI WATERWORKS

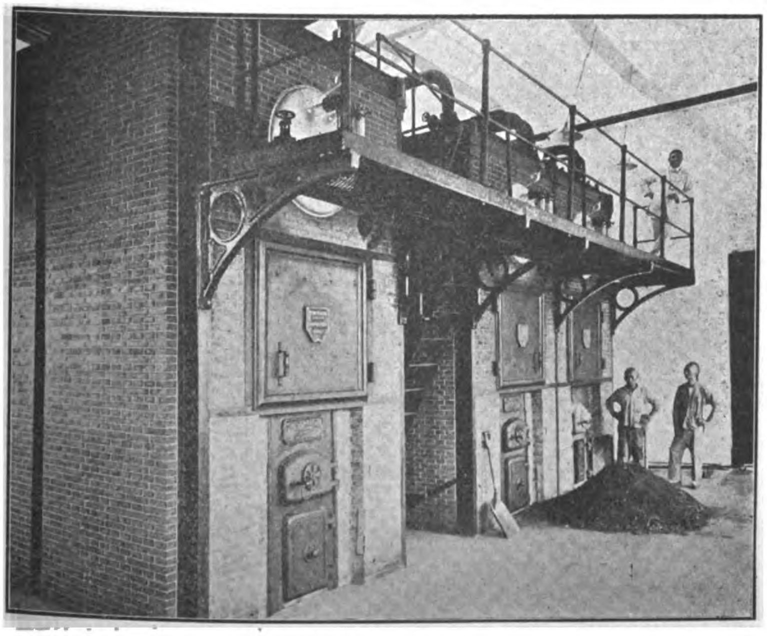




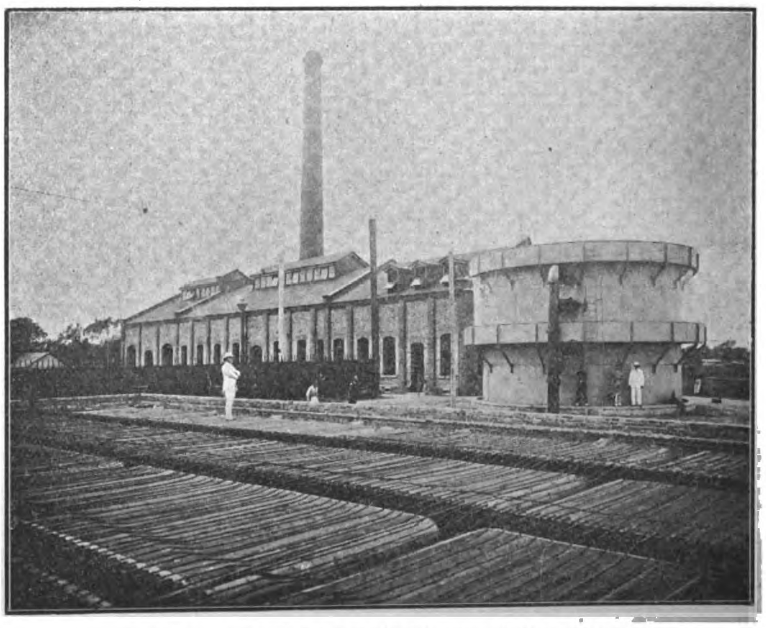
CENTRIFUGAL PUMPS AND PUMPING INSTALLATION AT THE CHAPEI WATERWORKS



FILTER BEDS, CHAPEI WATERWORKS



BOILER ROOM



GENERAL VIEW OF PLANT AND SETTLING TANK

COMMERCIAL VALUE OF THE SAP OF THE NIPA AND OTHER PALMS

Under the caption, "The Alcohol Industry in the Philippines," a valuable contribution by H. D. Gibbs, B. S., of the Laboratory of Organic Chemistry of the Bureau of Science appears in the Philippine Journal of Science covering the history, processes and commercial statistics of the alcohol industry developed in the distillation of saps from different palms indigenous to the archipelago and the result of investigations made to determine the adaptability of these saps for the manufacture commercially of sugar, starch, vinegar, etc.

The importance of the alcohol industry in the Philippines has been greatly increased in recent years by its use commercially in denatured form Accurate figures gathered from the report of the Internal Revenue Bureau are available placing the annual manufacture of distilled liquors at 10,000,000 proof liters approximately with an estimated consumption of 1.36 liters per capita.

Of the total amount of alcohol and alcoholic beverages 93% was produced during the fiscal year 1910 from the saps exuding from nipa palms. A total of 9,700,000 proof liters of alcohol beverages were produced from 90,000,000 liters of sap handled by 68 distilleries. About 22 beverages are manufactured from the rectified alcohol of which anisette, anisado, gin, vino de coco and vino de nipa are the most popular and vary from 10 to 55% alcohol. Besides these, undistilled but fermented saps of the palms of which no record is available are largely consumed.

Mr Gibbs writes that the production of alcohol from palm saps is, at this time, developed to only a fraction of its possibilities as vast areas of palms admirably adapted and easily accessible are yet untouched by commercial exploitation.

In the matter of cost of manufacture he submits a comparative table of cost in U. S. Currency demonstrating that of 16 kinds of raw material used to produce alcohol the nipa sap at $0.005 por liter equivalent to 6.5% alchool, is the cheapest, costing 0.015 per litter at 100 proof and 0.27 at 180 proof. Other factors serve to make the nipa sap a most desirable material among which is the fact that it ferment with great ease and rapidity in the ordinary course of gathering and transporting to the distillery and in less than twenty hours the liquor is ready to be pumped into the stills. One plant operating but twelve hours a day manufactures 93% alcohol 186 proof at a cost of 0.05 U. S. per liter.

The nipa palm grows along the mouths of tidal rivers in low, wet lands subject to overflows of brackish water as the tide rises each day and will not thrive in localities where either fresh or sea water alone is available. The largest areas are found along the shores of Manila Bay, in the Provinces of Pangasinan and Tayabas, and in the valley of the Cagayan in Luzon, and the islands of Panay, Samar and Mindanao. These swamps which to the unitiated appear of no value, gives a profitable crop when properly exploited and offers unusual attraction to capital particularly in the production of alchool.

The various parts of the nipa palm lend themselves to a variety of uses in the islands, among the most important of which is the employment of the general use of the leaves for house thatch and shingles, matting, etc., besides the sap for beverages, alcohol, etc., and sugar.

Photograph by Martin.

CULTIVATED NIPA SWAMP, BULACAN

Photograph by Martin.

UNCULTIVATED NIPA SWAMP, LEGASPI

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tion of the machine plant, all the materials have been bought locally. The capital was provided by the Chinese Government and the works were planned and constructed by Mr. Max M. Engel, the Engineer in Chief of the Shanghai Inland Water Works, under the directorship of Mr. Li Ping Shu, the chairman of the Chinese Municipal Council.

ANALYSIS

		Parts per 100,000	
Total solid residue		—15.2	
Volatile		—4.2	
Mineral residue		—11.0	
Ammonia	(free)	Traces	
,,	(Albumenoid)	—0.018	
Chlorine		—2.5	
Hardness	(Total)	—9.6	degrees
,,	(Temporary)	—7.6	,,
,,	(Permanent)	—2.0	degrees
Sulphates		Traces	
Nitrates		Traces	
Nitrites		None	
Phosphates		None	

The above sample of water is perfectly clear and judging from the chemical analysis is an excellent water for domestic and technical purposes.

L. W. DUPRE, m. p.

Fellow of the Institute of Chemistry of Great Britain and Ireland.

STILL, CONDENSER AND FIRE BOX AT MAJAYJAY DISTILLERY

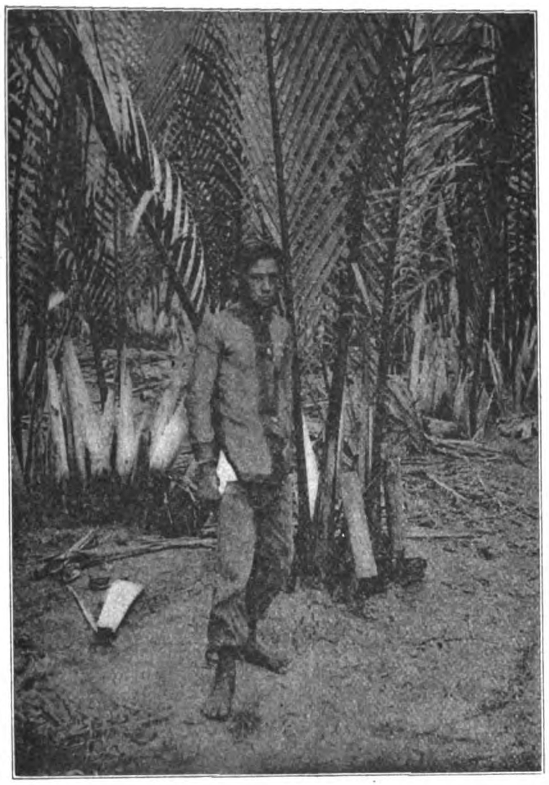
STILL, CONDENSER AND JARS OF TUBA

BURI PALM WITH LADDER TO COLLECT SAP

SMALL GROVE OF COCONUT.—THE BAMBOO BRIDGES FROM TREE TOP TO TREE TOP ARE PLAINLY SHOWN

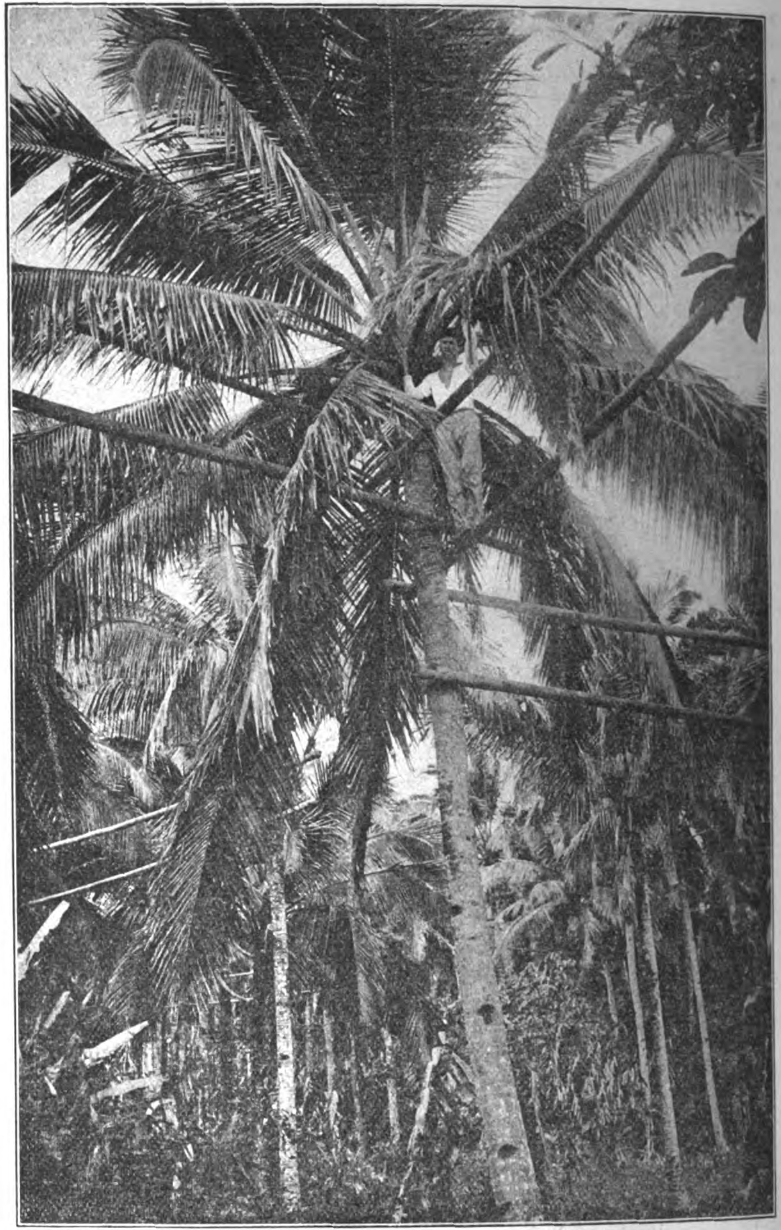
One of the most important nipa districts in Luzon includes about 6,450 hectares worked for sap on the shores of Manila Bay. It is divided for working purposes into sections of one hectare each averaging at per cent from 700 to 800 producing plants in charge of from one to more men, usually two, who are responsible for the care of the hectare of plants and the delivery of the *tuba* to the distillery.

Four years after planting the seed, the nipa bears small fruits but is not tapped for its sap until the 5th year. As the nipa sends its inflorescence up from the base and hence near the ground the flower stock is conveniently situated for gathering the sap. Some time after the fruit has formed, the stalk is cut across its top, usually just below the fruit, and each day a thin slice is removed to keep the wound fresh and facilitate exudation. The sap is collected in bamboo joints with a capacity each of two liters hung upon the stem. One stalk normally flows for above three months. In some sections the flower is cut before the fruit forms and under this treatment the yield increases but the flow is reduced to one and one half months. The usual *tuba* season in all covers about six months beginning in August and July, but it may be extended throughout the year



COLLECTING NIPA SAP, SHOWING COLLECTOR AND TWO BAMBOO JOINTS IN POSITION TO RECEIVE THE SAP

NIPA PALMS IN FRUIT



NEAR VIEW OF COCONUT GROVE, LUISIANA, LAGUNA.—ON THE LEFT SIDE OF THE TRUNK AND ON THE LEVEL OF THE NATIVE'S HEAD ALMOST HIDDEN BY LEAF STEMS IS HUNG A BAMBOO JOINT ATTACHED TO A FLOWER STALK FOR COLLECTING THE SAP—THE BAMBOO BRIDGES FROM TREE TOP TO TREE TOP FACILITATE SAP GATHERING

by cutting a portion at a time and bringing other plants into production as the first are exhausted. No definite estimate of the length of time a nipa palm may fructify and give tuba is available but there is authority for believing that a plant will survive 50 years of this process.

An average producing plant is estimated by different authorities to yield 1.25 liters daily and 50 liters in a season. As the result of careful experimentation, Mr. Gibbs places the average daily yield of sap per plant at .58 liters, the season yield per plant at 43 liters, and the return for a hectare for the season of 87,000 liters.

The author has demonstrated that a large proportion of the fermentable sugars is lost through careless and improper methods employed in handling the sap and places the sucrose in nipa sap at an average of from 14 to 15%.

The yield of alcohol from the sap according to the returns for 1910 (90,000 000 liters of sap distilled producing 9,023,323 proof liters of alcohol) varies from 4.1 to 7.5%.

The estimated cost arrived at from tests of two distilleries placed one at $0.06, U. S C., and the other at $0.048 per liter. While the selling price in Manila including a tax of $0 125, U. S. C., a liter averaged from $0.31, U. S. C., to $0.36 U. S. C. Mr. Gibbs sees great opportunity for large returns for more economic methods of transportation, distillation, etc., so as to prevent the average loss of about 50% in alcohol yield as is now the case in many distilleries.

The earning capacity of a hectare of nipa swamp even under present conditions sometimes reaches $750, U. S. C., a year. This could be greatly enhanced by more improved methods of employment, supervision of the labor and modern methods of distillation. The cost of maintenance is practically nothing and the life of the producing plant so prolonged that there is a steady, never ending return from the nipa.

Sugar.—In his paper Mr. Gibbs refers to extensive investigation made as to the adap-

tability of the nipa sap as a source for the profitable manufacture of sugar. He says;

"The sucrose content of all of the plants which I have investigated ranged from 12 5 to 17.0 per cent and I believe a fair average lies between 14 and 15 per cent. The purity is approximately 90 per cent.

Collection of sap.—An efficient method for preserving the sap is the first essential. Lime answers the requirement perfectly. Sap collected in the bamboo receptacles ordinarily employed by the natives remained unchanged for a longer period than ten days when the receptacles, before placing upon the plant stems, were coated on the inside with milk of lime by dipping into a rather thick mixture of lime and water. Since this preservative enables the sap to be collected and transported to the central refinery in an unchanged condition, the principal difficulties connected with such an industry are met, for the sap in its composition so nearly resembles cane juice that no special changes are necessary in the process of refining.

"*Sugar boiling experiment.*—On December 14, 1910, at 6 o'clock in the evening, twenty new bamboo joints were coated on the inside with a thick mixture of lime and water and immediately placed in position to catch the sap from as many nipa palms. The lime employed was manufactured at the distillery by burning oyster and other shells. At 6 the next morning, the sap which had flowed during the twelve hours was collected in a glass demijohn and transported to Manila to the laboratory. It was filtered twenty-eight hours after collection, and the clear filtrate measured 15 liters.

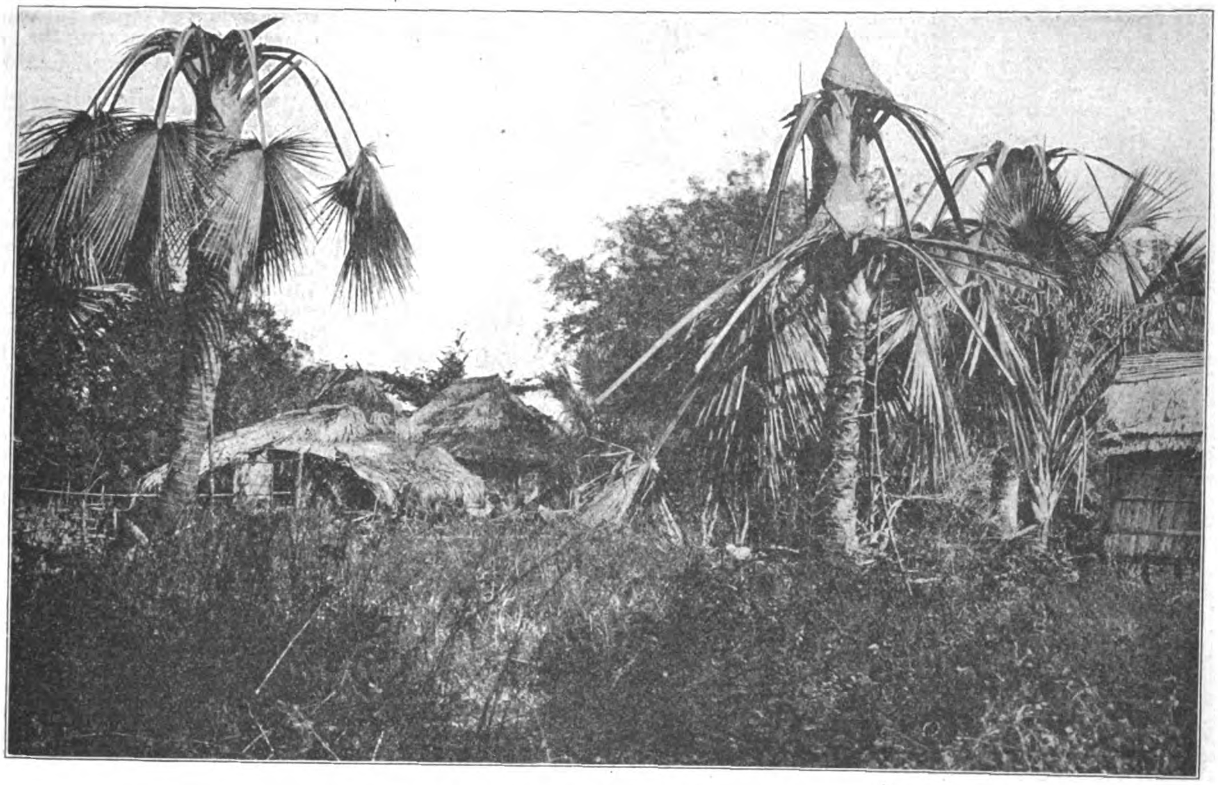
Four liters of this liquid were heated to boiling in a large porcelain evaporating dish and carbon dioxide run in until the alkalinity was reduced to 0.10 gram calcium oxide for 100 cubic centimeters of solution. The solution was then filled and analyzed.

The process of evaporation was then continued and the alkalinity further reduced with sulphur dioxide to 0.011 gram calcium oxide for 100 cubic centimeters of liquid. The solution was again filtered and analyzed. This solution contained, according to the analysis, 236 grams of sucrose.

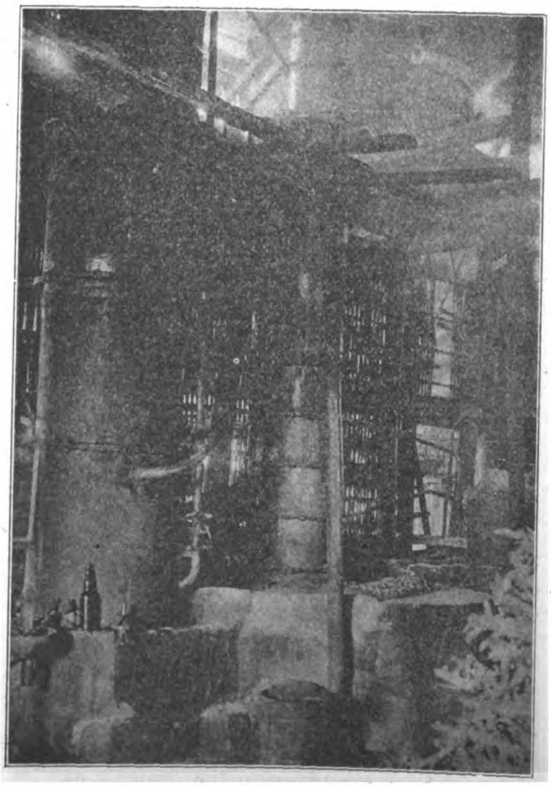
On boiling down to a massecuite and cooling, crystals of good grain were obtained. These, on drying in a hand centrifuge and finally in an air bath at about 90°, weighed 157 grams, were pure white, and polarized at 96.8 per cent.

The molasses and washings were boiled down to a second massecuite and treated in the same way. A yield of 79 grams of very light yellow sugar polarizing at 93 8 was obtained. The second molasses was light yellow, measured 20 cubic centimeters and polarized at 58.6. A third sugar could easily have been crystallized from it if the volume had been sufficient. The losses were entirely due to the numerous samples taken for analysis during the course of the work and to the handling of small quantities of material in the centrifugal machine, which was much too large for the samples.

Ten days later, on December 24, 1910, a second portion of the same raw material was treated in practically the same manner. Two liters of this solution, containing theoretically 276 grams of sucrose, yielded 210 grams of first sugar, which was almost pure white and polarized at 96 8. The quantity of molasses was too small to handle successfully

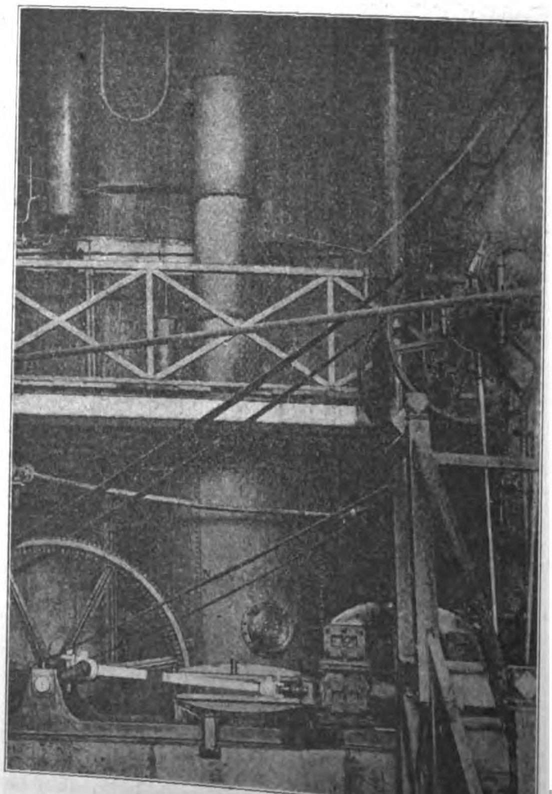


BURI PALMS TAPPED FOR THEIR SAP

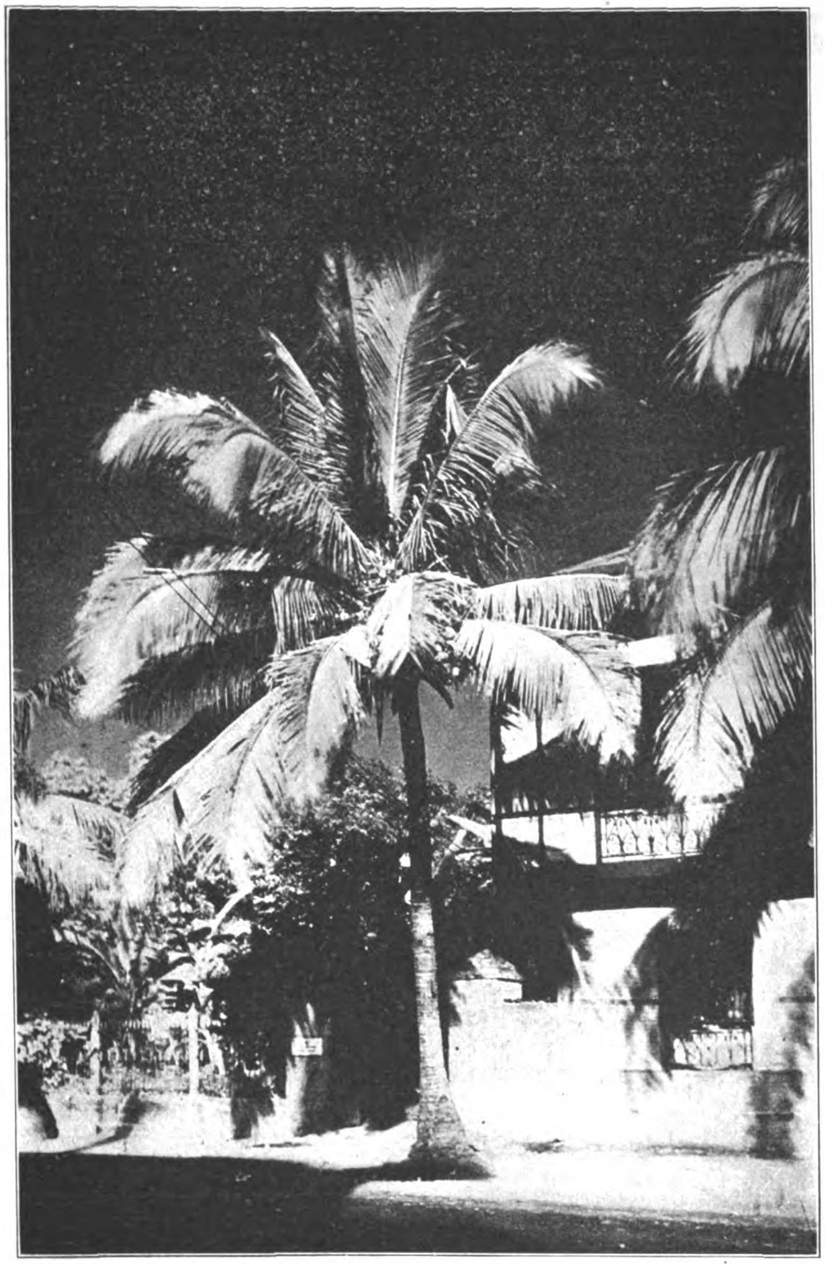


Photograph by Martin.

INTERIOR OF PROVINCIAL DISTILLERY



RECTIFYING COLUMN IN DISTILLERY OF THE COMPANIA GENERAL DE TABACOS DE FILIPINAS, MANILA



COCONUT PALM

in the apparatus, so no further attempt was made to refine it, although with larger quantities it could easily be handled

"The refining of this sap will require the ordinary equipment of a sugar mill with the exception of the crushers, namely, a lime kiln to furnish both the lime and the carbon dioxide, clarification, sulphur, and concentrating apparatus, filter presses, centrifuges, steam generating plant, dynamos, and motors. A great saving over the cane will be the omission of the crushers. The nipa districts are well suited for cheap transportation of fuel, limestone; and the various supplies through the waterways, and for the shipment of the product.

"*Estimates of production.*—The investigations of a number of individual trees, previously described, show that a seasonal production of 43 liters of sap is about the average.

"On the basis of 2,000 trees per hectare the sap-yield is 86,000 liters per annum per hectare. Estimating 14 per cent sucrose in the sap or, to be on the side of conservatism, 12 per cent recoverable sugar, the yield per hectare will be 10,428 kilos of 96 per cent sugar valued at 0.16 peso (subject to market fluctuation) per kilo, at 1,668.48 pesos. A hundred-ton sugar mill would probably be kept running 180 days of the year on the product of 750 to 1,000 hectares. The actual figure derived from calculation is 745 hectares.

"Since the cost of refining will probably be less than that for cane and since sugar is an expensive raw material for the manufacturer of alcohol, I am strongly of the opinion that more profit is to be made from the nipa lands through the establishment of sugar refineries than distilleries.

"I fully realize that great claims which have never been realized have been made for the profits to be derived from the use of other palms, *Arenga saccharifera* and the *Caryota urens*, in Java and India, for sugar production on a commercial scale attractive to the investment of European and American capital. However, in the case of the nipa, many of the difficulties encountered with the other palms do not exist. Some of the points of especial advantage to the *nipales* are as follows: The swamps already exist in a state ready to bring them into active production merely by thinning, or, in the case of the swamps already employed in the alcohol industry, this work is already well under way; many large areas are not now put to any use and are to be had for a small investment; the plants reproduce themselves and it is probable that each plant is capable of producing continuously for fifty years; the flower stems are close to the ground and the work of gathering the sap is quickly and easily performed; the producing plants grow very close together and the production per hectare is large; transportation of the sap is cheaply accomplished through the numerous waterways.

"Before concluding, I must point out that while these estimates are the result of accurate laboratory and field investigations, they must be substantiated by experimental work on a small factory scale. I sincerely trust that some one will be found willing to make the initial investment to test these figures. If no unforeseen difficulty is encountered, I believe splendid returns will accrue.

"*The Fruit of the Nipa Palm.*—The seed, when soft and jelly-like, is eaten raw or after preserving with sugar sirup. It is white when removed from the carpel and turns brown on exposure to the air. The flavor is agreeable, resembling that of meat of the coconut.

"An average size fruit weighed 9,541 grams, and consisted of 8,960 grams of husks and stems and 575 grams or 6.1 per cent of edible seeds."

Mr. Gibbs also reviews the commercial value of the cocoanut palm as a source for alcohol, sugar and vinegar. The fermented sap is utilized as a beverage among the islanders and when distilled produces the vino de coco. Little or no sugar is made from it in the Philippines, although the percentage of sugar in cocoanut sap is stated by Ceylon authorities to be 9 to 13% and the natives there have produced a crystallized sugar from this source for time immemorial. The height of the trees make the collection of sap much more difficult than from the nipa.

The buri palm, prominent as the source of material for the buri hat of which there is a large number exported from the islands, is also referred to by Mr. Gibbs as valuable for its sap and trunk. The sap may be developed into fermented drink, vinegar, alcohol, syrup and palm sugar while from the trunk of the tree starch is prepared. A similar review is made of the sugar palm. Mr. Gibbs' paper is very comprehensive, covering in detail descriptions of processes of manufacture, experiments made upon which to base his conclusions, and altogether contributes a valuable article on the commercial possibilities of the different species of the palm as found in the Philippines under well directed enterprise.

The illustrations accompanying this article are published by courtesy of the Director of the Bureau of Science.

THE WESTERN ELECTRIC'S NEW INTER-PHONE BULLETIN

"The selection, installation and wiring of inter-phone systems" is the title of bulletin No. 1105, a new thirty-six page publication which the Western Electric Company has just issued. It is the most complete and comprehensive bulletin ever written on the subject of inter telephone systems and is illustrated with sixty-six cuts and diagrams. Twelve different systems are described in this bulletin, and in it are also shown sets ranging from the No. 1327 type, a set used for two to six-party common ringing and common talking service to the No. 1335 type, a set used for twenty-four station installations where selective ringing and selective talking are desired. This bulletin tells how to choose the best system for every conceivable service, and gives valuable information on the installation of the sets.

The section of the bulletin describing the various methods of running and connecting cable, the method of installing the sets, and forming the cable at the cable terminals, is especially valuable, as it is profusely illustrated and shows just how the work is to be done.

Two new systems are shown, one a selective ringing, common talking set made both in four and eight button types to accommodate five and nine party service, the other a selective ringing common talking set for limited service. This limited service is one where, from a master station a call may be made to any outlying station, and the master station may in turn be called from any outlying station.

FAR EASTERN RAILWAY NEWS

CHANGSHA-CHU-CHOU SECTION OPENED.—On September 10 a special train of eight coaches made a through trip from Changsha, Hunan, to Chuchou, a distance of approximately 35 miles. The permanent bridge work over this section has not yet been completed, but the distance was covered in about two hours. A service of one train daily each way is maintained.

STANDARD GAUGE FOR FORMOSA.—The program of railway construction on the Imperial Taiwan Railways includes the widening of the present gauge to standard and to double track the Keelung-Taipeh section.

RAILWAY TO BAGUIO.—The proposed construction of a railway from Aringay on the Northern line to Baguio by the Manila Railroad Company is expected completed within two years and in the meantime the old road to Baguio from Camp One will be utilised, by means of a narrow gauge auto-traction tramway as far as Camp 4 and from that point by automobiles to the summer capital. The latter improvements will be completed before the 1912 season.

THE PHILIPPINE RAILWAY CO.—On September 20, E. G Carrera assumed the duties of acting auditor of the company on the departure of A. Strausz jr, auditor, for the United States on leave. R. R. Hancock, secretary of the company, has undertaken the duties of acting general superintendent with headquarters at Iloilo. He has also assumed charge of construction work, relieving B. B. Harris, assistant chief engineer for J. G. White & Co. who returned to the States upon practical completion of construction work. H. A. Glover, secretary to W. B. Poland, vice-president and chief engineer, in addition to his other duties, was appointed acting trainmaster vice Gifford Jones who is absent on leave.

RAILWAY MATERIALS IMPORTED INTO FORMOSA.—Trade reports for 1910 state that the import of rails was as follows:—Germany 9,562 tons (£55,314); United States 2,455 (£13,836); United Kingdom 3 (£72); Belgium 3 (£39). Total 12,023 tons (£69,261). And of bridge materials the principal suppliers were:—United Kingdom £23,262; United States £19,643; Germany £19,037. The small balance came from France and Hong Kong.

RAILWAY CONFERENCE AT PEKING.—The Ministry of Posts and Communications has issued a circular to the officials of the different railways in China announcing that a conference will be held at Peking on October 22 for the purpose of discussing the standardization of construction, equipment, and methods of administration and operation of all railway lines in the empire. This will include the adoption of standard specifications for rolling stock, tariff rates, control of trains, safety device, rules and regulations governing operation, etc.

THROUGH TRAFFIC FROM HONGKONG TO CANTON.—Tariff rates over the 110 miles of the Kowloon-Canton Railway are as follows: First class fare $5.00 Hongkong money; second class $2.50, and third class fares $1.25.

THE CANTON-HANKOW RAILWAY.—A. H. Collinson, engineer-in-chief of the Canton-Hankow construction, has concluded an inspection of the American survey of the route made by Mr. Parsons for the China-American Development Co. from Wuchang to Yochow and with some slight changes will recommend it. This section is about 150 miles in length and passes from Wuchang South through Hsiniang, Puchi, Yanglotung, Lucao, and Yunshi to Yochow. During this inspection high water, occasioned by the heavy floods, gave the engineers an opportunity to make observations of value in providing the maximum percentages of safety in construction. The contract of the terminal offices at Wuchang has been let.

CHEFOO'S RAILWAY CONNECTION.—The abandonment of the Chefoo-Weihsaw railway project and the proposal now made to substitute a line from Chefoo connecting with the Tientsin-Pukow lines at Tsining is being discussed. This line would in a measure compete with already existing railways and a large measure of opposition to its construction is anticipated.

KIOCHOW-YICHOW LINE.—A report from Peking given more or less credence is to the effect that the Deutsche-Asiatische Bank has arranged a loan for the construction of this line which, if built, would compete with the Hai-chow-Hsuchow line. The loan is reported to be for Tls. 8,000,000 redeemable in ten years.

MANILA RAILROAD COMPANY'S CONSTRUCTION.—Regardless of the heavy rains this company is making rapid headway on construction. The Cavite line to Naic is practically completed and work on the southern lines towards Lucena is progressing. In all there are about 650 kilometers, a large part of which is under construction to be completed by 1918. Of the through line from Manila to Lucena which is 140 kilometers in length, but 40 miles are to be constructed. A line is projected from Lucena south to Legaspi which will make over 300 kilometers from Manila to the most southern terminus.

DAMAGE FROM FLOODS.—The recent heavy floods that prevailed throughout the Philippines, China and Japan resulted in much damage and delay to railways. In the Philippines there were several washouts and traffic was delayed. The damage, however, was quickly corrected and nothwithstanding two very severe typhoons, traffic has been fully restored.

In Formosa and South, Central, and North China reports indicate very severe floods with serious delay in traffic. In Manchuria, the Liao River overflowed its banks, and owing to the low lying character of the country carried away embankment on the I. R. N C. and the South Manchuria. The country for many miles was under water and severe damage to crops is reported. Traffic on the I. R. N. C. was suspended, but as a soon as the waters abated great activity was displayed in repair work.

SHAHO RIVER BRIDGE.—The contract for the construction of a bridge over the Shaho for the Peking-Mukden line has been let to the South Manchuria Railway Co.

CANADIAN PACIFIC RAILWAY.—At a meeting of the directors of the Canadian Pacific Railway Company dividends of 2 per cent. on the preference stock for the half-year and of 2½ per cent. on the common stock for the quarter ending June 30 last were declared. The results for the fiscal year to June 30 last were:—Gross earnings from railway and steamship lines, £20,833,561; working expenses, £13,493,595; net earnings from railway and steamship lines, £7,337,966; the net earnings of steamships in excess of the amount included in the monthly reports were £223,670; deducting the fixed charges—£2,002,214—there remains a surplus of £5,561,421; deducting the amount transferred to steamship eplacement account—£200,000—and deducting the contribution to the pension fund—£16,000—the nert revenue from railway and steamship lines available for dividend is £5,345,420. After payment of all dividends declared for the year, the surplus from railway and steamship lines for the year carried forward is £2,374,648, the special income from interest on land sales and from other extraneous assets not included in the above is £1,320,441.

ADDITIONAL LOAN PROPOSED.—The Ministry of Posts and Communications has presented a memorial requesting an additional loan of Tls. 30,000,000 from the international syndicate to be utilized in redeeming the private railway interests in cash.

TUAN FANG'S PROCLAMATION TO THE SZECHUANESE.—The Imperial Railway Commissioner, who was directed to proceed to Szechuan for the purpose of enforcing the Nation- lization Decree to which local objection in the form of a serious disturbance was made by the railway officials, issued a proclamation, part of which we reproduce:

"I have been appointed to come to Szechuan solely to make known the benevolent intentions of the Throne. The troops I am bringing with me are simply for the purpose of suppressing banditti. The object of the Throne in taking over the railways is because of their great importance to the State, and because the Szechuan railway is specially difficult to construct. The construction of this road is a burden greater that the Szechuan people can bear, and is likely to reduce them to poverty before they can get through with it. As a special favor to them the Government takes over the railway and puts a stop to enforced subscriptions, proposing to provide all the necessary funds itself. The Szechuan people ought to have been delighted and grateful for this favor, but instead of that busybodies have been declaring that the Government is robbing them, and that in connexion with the loan they will lose their independence. They do not know that the North-China Railway and the Peking-Hankow Railway were built with foreign money, and that they have been extremely lucrative enterprises to the country without its losing a grain of its independence. Further the new loan agreements are much more favorable to China than those under which the previous railways were built. These things they did not inquire into, but proceeded to raise disturbances, shutting the schools closing down the markets, refusing to pay taxes and every way behaving like rebels. They did not think that genuine rebels would take advantage of the opportunity to plunder the people, to kill your sons and daughters, to burn and destroy till you all tasted the miseries of insurrection. For banditti of that sort the Throne has no mercy, and it has sent me to deal with them alone."

The proclamation further states that the books containing the names of those who formed societies to protect the railway are to be burned. It points out that, although the railway belongs to the State, it will still be the people's railway, new shares will be given for old. The proclamation concludes: 'Let there be no more trouble. Let business proceed as before. Let the taxes be paid and all be peaceful. Then can the railway be built, the Throne will be gratified, I shall be gratified and all the people of Szechuan will reap the benefit."

HUPEH RAILWAY SURVEYS.—Director General Tuang Fang has reported to Peking that a re-survey of the lines places the mileages in Hupeh as follows: from Tunghsiang gate at Wuchang to Yochow, 190 miles, from Kuangsui to Fancheng 130 miles, and from Hsiangyang to Shasi 207 miles.

TOKYO RAILWAY CO.—The report for the last six months places the number of passengers carried during the term at 99,400,681 and the revenue at yen 3,517,545.26. The following is the statement submitted and approved:

	Yen.
Net profits	1,944,788
Previous Balance brought over from accounts	22,229
Total	1,967,017

The No. 1335 type set, a metal wall set made in capacities for 16, 20, and 24 line stations, is also described, as well as the No. 19 cable terminal. In addition to these new sets, all the standard sets manufactured by the company, together with accessories and supplies necessary for the complete installation of inter-phone systems, are shown.

PHILIPPINE MINING NEWS

THE COLORADO MINING CO.—This company, which owns a splendidly developed property in Masbate, began operations this month with its 20-stamp mill and modern cyaniding plant the installation of which is now complete. The result of the first clean up is looked forward to with great interest by Philippine mining men. Work has been in progress for the last six years and from reliable sources we learn that the property is probably the most highly developed in the islands. The officials of the company while confident are reticent about making forecasts.

AUSTRALIAN ENGINEER VISITS ISLANDS. —Mr. E. Byron Moore of Messrs. Byron, Moore and Day of Melbourne made an examination of placer properties in Nueva Ecija and Paracale in September and left for home October 10. He was ag eeably impressed with the prospects for dredging in the islands but was of the opinion that more development work by the owners would be necessary outside Paracale before capital would be attracted in any large amount.

THE PARACALE GOLD PROPERTY.—The Philippines Dredging Proprietary Co., Ltd., of Melbourne has been organized with a capital of £150,000 for the purpose of taking over 500 acres of alluvial ground and plans for the first dredge have been completed The Board of Directors are the Hon. John McWhae, M. L. C., and A. Burlingame Johnson of Manila. Mr. A. F. Showers of Melbourne is secretary.

This was distributed as follows:—

Reserve	97,239
Special reserve	97,239
Contribution to Tokyo City	55,764
Contribution to Tokyo City	55,764
Bonus to officials	38,500
Bonus to officials	38,500
First dividend (7 per cent. per annum)	1,522,500
Second dividend (6 per cent. per annum)	130,500
Balance carried forward to next accounts	25,274

THE SZECHUAN RAILWAY.—The Ichang correspondent of the *North China Daily News* states that 40000 coolies are at present employed and gives the following result of the activity of this company on the Iwang section during the last one and one-half years:

The Construction Department is said to have paid out up to the end of the 4th moon of this year a little over $3,000,000. The cost of material brought from abroad and locally has been about Tls. 1,200,000. Some Tls. 600,000 worth of this material is still in stock in the store yards or along the line. About eight miles of line have been laid and the construction trains are running on this, while the embankment and bridges on another twenty-five miles are finished and, were it not for some deep cuttings and tunnels, the rails might be laid on this whole length.

Up to date the following have been completed: Two stone landings at Ichang, three store houses, earthwork for the wharf and Ichang station yard, Ichang station buildings and two platforms, four station buildings along the line, two locomotive sheds, one water tower and two deep wells, one temporary machine-shop building with machines put up in working order, one residence building for the staff of the chief store department, two residence buildings for the staff and other employees of the locomotive department, two tunnels holed through of a total length of 1,600 feet, fifty bridges, 100 drains.

The following are under course of construction:—

One permanent machine shop, eight tunnels, one coal yard, foremen's quarters and platelayers' cabins for the first section, the building for the construction head office, about sixty bridges and the same number of drains.

The report of the experts is illustrated with several views and a map of the country and is in all a complete confirmation of the claims advanced by the owners.

The properties tested include 310 acres of ground of the Paracale Gold Dredging Co., 150 acres of the Melville and Fingal Claims, and 60 acres of the Nueva California, making in all 520 acres.

On the Paracale Gold ground 64 holes, including twelve blanks, were drilled to an average depth of 32 feet and give an average value of 28.1 cents U. S. C. per cubic yard.

On the Melville property 13 holes, were drilled to an average depth of 25 feet and realized an average value of 42 cents U. S. C. per cubic yard.

On the Nueva California seven holes were drilled to an average depth of 25 feet giving an average value of 55 6 cents U. S. C. This property was previously tested by Mr. Hanlon who put down 26 holes giving an average value of 32 cents a yard.

In concluding his report Mr. John W. McWhae says:

"In conclusion, after our thorough investigation, I have no hesitancy in recommending the properties as very desirable and valuable ones, provided large capacity dredges, designed to fit the peculiar conditions existing at Paracale, are installed."

Concluding his report Mr. J. Bertinshaw says:

"In conclusion, I consider the property a very valuable one, but would strongly recommend close connected buckets with a capacity of not less than six feet, so as to get away with the overburden quickly.

"If dredges such as I have mentioned are put on the property, I feel sure each one would more than double the yields now being obtained by the dredge operating on the lease without to any great extent increasing the working expenses".

For purposes of comparison the report contains the values of ground worked in Victoria as follows:

The Campbell's Creek Dredging Company, Castl main, values per cubic yard 4½d (9 cents gold), cost of saving, 2½d (5 cents gold), per cubic yard; material treated during the half year ended March 18, 1911, 331.540c. yds. and dividends paid to amount of £4000 during the term.

The Junction Dredging company's ground gives about the same value as the Campbell's Creek and the Perseverance Gold Dredging Co. operates in 3¾d (7½ cents gold) ground at a profit.

With Paracale ground averaging from 14d (28 cents gold), to 27½d [55 cents gold], per cubic yard and the highest estimated co t of saving being placed at 2½d [5 cents gold] per cubic yard, the company should work out large dividends.

Director McWhae arrived in Manila early this month to conclude arrangements for preliminary work and proceeded to Hongkong for the purpose of submitting p ans for bids on the construction of the first dredge. The old dredge on the Paracale Gold Property taken over by the Melbourne Company is in operation. The last clean-up produced 207 ounces.

THE HEADQUARTERS MINING CO.—The report from this property indicates that, due to storms and other causes incidental to the opening of a new plant, the mill has not yet been given an opportunity to demonstrate adequately the returns from the property. The latest monthly clean-up with the plant running only a portion of the time, and then not to its full capacity, is reported to be worth about ₱7,000, and calculating from this basis, when at its full capacity, the returns should reach ₱20,000 every month.

THE MALAGUIT RIVER DREDGING.—For the quarter ended June 30 the sum of ₱6,000 represented the net profit distributed among the owners of the ground and the owners of the dredge. Of this the owners received 30%. The returns to the dredging company represents a large percentage on investment. As the operation on this river continues the values in gold increase.

CONTRACTING NEWS

CONTRACTS AWARDED.—PHILIPPINE GOVERNMENT—15,000 tons of coal.—Contract awarded Macondray & Co. Ochi Coal.

MUNICIPALITY OF SHANGHAI—Induction motors miniature lamps, time switches and transformers.—Construction of substation, and house service fuse boxes.

Induction Motors.—Of the tenders received for twenty one phase induction motors, the following have been authorized for acceptance:—

				£	s.	d.
Arnhold, Karberg and Co	4	3	H. P. motors	76	8	0
Inniss and Riddle	5	5	,, ,,	120	7	6
Inniss and Riddle	8	12	,, ,,	372	0	0
Siemens China Elect. Eng. Co	3	20	,, ,,	175	10	0

Miniature Lamps. Time Switches and Transformers.—Tenders were invited for the supply of 4,000 miniature metallic filament lamps for use in parallel on 10 volt circuits, also for Time Switches and small Transformers, and, upon the recommendation of the Electrical Engineer, the following have been authorized for acceptance:—

Arnhold, Karberg and Co., 4,000 Miniature Lamps	£127	0	0
Messrs. Samuel and Co., 12 Time Switches	113	10	0
Messrs. Samuel and Co., 12 Transformers	114	0	0

Sub-Station —Of five tenders received for the construction of a Sub-Station to contain extra high tension switch gear, lighting arresters and transformers at the Shanghai Roller Flour Mill, Ichang Road, that of the Vulcan Iron Works, Ld., Tls. 555 has been accepted. The other tenderers are Soy Chong, Tls 560, Fah Shing Ironworks Tls. 5*8, Kien Chong, Tls. 595 and the Shanghai Dock and Engineering Company, Limited, Tls. 812.

House Service Fuse Boxes.—Sixteen tenders were received in response to Notification 2120 for House Service Fuse Boxes, and upon the recommendation of the Engineer that of Messrs. W. T. Henley's Telegraph Works Co. Ld., has been accepted at a cost of £120 16s. 8.

PROPOSALS INVITED

PHILIPPINE GOVERNMENT.—Gas Franchise Manila and Province of Rizal.—Sealed proposals for the franchise set forth in Act Numbered Two thousand and thirty nine of the Philippine Legislature, to construct, maintain and operate gas systems for the furnishing of gas for heat, lighting and power in the City of Manila and the Province of Rizal, Philippine Islands, will be received at this office up to eleven o'clock A. M. on Monday, December eighteenth, nineteen hundred and eleven. No bid will be considered unless accompanied by cash or a certified check to the order of W. Cameron Forbes, Governor General, in the amount of Five Thousand pesos to guarantee acceptance of the franchise under the terms of the bid, and unless a statement be made therein that said sum of Five thousand pesos shall be forfeited to the Government of the Philippine Islands as liquidated damages in the event of failure on the part of the bidder to comply with the terms of his bid. The check or cash of each unsuccessful bidder will be returned to him immediately upon the rejection of his bid. No bid will be considered unless it is stipulated therein that the bidder will pay a lump sum to the Government of the Philippine Islands for and in consideration of

FAR EASTERN ENGINEERING CONSTRUCTION, COMMERCIAL AND FINANCIAL NEWS

ELECTRIC RAILWAYS, LIGHT, POWER, TELEGRAPHS, TELEPHONES, AEROPLANES, ETC.

INSTALLATION AT SHANGHAI.—Two Siemens' alternators of 600 K. W. each were installed in the new cotton mill erected on Soochow Creek by the Home & Foreign Cotton Co. Ltd., opened this month. The generating plant is supplied with power by two Babcock & Wilcox water tube boilers while two Belliss & Morcom triple expansion engines of high speed type are installed. The company represents Japanese capital.

CHINA LIGHT & POWER CO.—The report for the year shows a net profit of $5,728 which was carried forward. The chairman stated that there had been an unusual delay in installing the three engines ordered. One was now working and when the balance were installed the efficiency of the plant would be enhanced.

AVIATION IN CHINA.—Fung Yu, who accomplished several successful ascents recently in Canton, has announced his purpose to return to America in view of the lack of interest of the Army Board in promoting aviation for military purposes.

WIRELESS ON PHILIPPINE TRANSPORTS.—The U. S. Quartermaster's Department have been installing Telefunken wireless on the interisland transports Warren and Liscum. The equipment used is two k. w. with a radius of 250 miles. Other vessels will be equipped as soon as feasible.

CEBU ELECTRIC LIGHT PLANT.—This company proposes to add an additional unit of 200 K. W. to its generating plant in view of t e steady expansion of its operations. It paid a dividend of 18% for the last eleven months of 1910 and 5% for the first quarter, 1911.

the granting of the franchise in accordance with the terms thereof as set forth in Act No. 2039, within ninety days after the sending of formal notification of acceptance of the bid. This notification will be placed in a sealed envelope and sent by registered mail to the address given in the proposal which should contain an address in the Philippine Islands to which the bidder desires notification to be sent. Bids will be opened by the Executive Secretary at eleven o'clock a. m. on Monday, December the eighteenth, nineteen hundred and eleven.

The right to reject any and all bids is hereby reserved.

W. CAMERON FORBES,
Governor General.

U.S. ARMY, PHILIPPINES:—2,400,000 pounds of potatoes and 480,000 pounds onions.—Contract awarded Messrs. Castle Bros Wolf & Sons whose bid approximated ₱111,800.

BIDS OPENED

PHILIPPINE GOVERNMENT.—63,000 feet planed and 91,000 feet rough ipil lumber—Tuason and San Pedro P174 per m. rough and planed; Findlay Richardson & Co. ₱180 per m. rough ₱180 per m. planed.

Pedro C. Quinco, ₱174 per thousand feet; D. C. Chuan, ₱209.50 per thousand for the rough, and ₱258.50 for the planed; Manila Saw Mill Company, ₱175 per thousand for rough, and ₱195 for the planed; Chua Tenco, ₱175 50 per thousand for the rough, and ₱224.50 for the planed; S. A. Reich, ₱185 per thousand for the rough, and ₱240 for the planed; and Tuason and San Pedro ₱200 per thousand for the rough, and ₱220 for the planed.

TOKYO MUNICIPAL TRAMWAY PURCHASE.—The following purchase bonds ordinance has been approved by the council:

Article 1.—English currency bonds for £9,175,000 sterling face value shall be issued in the course of the 44th fiscal year (April 1911-March 1912) to raise a fund for the electric business undertaken by the Municipality.

A portion of the above named bonds may be converted into domestic bonds, in which case the English pound shall be computed at the rate of 9 77 *yen* Japanese currency.

Article 2.—The issue of these bonds may be entrusted to the banks, or financial corporations, who accept them.

Article 3.—The rate of interest on the bonds shall be under 5 per cent. of the face value and be fixed at the time of their issue.

Article 4.—The certificates issued for the loan shall be unsigned bonds with coupons.

Article 5.—The interest on the bonds shall be payable twice a year, at the end of every six months.

Article 6.—The payment of interest on the bonds and the redemption of the principal shall be borne by a special municipal account for the electric business, and the principal of the loan shall be redeemed by lottery or by some other means within thirty years following the date of issue.

Article 7.—The denomination of the bonds, the method of paying interest and of redemption and all other procedure shall be determined b the Mayor of Tokyo, subject to the approval of the Aldermen's Council.

According to the estimate, the proceeds of the loan are to be appropria ed as specified hereunder:—

	Purchase price applied to Tokyo Railway Co.	Cost of construction of new lines.	Cost of installation of electric light power.
	Yen.	Yen.	Yen.
44th fiscal year	63,915,518	20,000,000	2,260,000
45th "	—	20,000,000	1,900,000
46th "	—	30,000,000	1,015,000
47th "	—	30,000,000	623,000
48th "	—	6,000,000	325,000
Total	63,915,,518	106,000,0(0	6,123,000

THE OSAKA ELECTRIC LIGHT CO.—This company paid 12 per cent half-yearly dividend for the term. It has recently new dynamos to the Ajikawa generating station and will complete the second station before the year closes. The company supplies electrical machinery as well as current. It now serves over 432,000 incandescent lights, an increase of over 68,000 in six months.

DAVAO WIRELESS.—A 10 k. w. station Telefunken apparatus has been installed at this point. It will be capable of communicating with all points in Mindanao as well as Manila and the China Coast.

MANILA ELECTRIC.—Final tests of the new Allis-Chalmers turbine generator installed in the power plant of this company were most satisfactory. The company's contribution to the internal revenue department representing 2½% of the gross receipts was ₱60,453 which would make the gross revenue for the fiscal year ₱2,421,720.

PUBLIC WORKS, DOCKS, WHARVES, BUILDINGS, ETC.

RUSSIAN ACTIVITY ON THE AMUR.—In order to open up all the waterways as freight feeders to the Amur Railway the Russian minister of ways and Communications has made the following recommendations:

1.—The bar of the Amur estuary must be removed for the passage into Nikolaevsk of ocean-going vessels of every draught.

2.—The port of Nikolaevsk must be deepened for the unrestricted unloading of ocean-going vessels.

3.—The conditions of navigation on the Amur, if possible in a technical sense, ought to be brought to such a pitch that ocean-going vessels, after being lightened at Nikolaevsk, may ascend as far as Habarovsk.

4.—In the event of the realization of the aforesaid desire, it is essential that Habarovsk should be adapted to the accommodation of maritime freight.

5.—At the same place goods warehouses and grain elevators must be constructed.

LIAO RIVER IMPROVEMENT.—This work includes the deepening of the channel 200 feet in width for 5 feet additional so as to make the channel from 22 to 28 feet deep at high water mark, the closing of the West Junk passage, and the deepening of the river beside works on the upper reaches of the river. The estimated cost is approximately Tls 800,000.

NEW LIOTUNG HARBOR.—The construction of a harbor south of Hulutao promontory on the Gulf of Liotung at a cost of Tls. 10,000,000 is proposed. The promontory extends about two miles into the gulf and the south side offers a protected harbor open practically all the year.

FILIPINO Y. M. C. A.—The International Committee has donated ₱280,000 towards the construction of a building exclusively for Filipinos to cost ₱355,000 provided the latter make up the balance by subscription which is practically assured.

KOBE HARBOR WORKS.—In 1906 the government appropriated yen 3,960,000 for a six year undertaking and again in 1907 a ten year program covering an estimated expenditure of yen 16,740,000 was authorized. A summary of the work accomplished up to end of the last fiscal year is given by the Japan *Times* as follows

a.—Reclaimed area:

	sq ft.
Reclaimed land No. 1	23,072
Reclaimed land No 2	48,000
Reclaimed land No. 3	54,000
Foundation of mole No. 4	10 800
Total	135,872

b—Dredged area .... 314,442 ft.

c—Landing stage completed 864

d—Breakwater completed 2,628

e—Ferro-concrete caissons made and used for constructing the quay-walls:

	Caissons made.	Caissons used.
Mole No. 4 (of 30 ft. below low tide)	14	13
Mole No. 1 (of 33 ft. below low tide)	4	4
Mole No. 2 (of 36 ft. below low tide)	3	2
Total length	2,520	2,280

f—The wood sheds along the landing stage:

	Span. ft.	Length. ft.	Area covering. sqf ft.
Shed No. 1	72	336	24,192
Shed No. 2	72	192	13,824
Total area			38,016

g—Roads and Bridges:

	Width. ft.	Length. ft.
Roads	60	576
Roads	72	420
Bridge	90	60

h—Temporary Breakwater .... ft. 300 ft.

i—Coast Breakwater 960

j—Dimensions of the caissons for breakwaters:

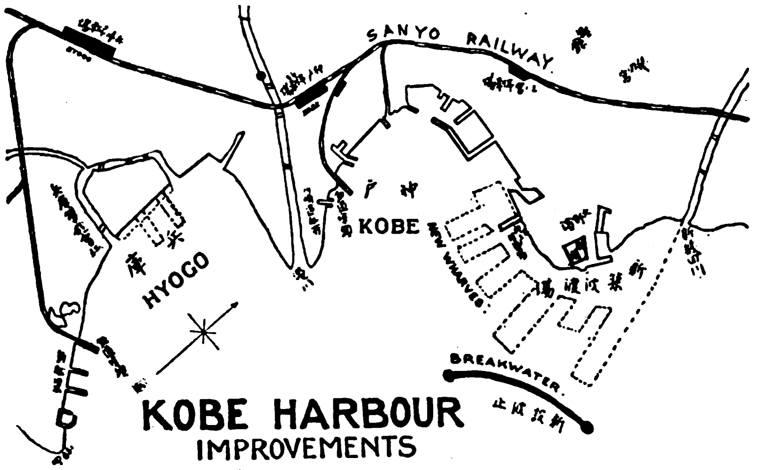
Length.	Width.	Height.	Weight.
ft.	ft.	ft.	tons.
40	21	21	400

k—Chief boats used for construction works:

Small steamboats	6
Dokai Maru (for dredging and reclamation)	1
Owada Maru (for dredging)	1
Priestman dredgers	4
Crane boats (can raise or lower the freights of from 1 ton to 20 tons)	7
Pile driving boat	1
Boats to carry mud and sand	16
Boats to carry concrete blocks	7
Floating dock	1

l—Employees:

Crew	263
Others	752
Total	1,015



Sketch of Kobe Harbour.

Straits Settlements Harbor Boards:—In the Governor's annual statement the following reference was made to the harbor boards:

The net revenue of the Tanjong Pagar Dock Board for the six months ending 30th June, 1911, was $756,880, an increase of $83,274 over the figures for the previous half-year. The total net revenue for the year ending June 30, 1911, was $1,430,486.

The number of vessels using the wharves during the year ending June 30, 1911, was 2,404, with a gross tonnage of 4,698,160. the quantity of coal and cargo handled being 2,333,832 tons.

The net revenue from the Government Wharves, Penang, for the half-year ending 30th June, 1911, was $49,964, and for the half-year ending December 31, 1910, $47,789, making a total for the year of $97,753. The cargo and coal handled during the six months ending June 30, 1911, being 264,170 tons and 233,799 tons for the six months ending December 31, 1910, making a total of 497,969 tons for the year.

Messrs. John Aird & Co., the contractors for the new wet dock and main wharf reconstruction, having declined to continue work under their contract, the Dock Board entered upon the works on the 8th March, 1911, and relet the contract to Messrs. Tropham Jones and Railton, the contractors for the graving dock at Keppel Harbour, who commenced work on 18th July, 1911, the most pressing work having in the meantime been carried on departmentally.

The action of the former contractors will delay the completion of this section of the Dock improvements for some three years, a result which in view of the urgent need of extended wharfage cannot fail to be very prejudicial to the port of Singapore and so to the Colony.

Of the main wharf reconstruction a length of 500 feet at the west wharf has been completed by the Board departmentally.

The progress of the new graving dock at Keppel Harbour has been very satisfactory, the daily average number of men employed being 1,900 and the value of the work executed to June 30th, 1911, being £175,000.

The extensions of Swettenham Pier at Penang have been completed and the construction of over-water godowns on the inner side of the Pier is well advanced.

Lumber Yards of the Bureau of Supply.—Two buildings of reinforced concrete 50×150 feet for lumber sheds are being erected on the new port area in Manila and other sheds with a floor area of two blocks and capable of taking care of 5,000,000 feet will be added from time to time.

SHIPBUILDING, MERCHANT MARINE, FISHERIES, ETC.

The Toyo Kisen Kaisha.—The following statement was approved at the last half yearly meeting:

	Yen.
Profit	329,847
Brought forward from last account	12,289
Total	343,136
To reserve	17,000
Dividend (12 per cent. on new shares and five per cent. on old shares)	318,500
Carried to next account	7,636

Nippon Yusen Kaisha Active.—This company it is reported has decided to discontinue its present working agreement with the Great Northern and will open its own offices in Seattle which city will in future be the terminal instead of Tacoma.

The Hongkong and Whampoa Dock Co., Ltd.—The report submitted at the last half yearly meeting shows a net profit of $66,595 for the term, out of which a dividend of $1 per share was paid. This sum is equal to the total profits for the previous year and indicates increased activity in the different departments. In the course of his remarks the chairman said:

"We have six dry docks and two slipways, and I am glad to tell you that on several occasions during the period under review we had all our docking accommodation taken up. All we want now is more work, and I have no doubt that when the reflection of the brisk condition of trade at Home, as shown by Board of Trade returns, reaches the Far East, we will obtain an increased volume of business for our establishments. There is an increasing demand for medium-sized steamers in this district, and while a few such boats have been placed with several builders on the China Coast the contract prices were so unremunerative, and the obligations attached to the contracts so difficult of fulfilment, that we consider nothing has been lost by these orders having gone past us. In smaller craft we do fairly well, and we have had a good share of trade in auxiliary machinery, boilers, general engineering and constructional work. In hand at present are a number of steam launches, motor boats, wooden barges, several new tramcars, and quite a lot of constructional work, and we have just secured an order for a steamer 180 feet in length. You will be glad to know also that our dredger, the Canton River, has been chartered to dredge Macao Harbour at a satisfactory rate. It is expected that this charter will go on for a considerable period, and if so it will be a source of added income to the Company. Out of revenue we have maintained all our establishments in first-class order. We have not added much to our plant during the six months, the principal item being a small steam launch, which we found necessary, and which we are now running as a ferry boat between Hongkong and the docks. This service is a great convenience, and is much appreciated by our clients.

Manuel Earnshaw & Co. to Increase Plant.—This progressive company is preparing plants for the construction of a new slipway and marine railway on the new port area which will represent an investment of ₱1,000,000.

Saigon, Manila and Japanese Ports.—The Philippine Government also favors this project and it is not improbable that special inducements will be made for a regular service between Manila and Japan.

Canadian Pacific Steamers.—Two steamers of 15,000 tons, a length of 570 feet and a speed of 18 knots have been ord red at the Fairfield Dockyard, Glasgow, for the Victoria-Yokohama service. Preliminary surveys have been made by the Atlantic, Gulf & Pacific Co

Japan-Manila Line.—The Mercantile Marine Bureau is reported to be contemplating a line of steamships to call at Java, Saigon, Manila and Japan ports. The Philippine Government also favors this project and will probably lend its support.

Pearl Harbor Docks.—The big naval drydock building at Pearl Harbor in the Hawaiian Islands, 831 feet long, 110 feet wide and 34 feet deep, is nearing completion. The total cost of the naval base now being constructed at Pearl Harbor will be not less than $10,840,000, of which nearly $3,000,000 has been expended on this big dock.

Siam Steam Navigation Co.—The half-yearly balance-sheet shows a net profit of Tcs. 170,702.80 including the balance of Tcs. 2,945.29 from the preceding half year, whereof it is proposed to utilise Tcs. 50,354.31, being 5 per cent per annum on the cost value of the steamers, 10 per cent per annum on the launches, junks, etc., and the amount of bad debts, as depreciation, leaving Ticals 114,348 49 to be divided as follows:—5 per cent. dividend to the shareholders Tics. 100,000.00; remuneration to the Directors Tcs 1,140.52; carried to the Reserve Account, Tcs. 10,000.00; to be carried forward to next half-year Tcs. 3,207.97.

Japanese Fisheries.—The four Grimsby trawlers acquired by the Japanese Fishing Company at Nagasaki, left Grimsby on their long voyage *via* Suez Canal. The journey will occupy between sixty and seventy days. The vessels are navigated by foreign certificated masters, the Grimsby skippers acting as chief mates. Each vessel will carry a crew of 10 Grimsby fishermen.

New Japanese Dreadnought.—The Mitsu Bishi Shipbuilding Yard in Nagasaki early next year will lay the keel of a 27,000-ton battleship, to be named the Kirishima. The Kirishima will be a sistership to the Kongo, which is now in course of construction in the Vickers' Shipbuilding Yard in England.

MINES, MINERALS AND THE METAL TRADE

New American Enterprise in Korea.—The Morris-McGraw interests, comprising four concessions in North Pyeng-an province, has been taken over by a new organization. Mr. Morris is pice-president and general manager of the new company.

THE YUNNAN-SYNDICATE.—An agreement has been reached with the Chinese government whereby the Syndicate cancels its concession in return for the sum of Tls. 1,500,000 in half-yearly instalments of Tls. 250,000 each.

OIL IN TAIYENFU.—Reports from this section indicate that oil in commercial quantities has been found and that an effort will be made by local merchants to organize a company to develop the district with the assistance of the Board of Industry.

PERLIS TIN INDUSTRY.—The report of Meadows Frost, adviser to the Perlis Government, contains the information that 2,533 piculs of tin were exported during 1910. Of the methods of mining he writes:

"The mining is most peculiar, the ore being found in underground streams and hollows in the limestone range which separates Perlis from Setul. People who have been all over Perak and the other States of the federation unite in saying that the Perlis mines are unique. The miners have followed up an underground stream for over three miles, the entrance to which is through a steep funnel, down which the coolies crawl for a quarter of mile before reaching the stream in which the ore is found and which opens out at different places into large caverns.

TONGKAH HARBOR TIN CO.—This company has declared an interim dividend of 10%. This is the fourth during the present year.

HAHMAN HYDRAULIC TIN CO.—At the recent annual meeting of the company a final dividend of 10%, making 25% for the year, was declared besides $12,000 added to reserve and $12,925 forward.

F. M. S. COAL.—Mr. Scrivenor, Chief of the Department of Mines, in his annual report gives some attention to the coal deposits in Selangor. The coal extends about half a mile and the seam approximates 50 feet.

The mean of five tests gave 9.8 as the evaporative value of one pound of fuel in lbs. of water at 212 deg Fahrenheit.

This compares unfavorably with other coals, the percentage of which is given by the Geologist as follows:

Chinese anthracite	12.4
Borneo coal	14.4
Australian coal	13.4
Indian coal	13.2 and 13.6

He also observes that the coal tested came from close to the surface and it is reasonable to expect that the quality will improve in depth; the discovery, too, of one seam of a certain quality does not preclude the possibility of further seams being found.

RAUB AUSTRALIAN GOLD MINING CO. LTD.—The total output for the four weeks ended Septe ber 9 was 577 ounces with an average yield of 2.8 ounces per ton of ore.

THE SHANGTUNG MINING COMPANY.—This company's report for the year gives a revenue from coal sales of M. 247,719, as compared with M. 407,651 in 1909-10, after deducting expenses for management and output. The payment of interest amounts to M. 168,195 (1909-10, M. 137,711); M. 448,859 (1909-10, M. 428,456) are written off, so that the loss increases by M 364,038 to M. 963,311. The report says that the year 1910-11, which had begun with good prospects and active sales, was disappointing in its further course. Especially the sale of the Fangtse coal was checked, so that restriction of the output was necessary. The last quarter of the year was influenced unfavorably by the plague. The output of the Fangtse pit amounted to 194,897 tons, as compared with 273,354 tons in 1909-10; the output of the Hungshang pit to 237,544 tons, as against 183,450 tons. The first quarter of the current year has delivered a revenue of M. 110.000.

FORMOSAN GOLD.—Three mines near Keelung are reported to have produced 50,000 ounces during the year 1910.

HANGYANG IRON WORKS.—This company produced over 130,000 tons of pig iron in 1910 of which 29,000 tons went to Japan and 15,000 to the United States.

PINGSIANG COLLIERY.—The export of coal and cake for the last year from these mines amounted to 96,000 tons of coal and 160,000 tons of coke.

FINANCIAL, COMMERCIAL AND MISCELLANEOUS NEWS

PHILIPPINES REVENUE.—The total collections by the Internal Revenue Bureau for the fiscal year 1911 amounte l to ₱19,211,127.62 as against ₱17,527,824.54 in 1910 or a 9.6% increase. The cost of collection was 3.35% as against 3.75% in 1910. Of these revenues the collections for the city of Manila were ₱3,095,-783 compared with ₱2 975,103 in 1910.

STRAITS SETTLEMENTS TRADE.—The imports for the six months ended June 30, 1911, amounted to £40,300,000, an advance of 1408% and the exports £35,900,000 practically the same percenta e of increase. The principal increase in exports was 5,453,600 lbs. of rubber, an increase in quantity of 4,459,867 lbs. and in value $1,750,000 over the corresponding first half of 1910.

CHINESE COMMERCIAL COMMISSION TO JAPAN.—The following is the personnel of the Commission announced to leave Shanghai for Yokohama on October 24:

From Shanghai: Messrs. Shen Tunho, Yang Hsin-chit, Shao Chin-tao, Chou Chin-chen, Yi Hung-ying, Su Yu-shang and Chu Chih-yao, also Mr. S. Nien-hsin, delegate of the National Agricultural Society.

From Tientsin: Mr. Sung Tse-chue and four others.

From Hankow: Messrs. Lu Hungchang, Wang Ping-sheng, Chang Pichuan, Yuan Ching-cheng, and Chang Shu po.

From Hangchow: Messrs. Shou Hoching and Lui Tsui-chit.

From Chentu: Mr. Ho Lu-sung.

From Soochou: Messrs. Su Chiachin and Hang Hsia-hsien.

From Hunan: Messrs. Huang Chung-hao, Tung Kuang-yi and Chii Chun-pu.

From Peking: Mr. Chas Yen-neng.

From Chefoo: Messrs. Sun Wenshan, and Li Hsing-hsien.

From Wusih: Messrs. Huo San-chin and Hua Shu-chin.

From Chinkiang: Mr. Kuo Li-cheng.

From Wuhu: Mr. Wang Meng chou.

From Shasi: Mr. Wang Yuang-kao.

Messrs. Mo Shu-wei and Chao Chiilin will be secretaries.

JOHNSON PICKETT ROPE CO.—A consolidation of the well known Johnson-Picket Rope Co. and the Santa Mesa Rope Works with a capital of ₱500,000 was consummated last month with a view to further expansion. Both companies have been active in this branch of industry in Manila for many years and the reputation of their output is world wide. The directors of the new company are: Milton E. Springer, Emil H. Johnson, M. Jeran, John T. Pickett, and Hartford Beaumont.

MANILA'S FIRE LOSSES. The report of the Manila Fire Department contains the following tabulated annual losses by fire since 1902:

1902—₱50,085.
1903—₱1 670,649.90.
1904—₱468,911.
1905—₱135,931.
1906—₱76,034.
1907—₱677,709.
1908—₱280,516 62.
1909—₱342.452.45.
1910—₱1,215,980,
1911—₱497,984.

CHARTERED BANK DIVIDEND.—This institution declared an interim dividend of 13% for the half year ended June 30.

THE IMPERIAL CHINESE POST OFFICE.—The report for the year 1909 shows that the number of postal agencies, including box-offices, letter-boxes and pillar-boxes, has been raised from 3,493 to 4,258, while the number of letters, postcards, newspapers, books, samples, etc., has increased from 253 to 306 millions. An increase from 2,455,000 to 3,230,000 in the number and kilos from 7,155,000 to 9,176,000 in weight, of parcels is recorded.

Registered letters have also increased from 19 to 25½ millions.

The money order office increase of two million dollars over the figure of last year brought the total amonnt of transactions to the appreciable sum of nearly ten million dollars.

ANOTHER CORDAGE PLANT FOR MANILA

The Tubbs Cordage Co., operating large Cordage Mills at San Francisco, Cal., Portland, Oregon, and Seattle, Washington, has concluded to install a modern cordage manufacturing plant in Manila. Complete plans of the building and machinery have been prepared, utilizing the experience of fifty years cordage manufacturing in the design of buildings and machinery and the mill will be the most efficient cordage manufacturing plant that can be constructed The investment in buildings and machinery will be ₱600,000.00 and the working capital requirements in addition to construction will fix the total investment at ₱1,000,000.00.

Mr. H. D. Nichols, Vice President and General Manager of the Tubbs Cordage Co., will arrive in Manila about the middle of December and it is contemplated to have the mill in full operation within a year and half after his arrival.

The general manag ment of the business will be in the hands of Captain Heath, General Manager of the Philippine Plantation and Commercial Co., and with him will be Captain A. J. Brazee, who has already been brought to Manila from Masbate where he has been the provincial manager of the business of the Philippine Plantation and Commercial Co.

*LONDON METAL MARKET

SEPTEMBER 1, 1911

COPPER.	£ s. d.		£ s. d.
*Tough cake and ingot	59 5 0	..	59 15 0
*Best selected	59 10 0	..	60 0 0
*Electrolytic	60 0 0	..	60 10 0
*Sheets and sheathing	71 0 0	..	—
*Flat bottoms	74 0 0	..	—
*Copper tubes, seamless per lb.	0 0 8½	..	—
*Lake	60 5 0	..	60 10 0

* Less 3⅓ per cent. † Net.

ALLOYS.

BRASS: Wire	0 0 6¾	..	—
,, Tubes (solid drawn)	0 0 6⅞	..	—
,, Sheets	0 0 7½	..	—

TIN.

English ingots, f. o. b.	187 10 0	..	188 0 0
,, bars	188 10 0	..	189 0 0
,, refined	189 10 0	..	190 0 0
Banka (in Holland) Cash	188 0 0*	..	—
	—	..	—

*Close of market for prompt.

LEAD.

English pig, L. B.	14 17 6	..	—
,, sheet and bar lead	16 0 0	..	—
,, pipe	16 10 0	..	—
,, red	16 15 0	..	—
,, white	20 0 0	..	—
,, patent shot	17 10 0	..	—

ANTIMONY.

Antimony Crude	11 5 0	..	12 5 0
,, Ore (basis 50%)	7 5 0	..	7 15 0

ALUMINIUM. Per ton. Per ton.

98-99 per cent.	58 0 0	..	59 0 0

NICKEL. Per ton. Per ton.

98-99 per cent. guaranteed	167 10 0	to	171 0 0

PLATINUM.

Per oz. Troy, 178s. 6d.; nominal and subject to negotiation.

*Mining Journal.

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Ynchausti & Co.

BANKS
Deutsch-Asiatische
Hongkong and Shanghai Banking Corp.
International Banking Corp.
Banco Español Filipino
Russo-Chinese Bank

BOILERS
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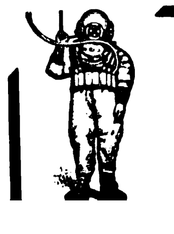

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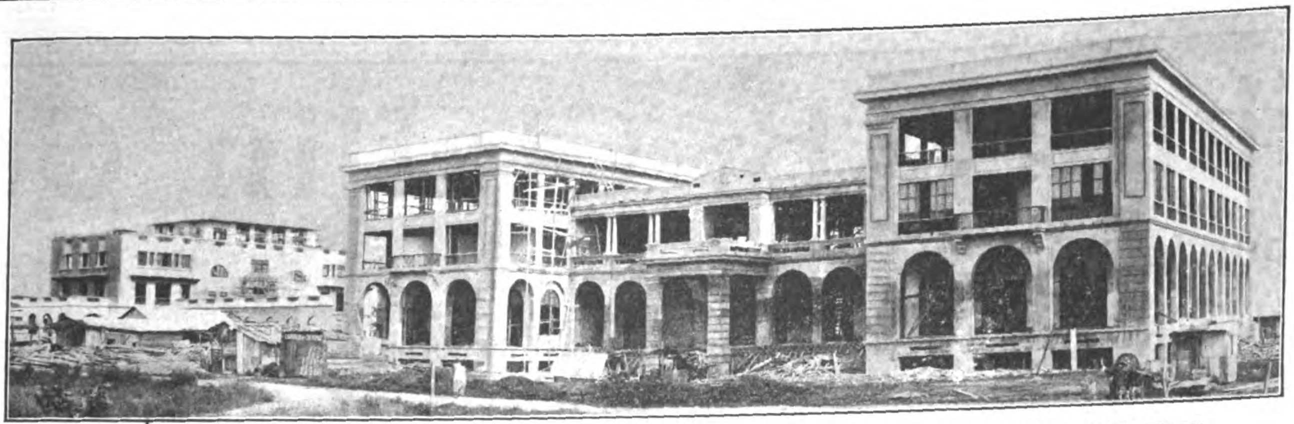

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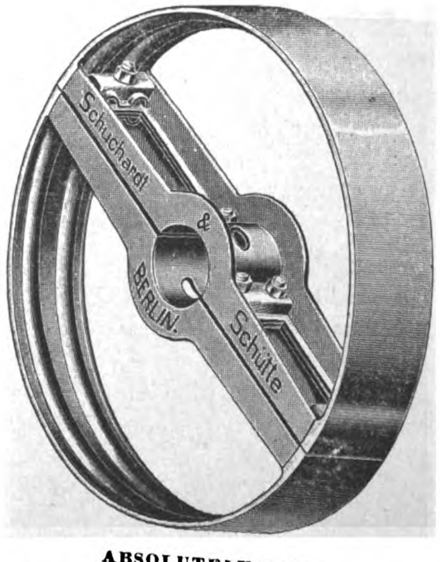

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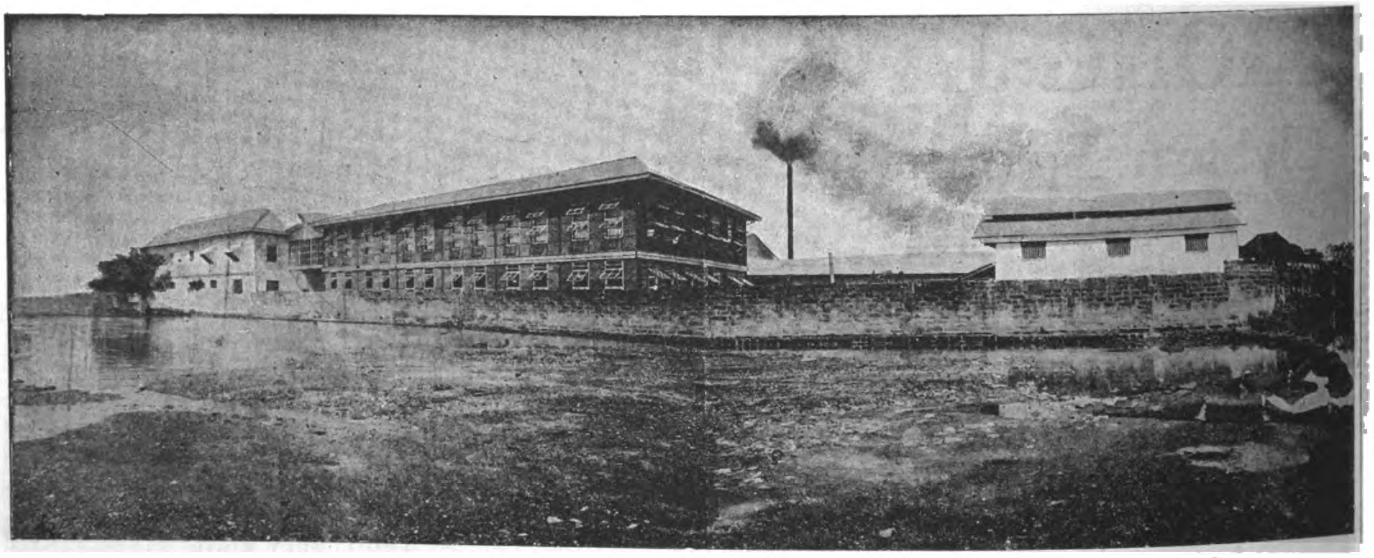

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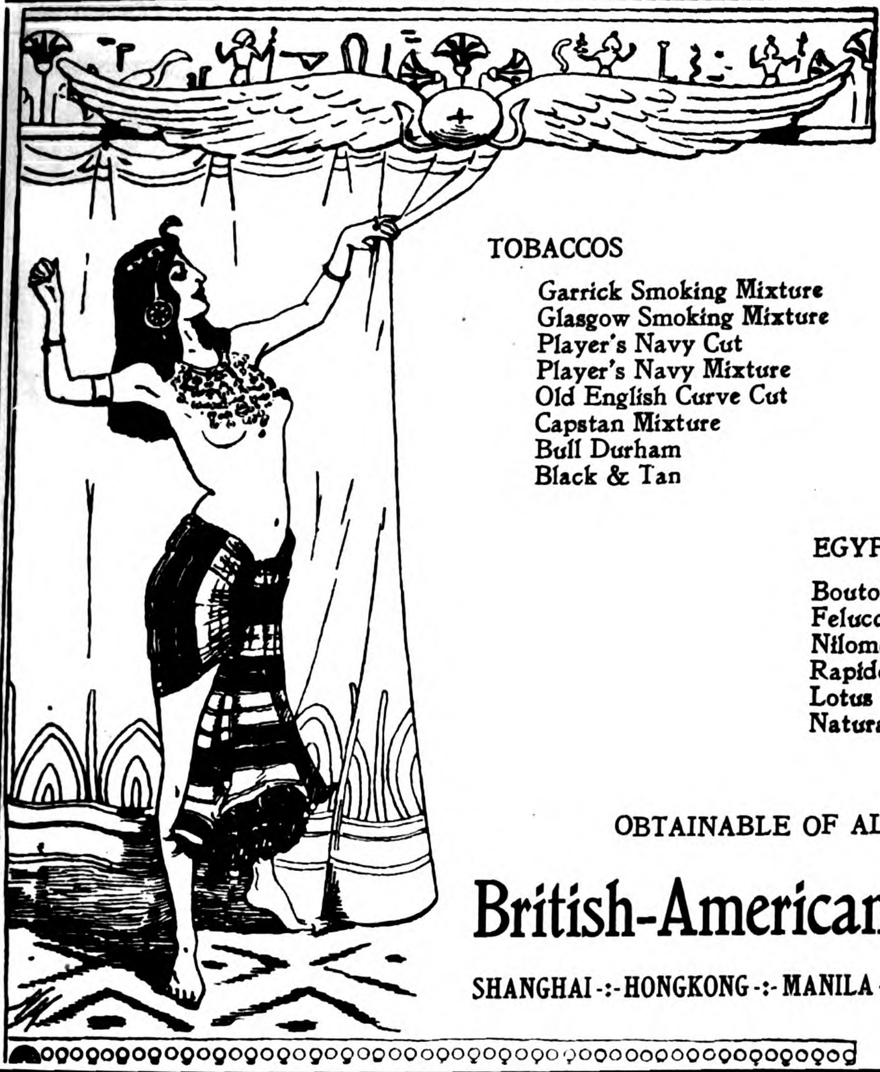

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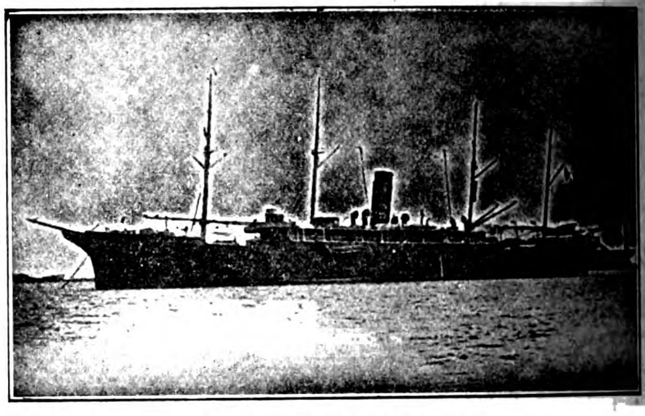

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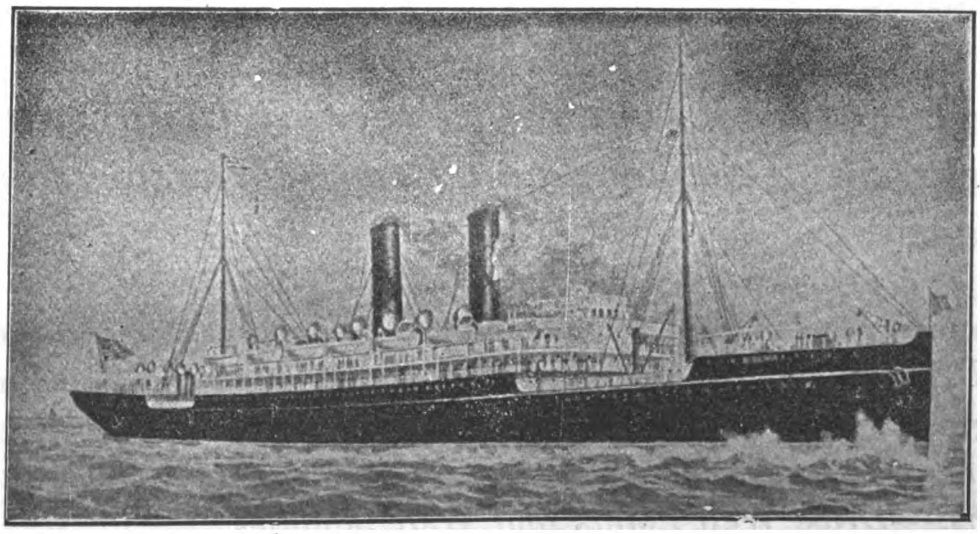

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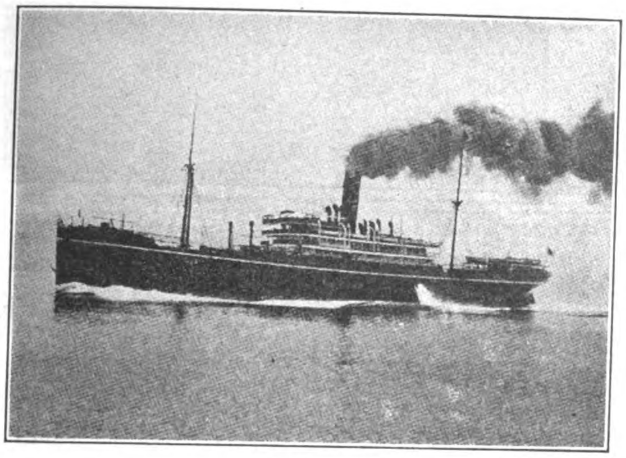

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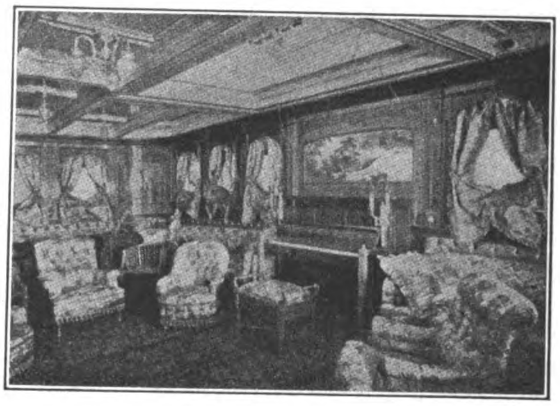

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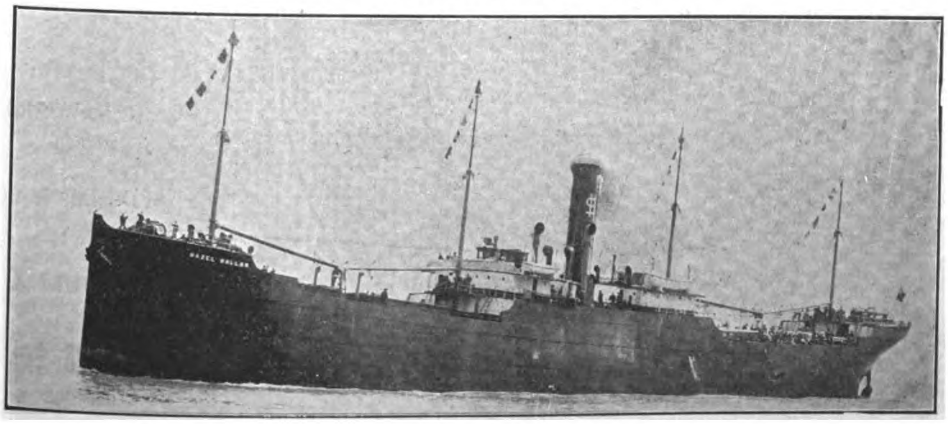

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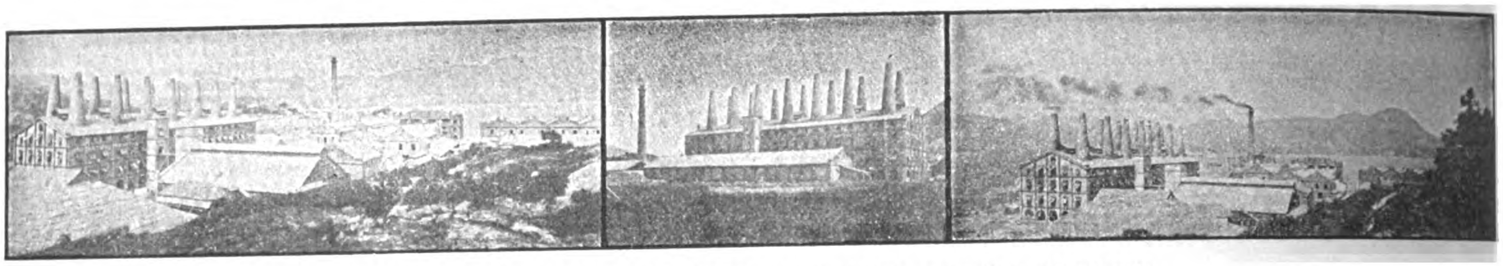

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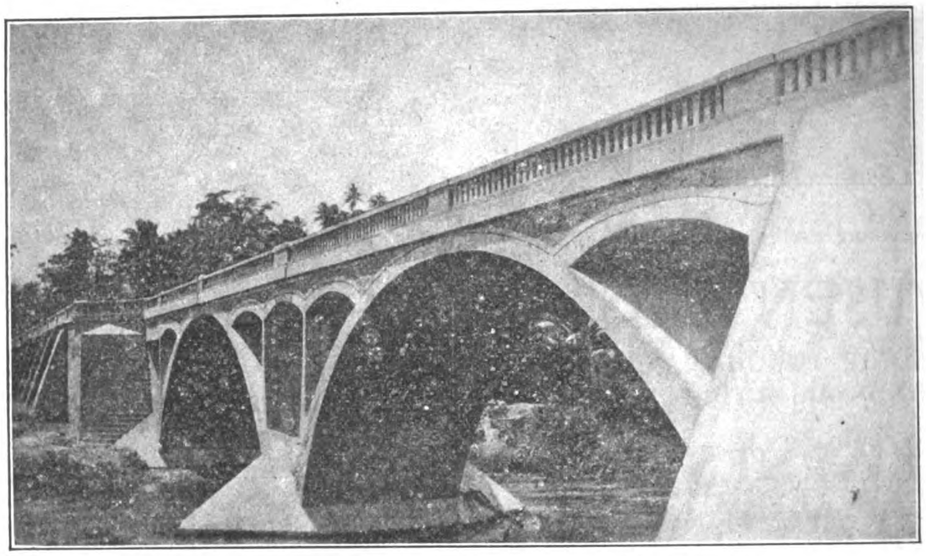

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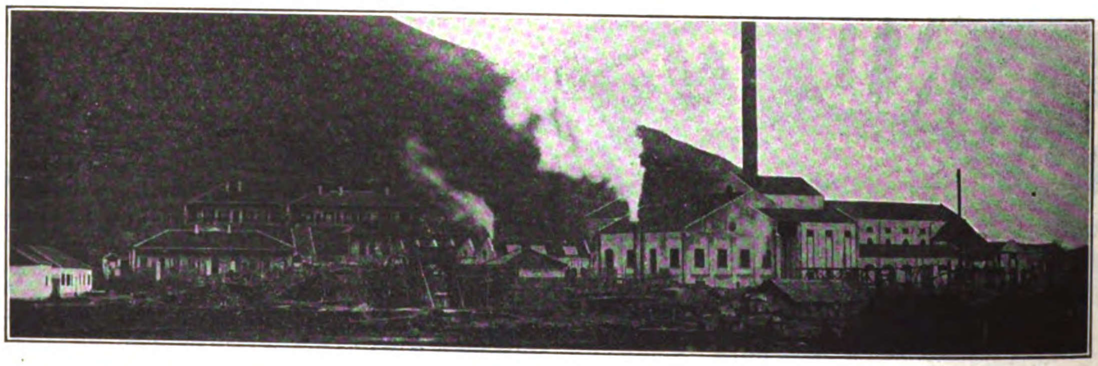

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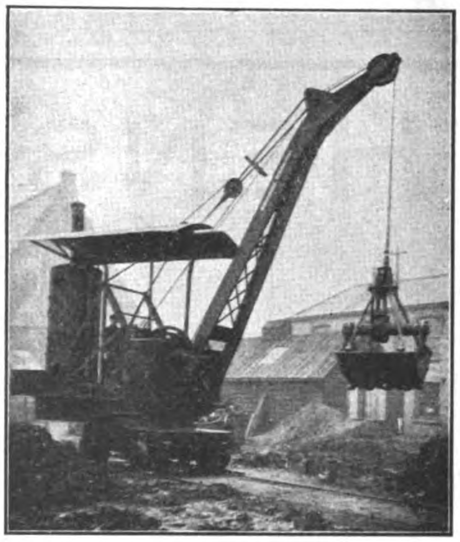

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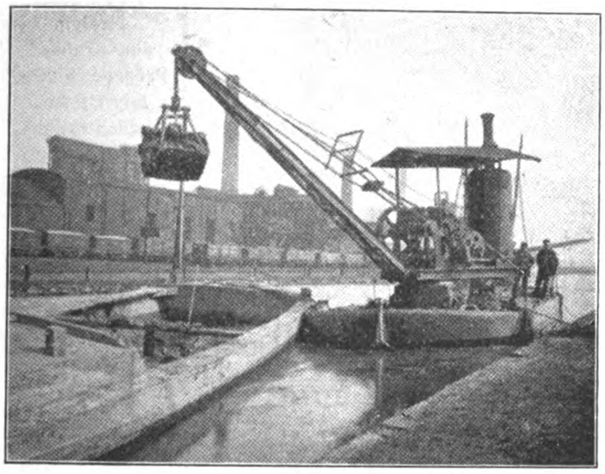

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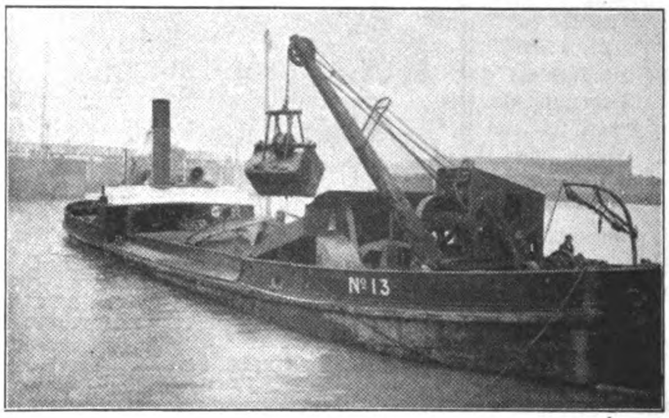

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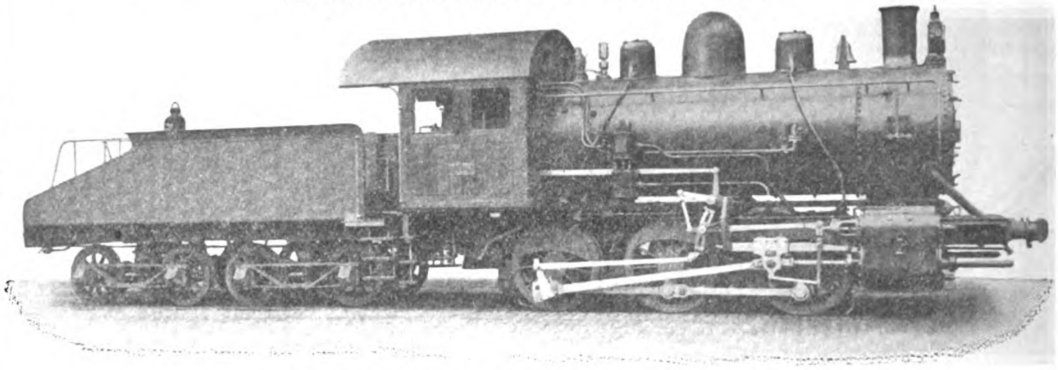

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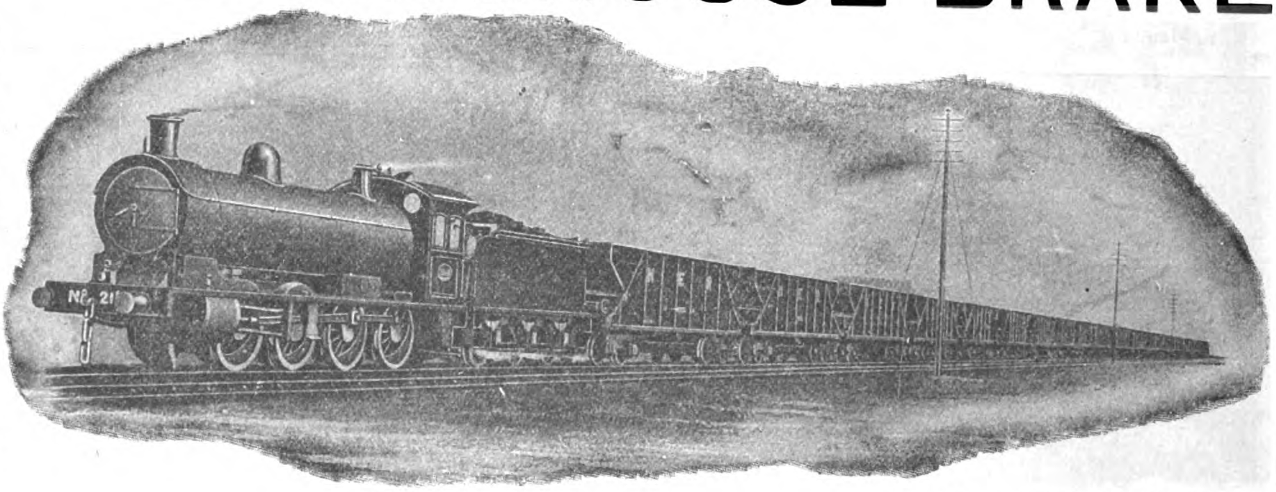

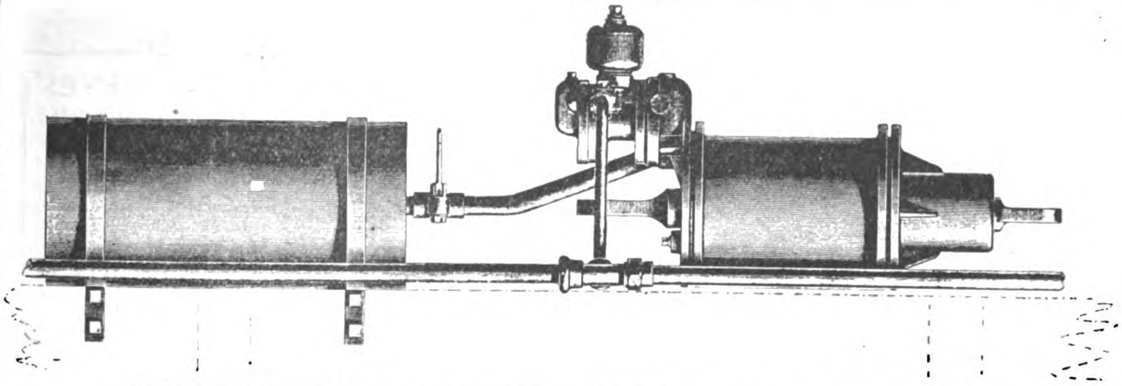

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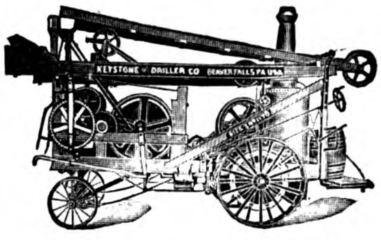

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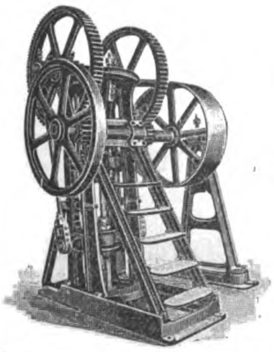

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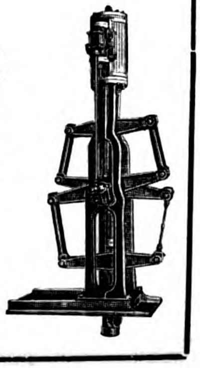

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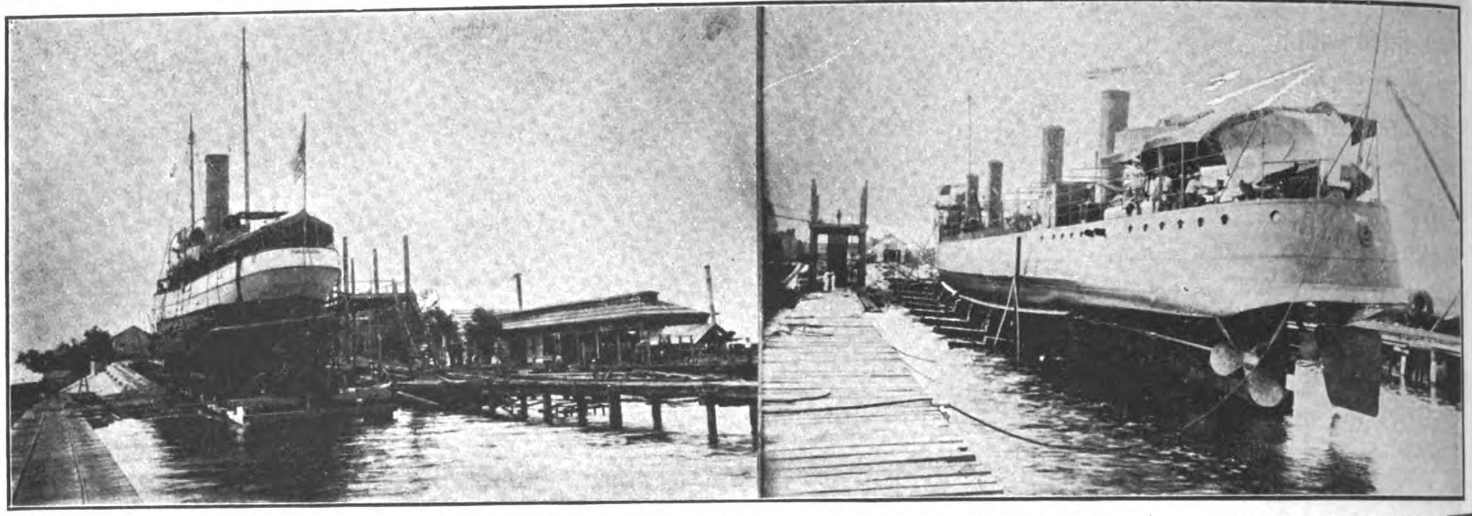

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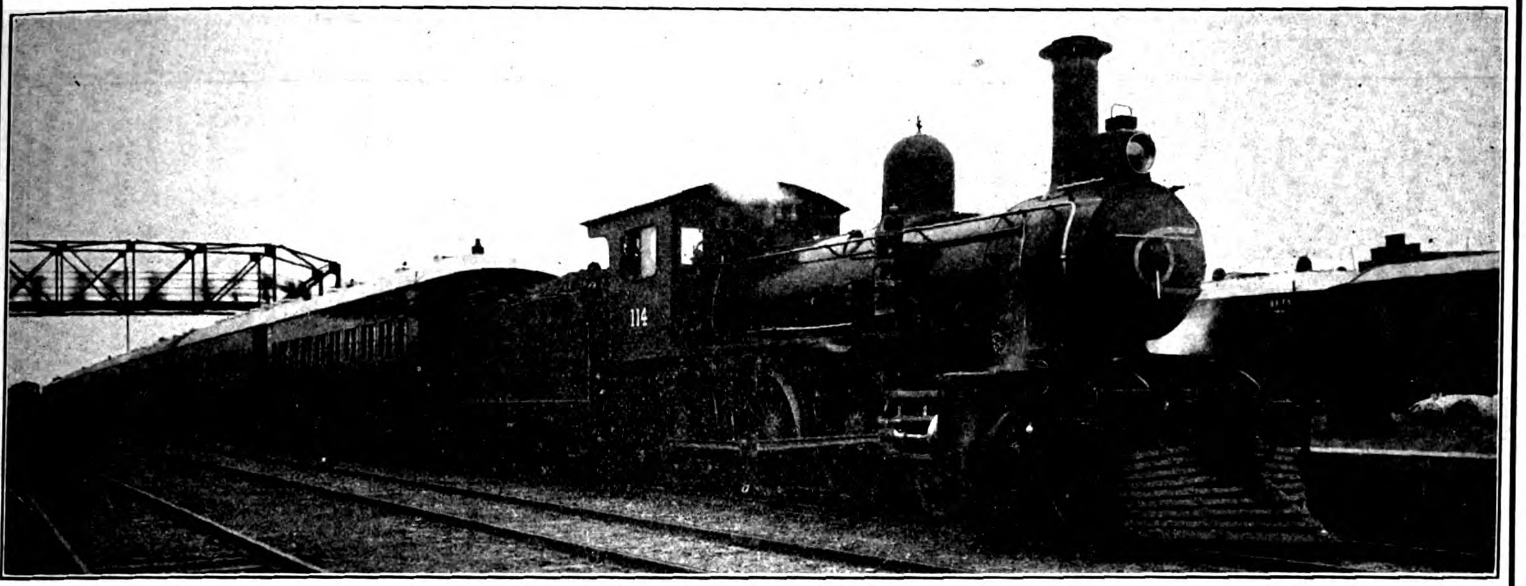

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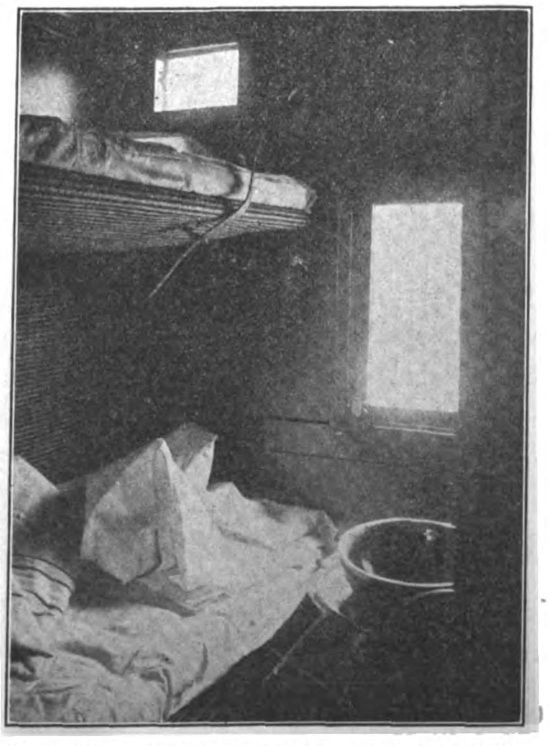

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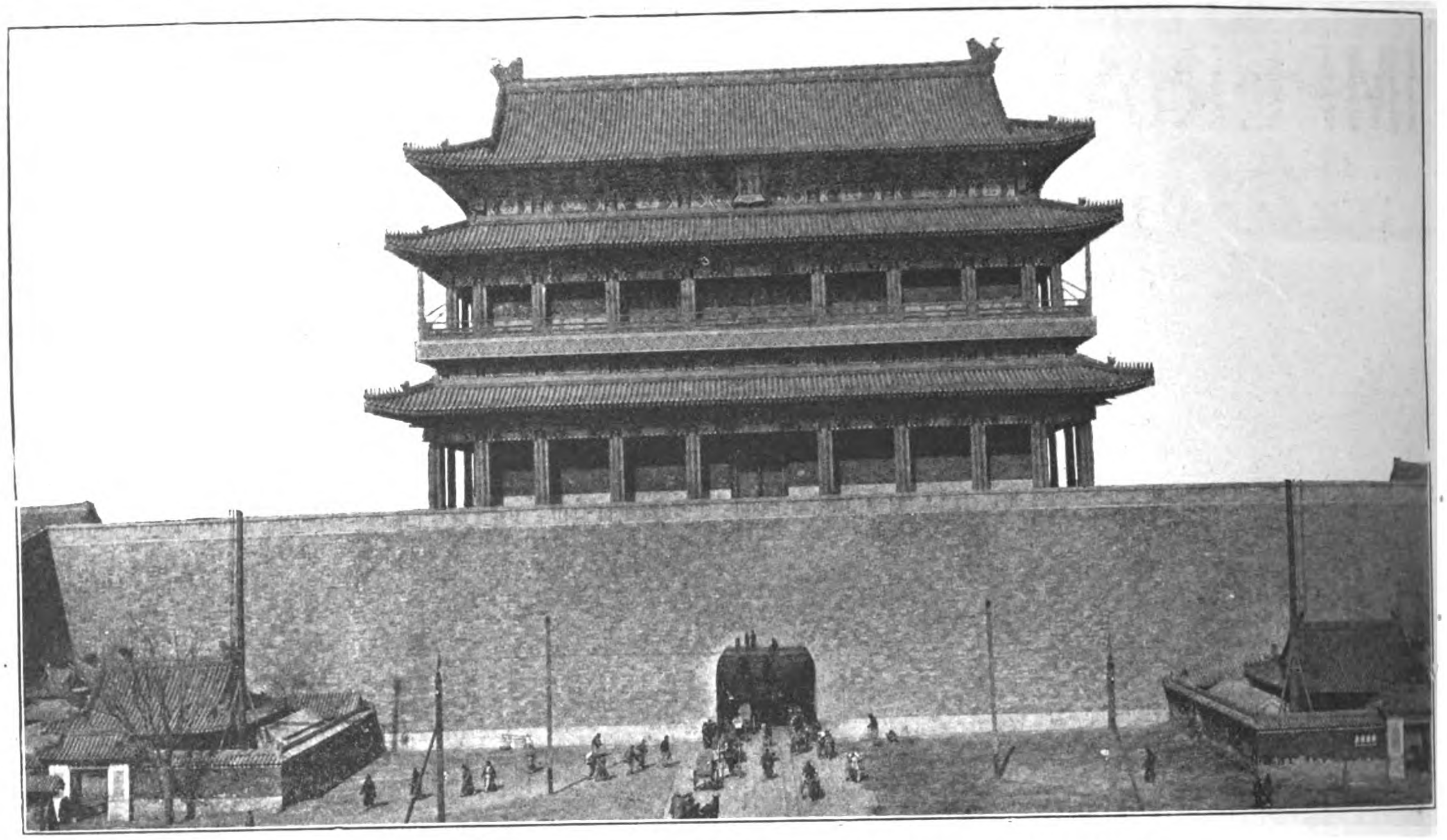

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Avoid the Cold and Rough Weather in the Sea Trip between Shanghai and the North by the more comfortable Route up the Yangtsze to Hankow, and from there via the Ching-Han Railway to Peking, where through connections for Europe are made with the Trains de Luxe of the Imperial Railways of North China.

This line passes through the Heart of the Empire and enables the traveller to and from Europe to catch a glimpse of Old China. Ancient walled cities, temples and pagodas are seen from the comfortable seats of the weekly trains de luxe operated by this line. From Peking, the great capital of the oldest civilization in the world, the train departs from the famous Chien-Men and carries the traveller through the historical and legendary portions of the Empire, to the modern industrial center at Hankow—the Chicago of China. Connections are made with the Cheng-tai Railway at Chengtingfu, with the Tao-Ching Line at Sin Siang-sien, and at Chengchowfu with the Pienlo Line.

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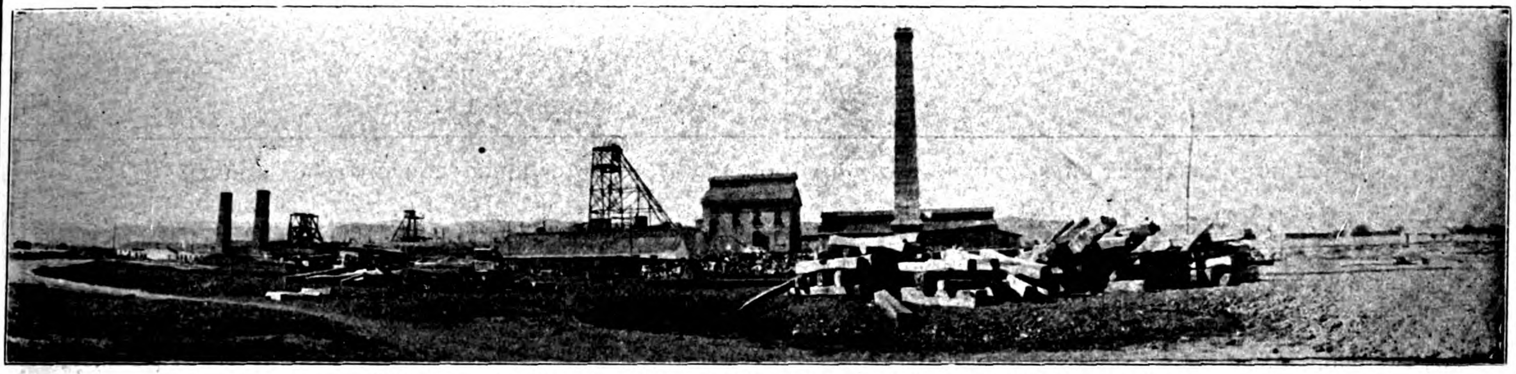
(Imperial Chinese Government Honan Line)



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THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

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This line connects with the through service of the Peking-Hankow Railway at Tcheng Tchéou, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

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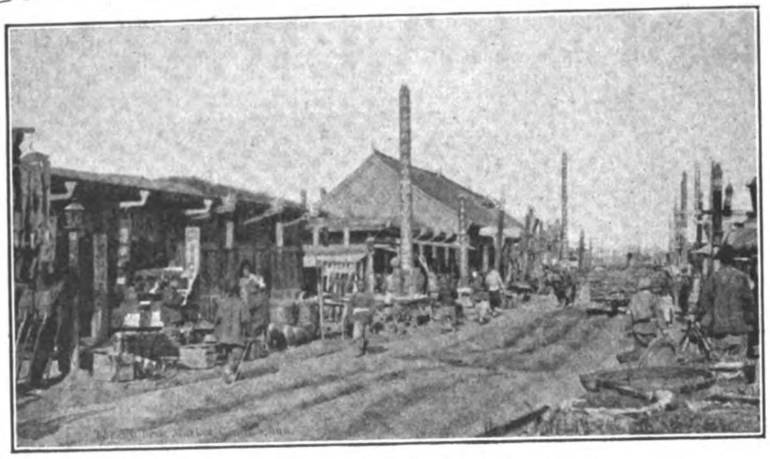
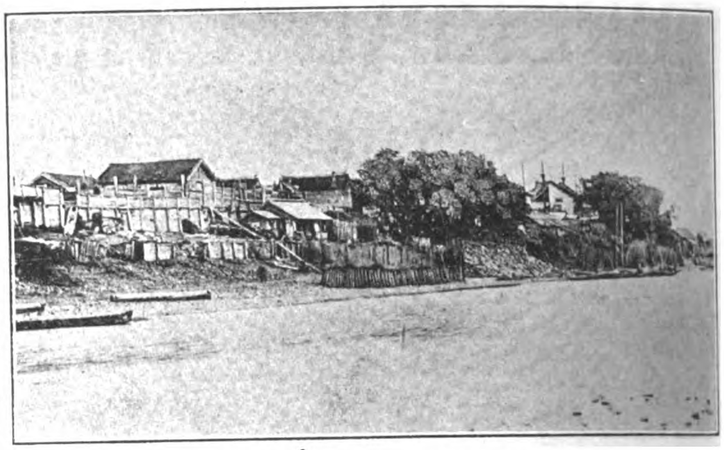


CHINESE MARKET AT CHANG-CHUN



VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

TIME TABLE

The Kirin-Changchung Railway

DOWN TRAIN

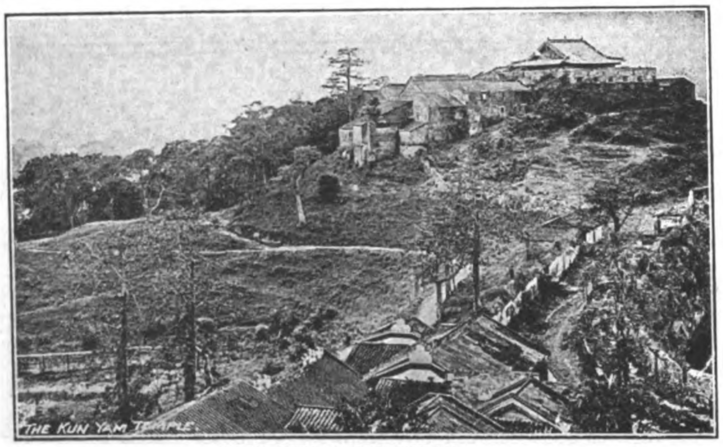
Station	*No.* 1 a. m.	*No.* 2 a. m.
Changchung	7:00	12:00
Coran	8:17	1:17

UP TRAIN

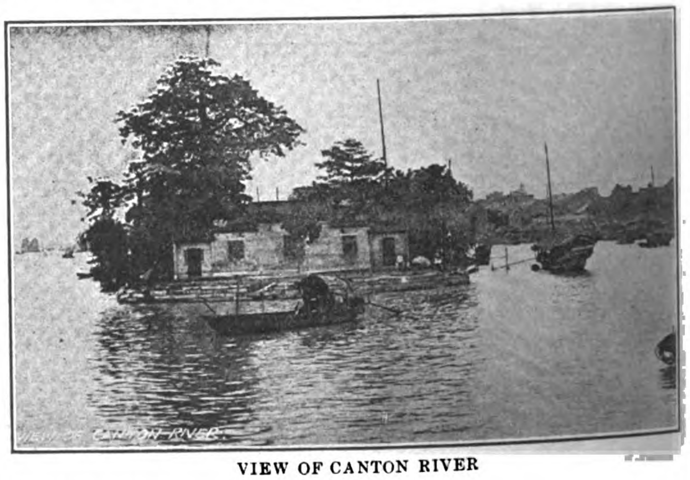
Station	*No.* 2 a. m.	*No.* 4 p. m.
Coran	10:00	5:00
Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS

CANTON-KOWLOON LINE



THE KUN YAM TEMPLE



VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 24th APRIL, 1911, UNTIL FURTHER NOTICE.

Canton (Ta Sha Tou) to Shek Lung

Miles	STATION		Daily Passenger Trains. No. 1	No. 3	No. 5
			A. M.	P M.	A. M.
	Canton (TAI SHA TOU)	dep	7.30	11.00	3 00
3.63	Shiek Pai	arr	7.39	11.09	3 09
		dep	7.42	11.12	3.12
7 90	Che Pi	arr	7.53	11.23	3.23
		dep	7.56	11.26	3.26
12 58	Wu Chung	arr	8 07	11.37	3 37
		dep	8.10	11 40	3 40
17.09	Nam Kong	arr	8.21	11.51	3 51
		dep	8.25	11.55	3 55
21.67	Sun Tong	arr	8.37	12.07	4.07
		dep	8.41	12.11	4.11
23.61	Tong Mei	arr	8.46	12.16	4.16
		dep	8.50	12 20	4 20
25.54	Nga Yeo	arr	8 55	12 25	4 25
		dep	8 58	12.28	4 28
29.00	Sien Tsun	arr	9.07	12.37	4.37
		dep	9.11	12 41	4 41
32.25	Shek Ha	arr	9 22	12.52	4 52
		dep	9-24	12,54	4 54
34.77	Shek Tan	arr	9.33	1.03	5.03
		dep	9 37	1.07	5 07
36.34	Shek Lik Kou	arr	9 43	1.13	5.13
		dep	9.45	1.15	5.15
40.15	Shek Lung	arr	9.58	1.28	5.28

Shek Lung to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2	No. 4	No. 6
			A. M.	P. M.	P. M.
	Shek Lung	dep	7.35	11.05	3 05
3 81	Shek Lik Kou	arr	7.48	11.18	3.18
		dep	7.50	11 20	3.20
5.38	Shek Tan	arr	7.56	11.26	3.26
		dep	8.00	11.30	3.30
7.90	Shek Ha	arr	8.09	11.39	3.39
		dep	8.11	11.41	3.41
11.15	Sien Tsun	arr	8.22	11 52	3.52
		dep	8.26	11.56	3 56
.61	Nga Yeo	arr	8.35	12 05	4 05
		dep	8.38	12 08	4.08
16.54	Tong Mei	arr	8.43	12.13	4 13
		dep	8.47	12.17	4.17
18. 48	Sun Tong	arr	8.52	12.22	4.22
		dep	8.56	12 26	4.26
23 06	Nam Kong	arr	9.08	12.38	4.38
		dep	9 12	12.42	4.42
27.57	Wu Chung	arr	9.23	12.53	4.53
		dep	9.26	12.56	5 56
32 25	Che Pi	arr	9 37	1.07	5.07
		dep	9.40	1.10	5.10
36 52	Shek Pai	arr	9.51	1.21	5.21
		dep	9.54	1.24	5.24
40.15	Canton (TAI SHA TOU)	arr	10.03	1.33	5.33

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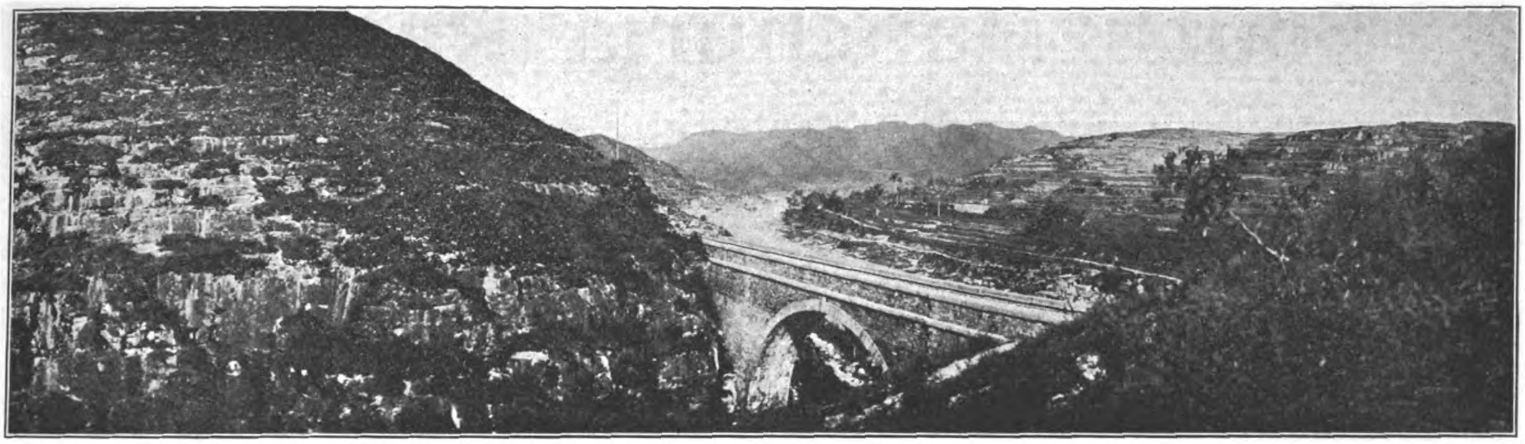
(IMPERIAL GOVERNMENT SHANSI LINE—CHENGTINGFU TO TAIYUANFU)



VIEWS ALONG ROUTE OF CHENG-TAI RAILWAY.

The trains of this line connect with the through service of the Peking-Hankow Railway, affording Travellers the opportunity of seeing the most picturesque part of China. The line passes through a mountainous section of country, rich in Mineral Resources to the Provincial Capital of Shansi at Taiyuanfu. This interesting city is a great educational center, and famous for the fine quality of its artistic embroideries.

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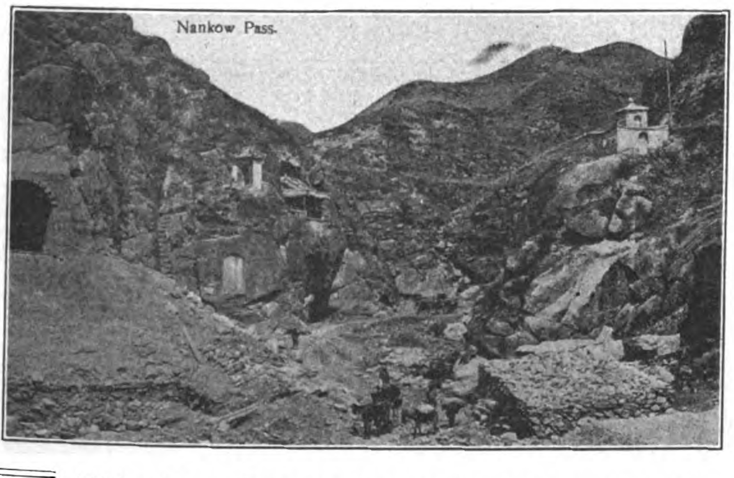
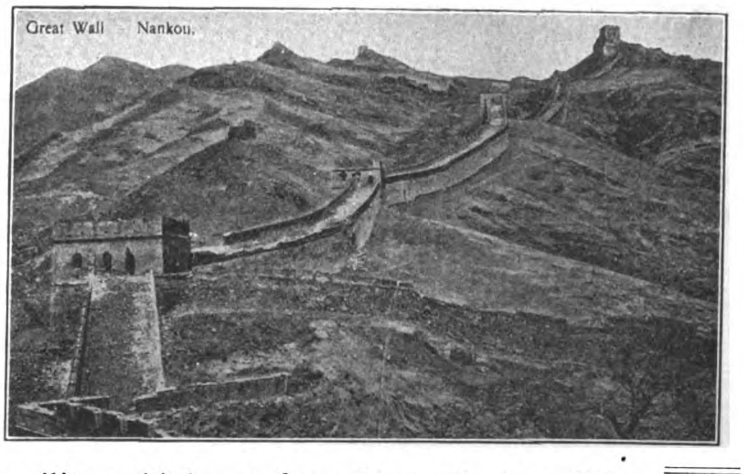
"THE ROAD TO THE GREAT WALL"





This line follows the ancient caravan route and military highway from Mongolia into China by the way of the historic Nankow Pass. This pass is the Key to Peking, and Kalgan is the gate of the Empire. From here the great camel caravans set out on their long journeys across Mongolia to Siberia and Central Asia. This old frontier mart, retaining its time-honored characteristics, one of the most interesting sights of the Old World, is made accessible by the new railway. The line also carries the passenger in two hours from Peking to Nankow, when the Great Wall of China and the Ming Tombs may be seen. A foreign hotel is operated by the railway authorities at Nankow, where chairs and guides may be secured for the Tombs.

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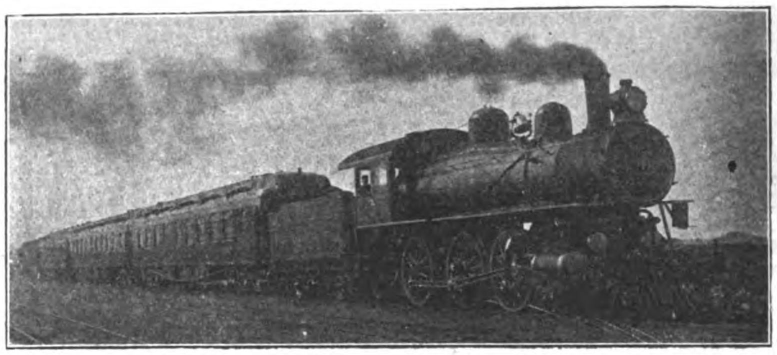

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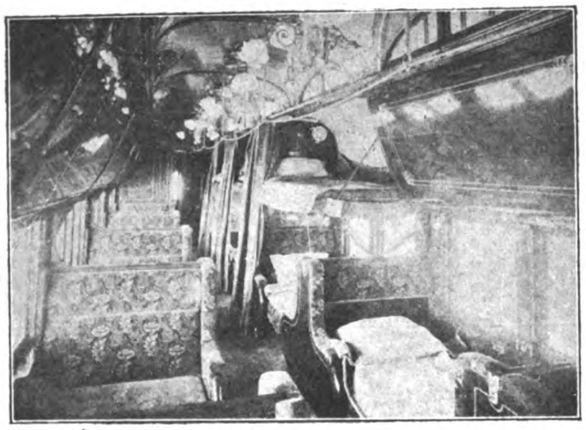
South Manchuria Railway



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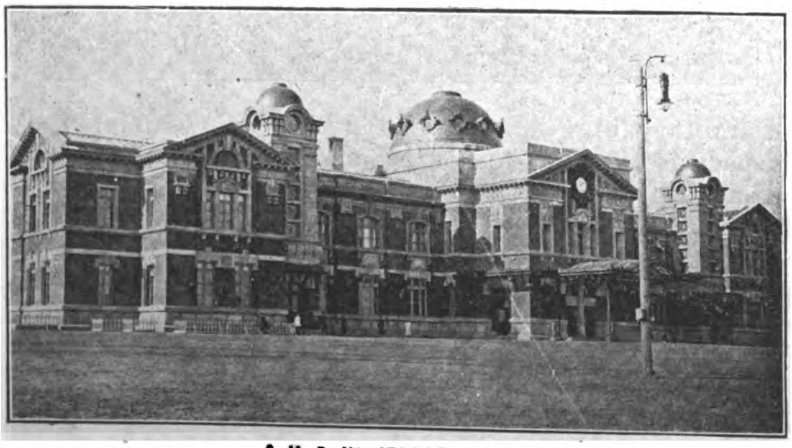

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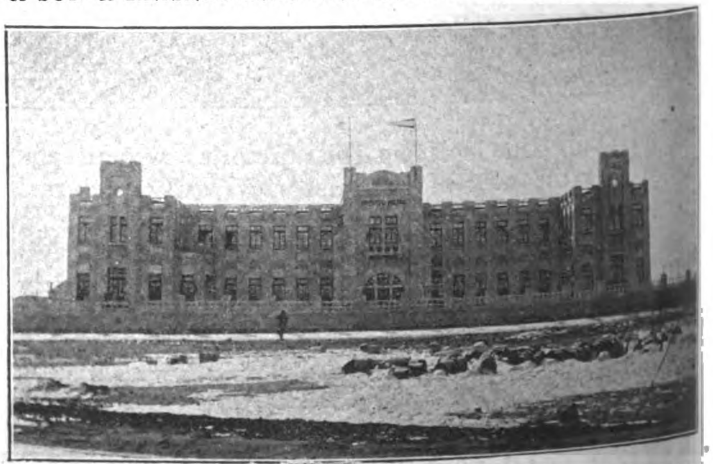

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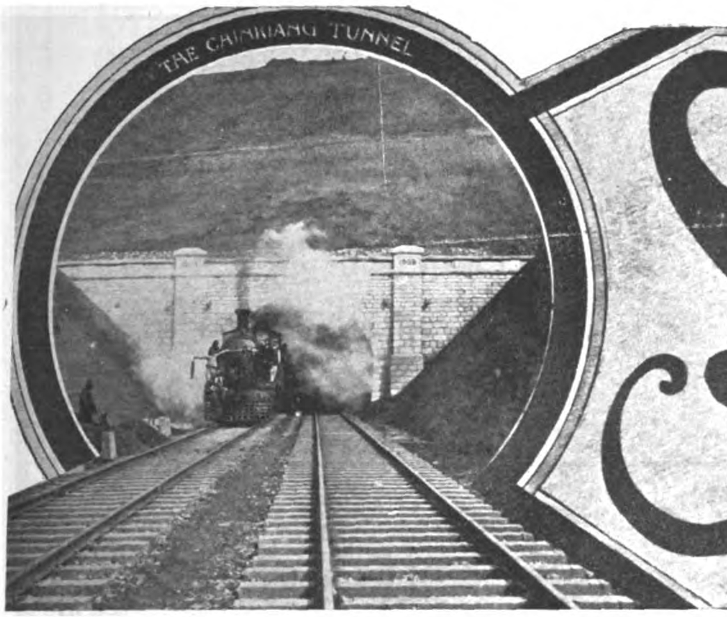

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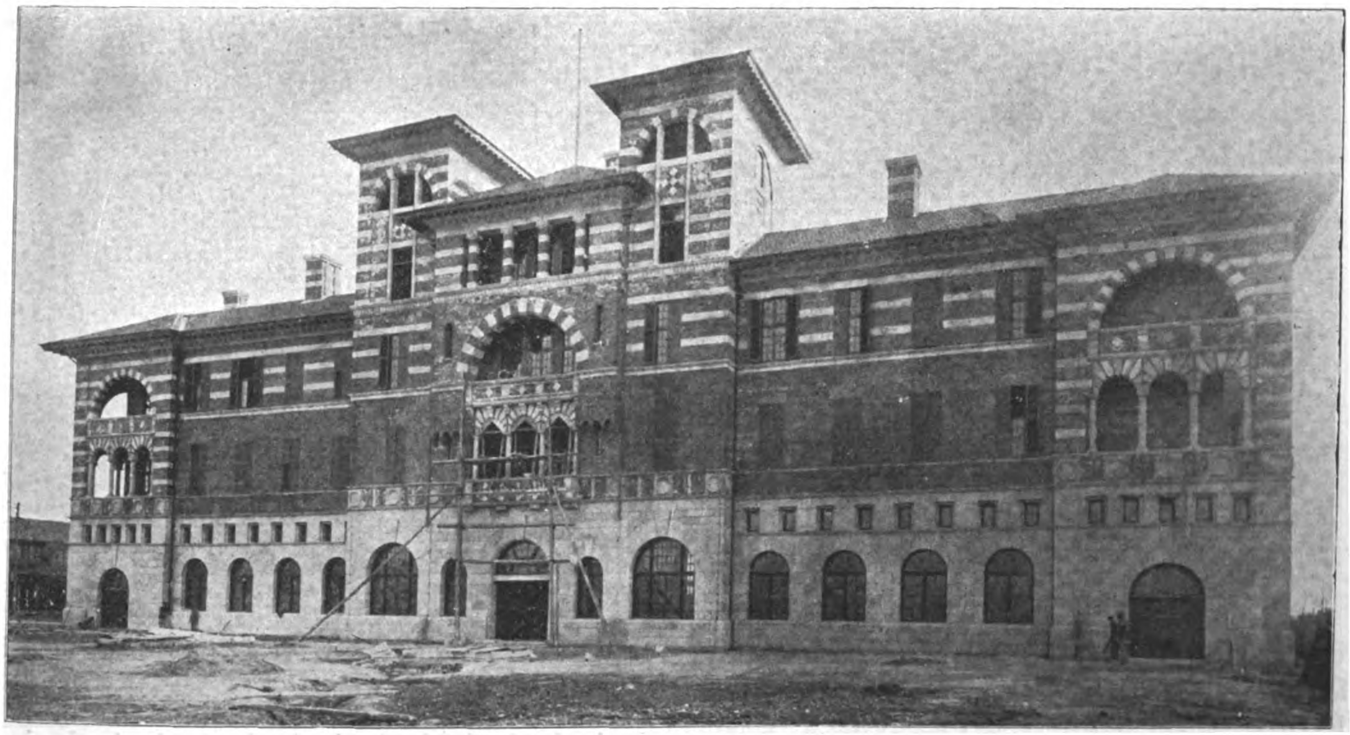

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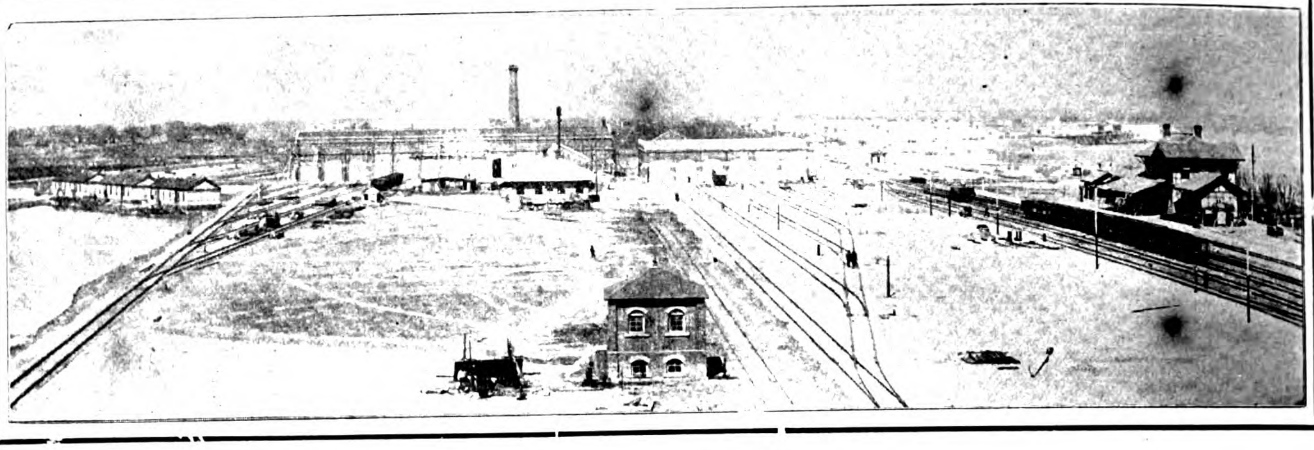

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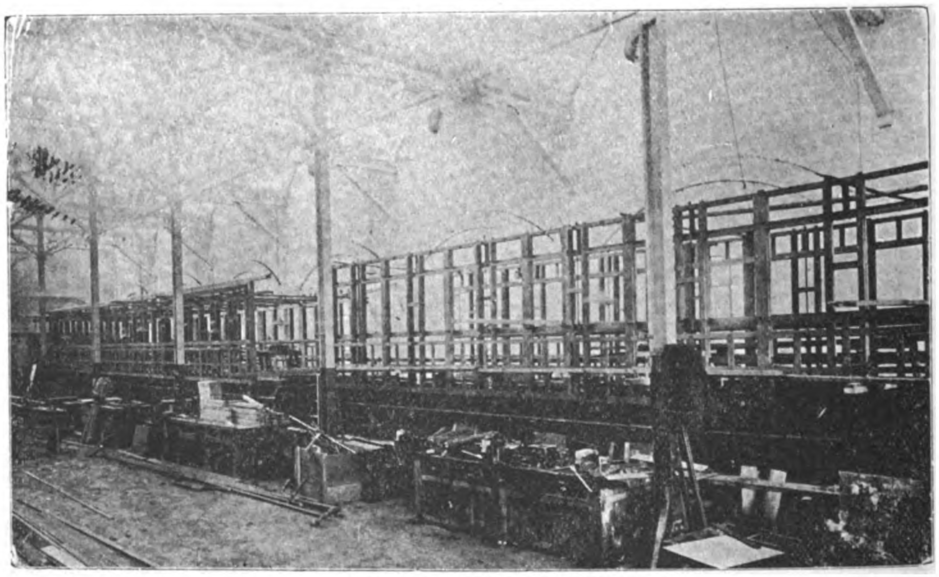

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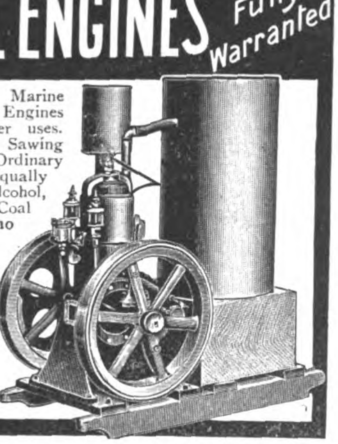

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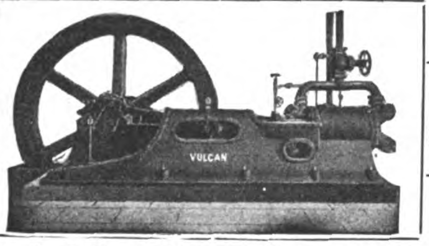

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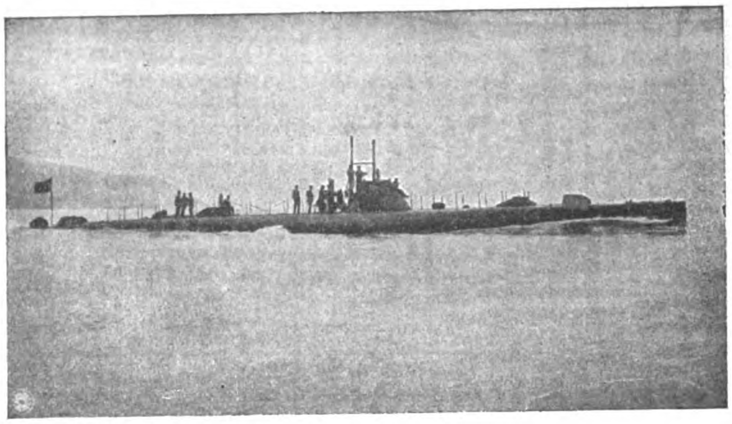

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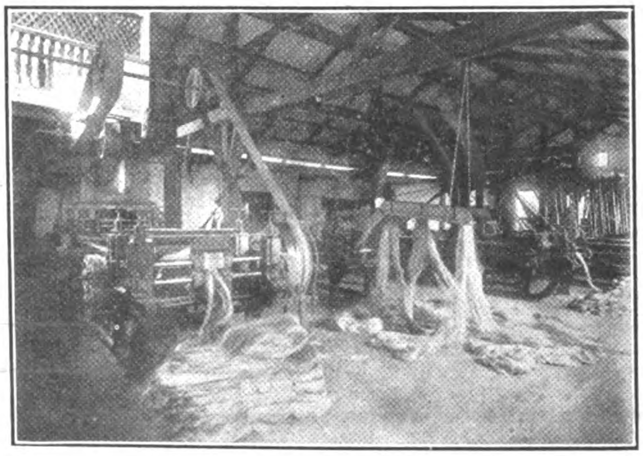

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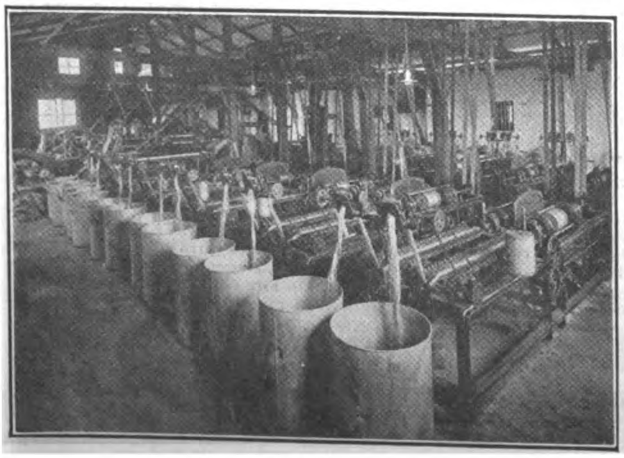

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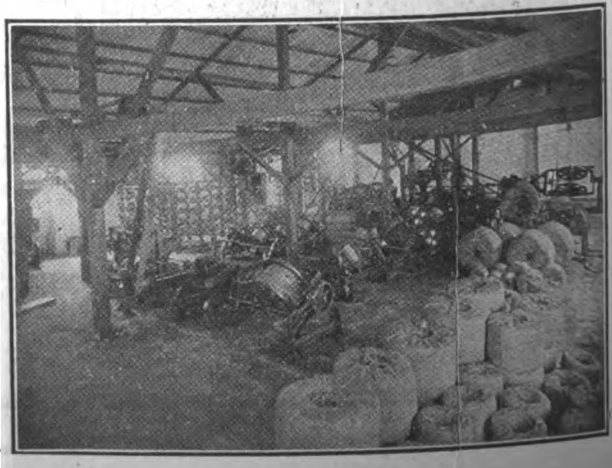

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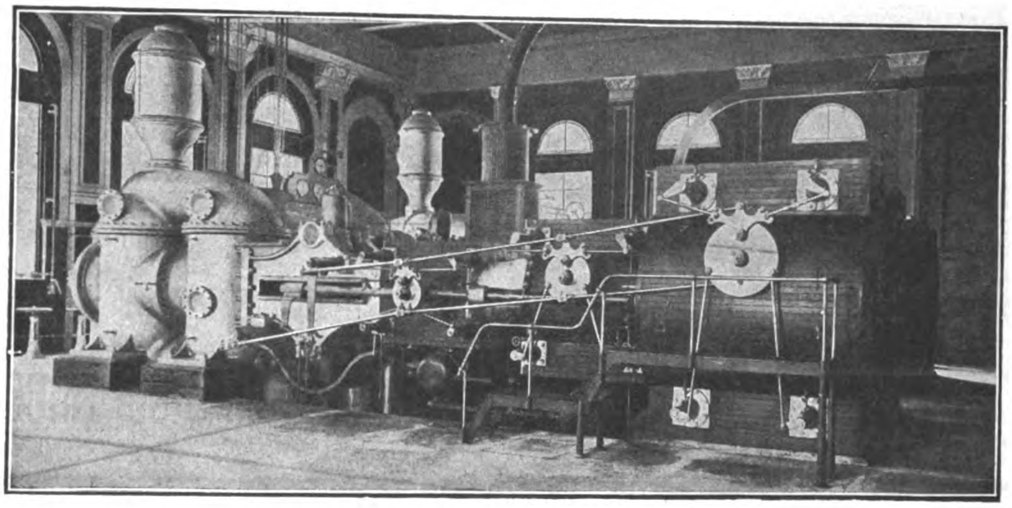

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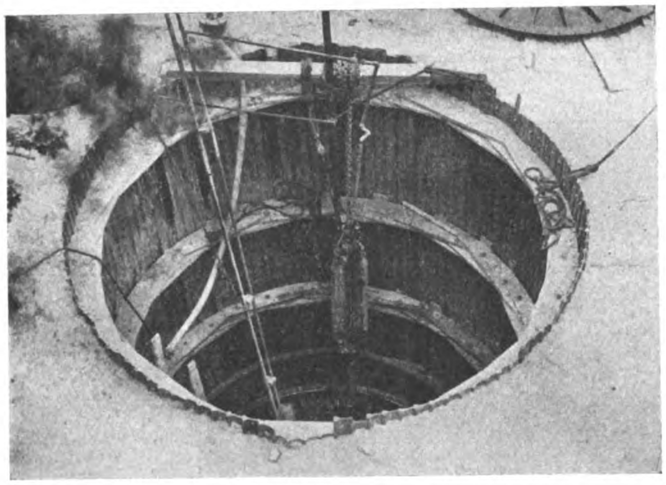

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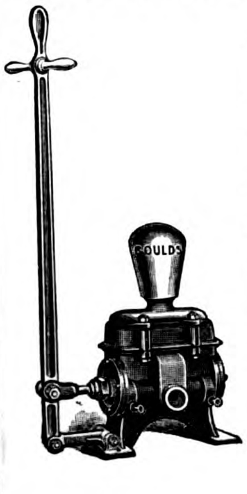

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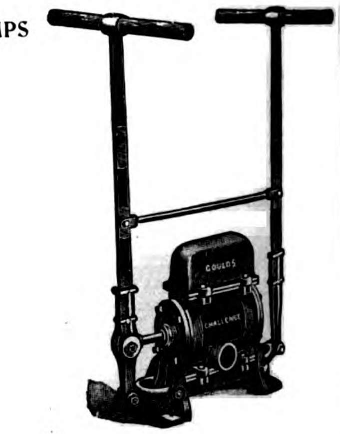

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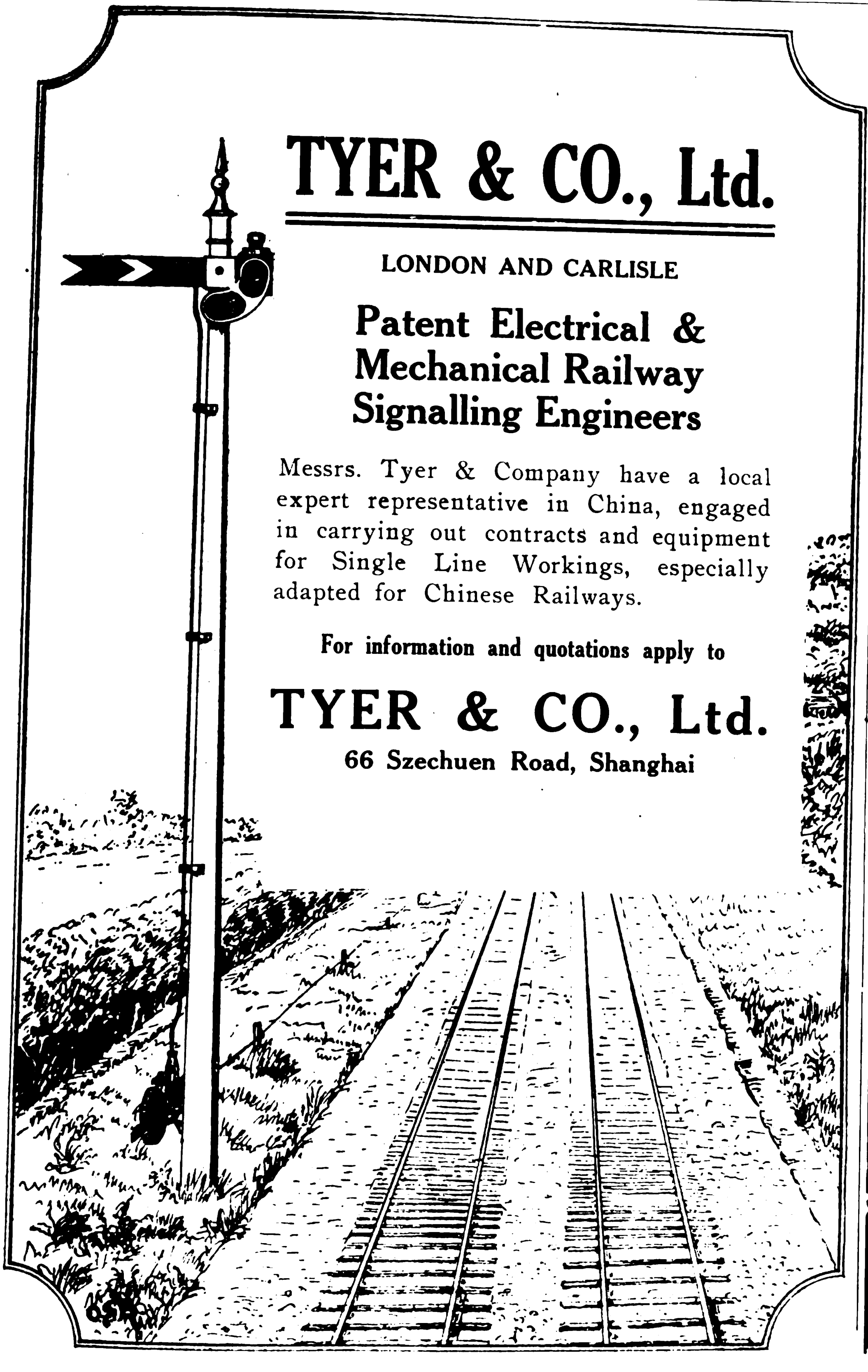

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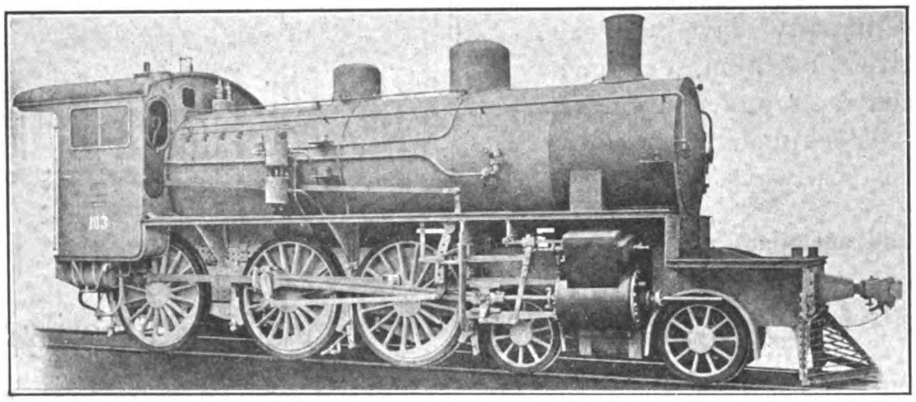

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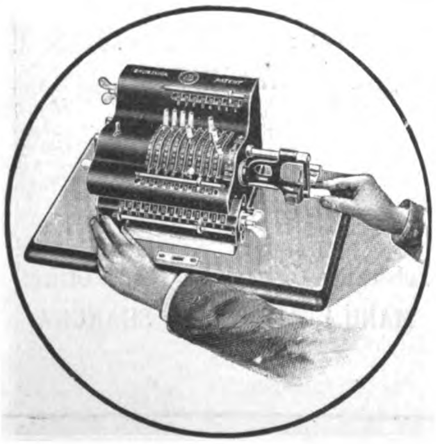

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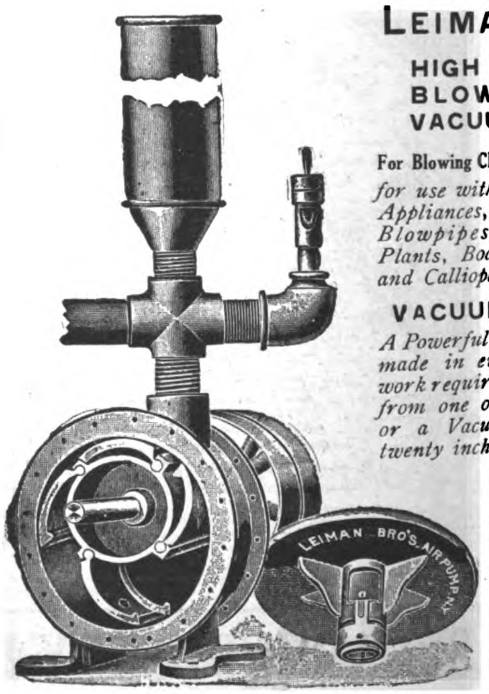

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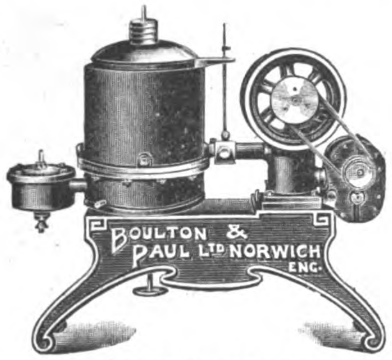

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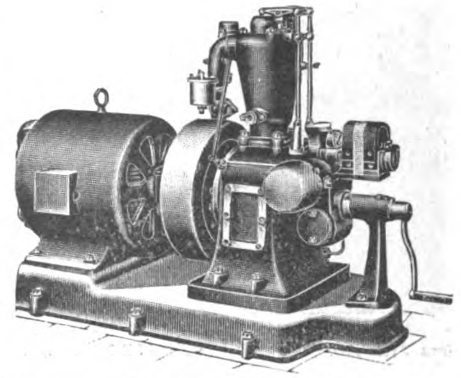

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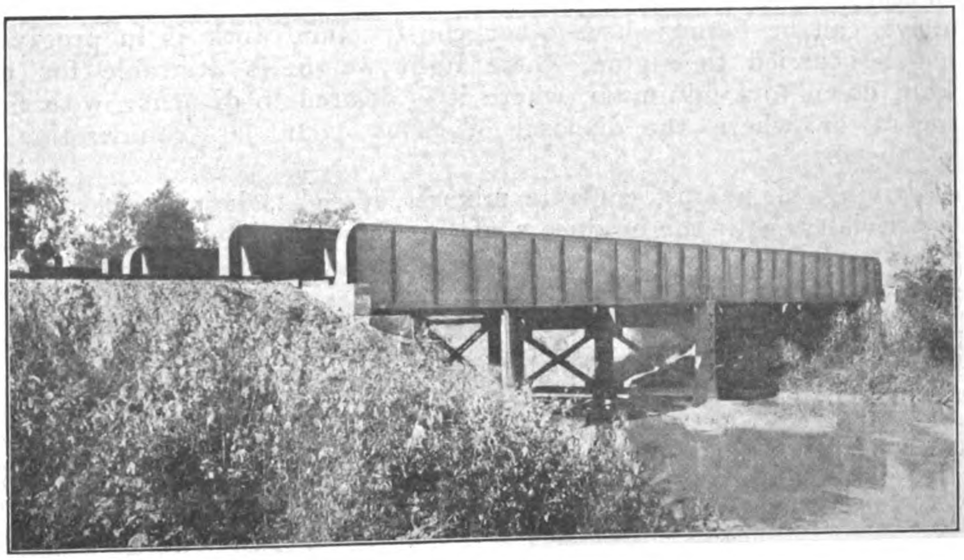

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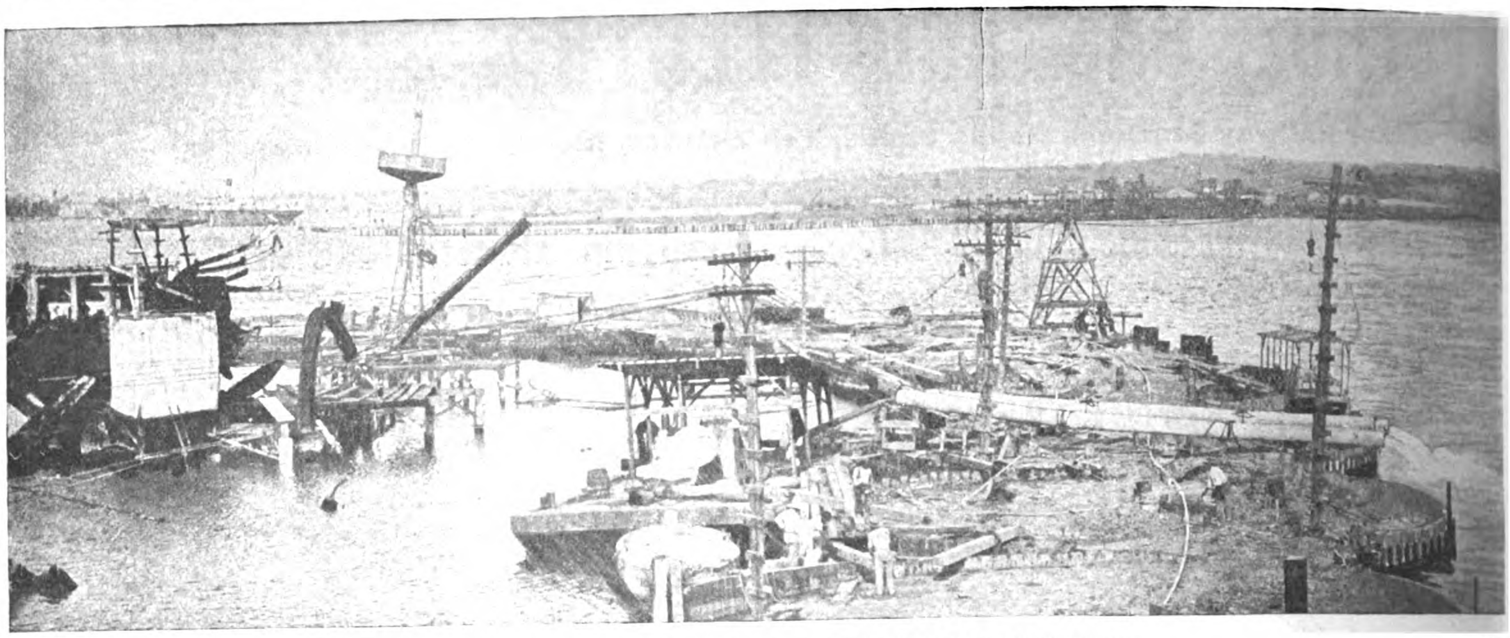

Courtesy of American Press Ass. PUMPS ON SCOW AT RIGHT CENTER OF PICTURE WERE USED TO EMPTY COFFERDAM

Battleship Maine Pumped Dry by Electric Power

The two pumps that emptied the cofferdam around the Maine wreck were driven by General Electric Company induction motors which received current by cable from the land.

A number of the conditions existing at the cofferdam which led to the adoption of electric motor pump drive can be found where other construction work is in progress. Where fresh water and coal must be carried to engine, where light weight is desirable for portability, where fire risk must be kept down to a minimum, where it is desired to dispense with firemen, watchmen and licensed engineers or where the disposal of ashes count as coniderations, electric motor drive is being widely used.

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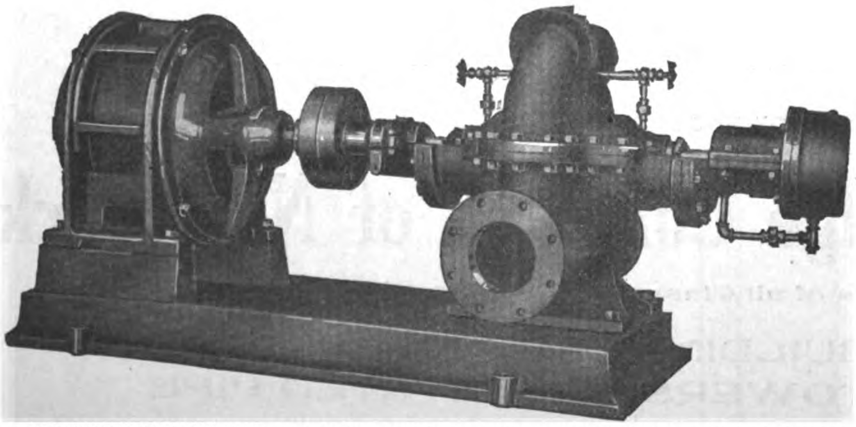

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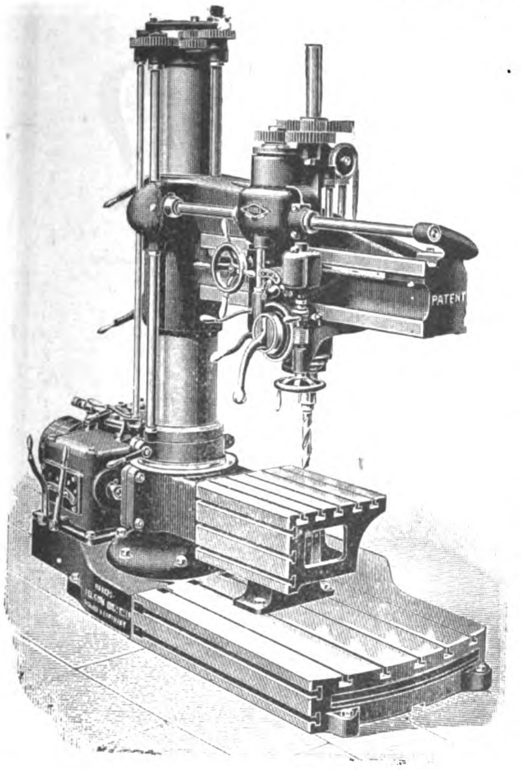

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Will drill to centre of circle — ,, table	8′ 0″	10′ 9″
Column, diameter	12″	15″
Price with Cone Pulley	*Horenblad.*	*Horenblok.*
Price with Gear Box — Belt drive	*Horengeld.*	*Horengoud.*
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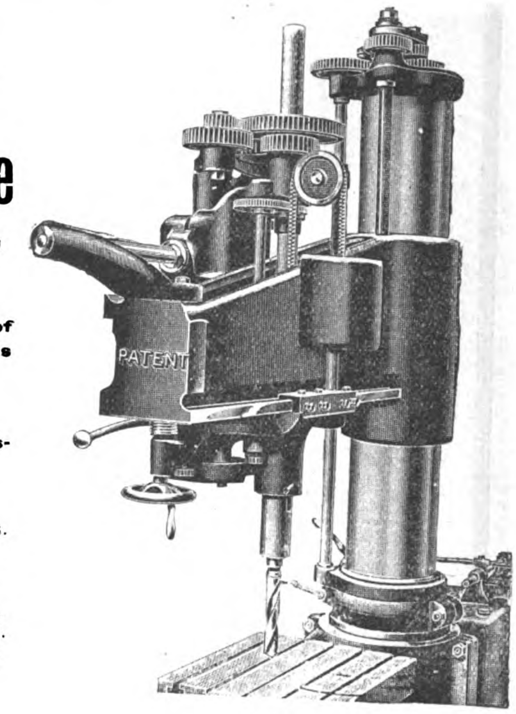

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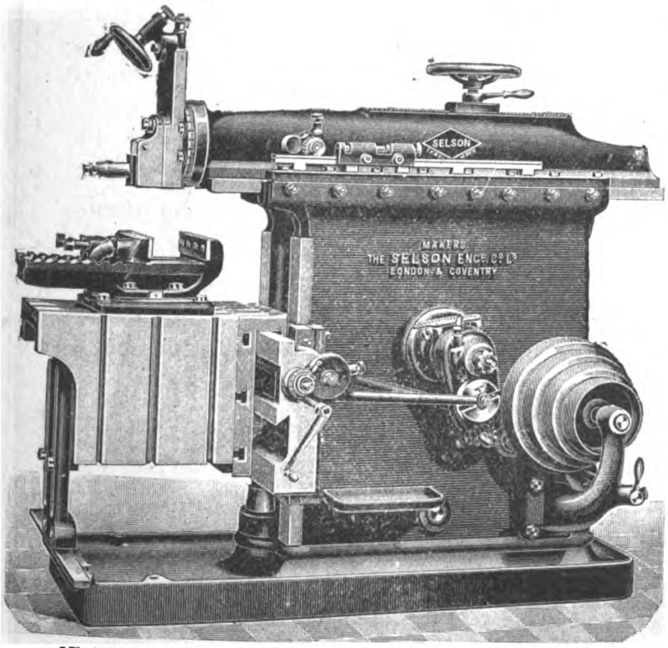

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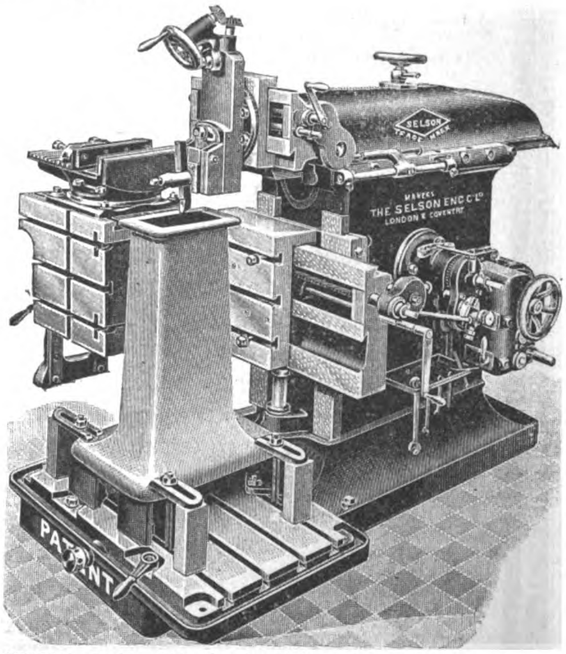

SPECIAL TYPE. 24in. Stroke with Gear Box and Motor Drive.

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Stroke	8½	12½	16½	20	24	28 in.	20	28 in.
Approx. weight, cwts.	13	17	25	30	42	45	36	46
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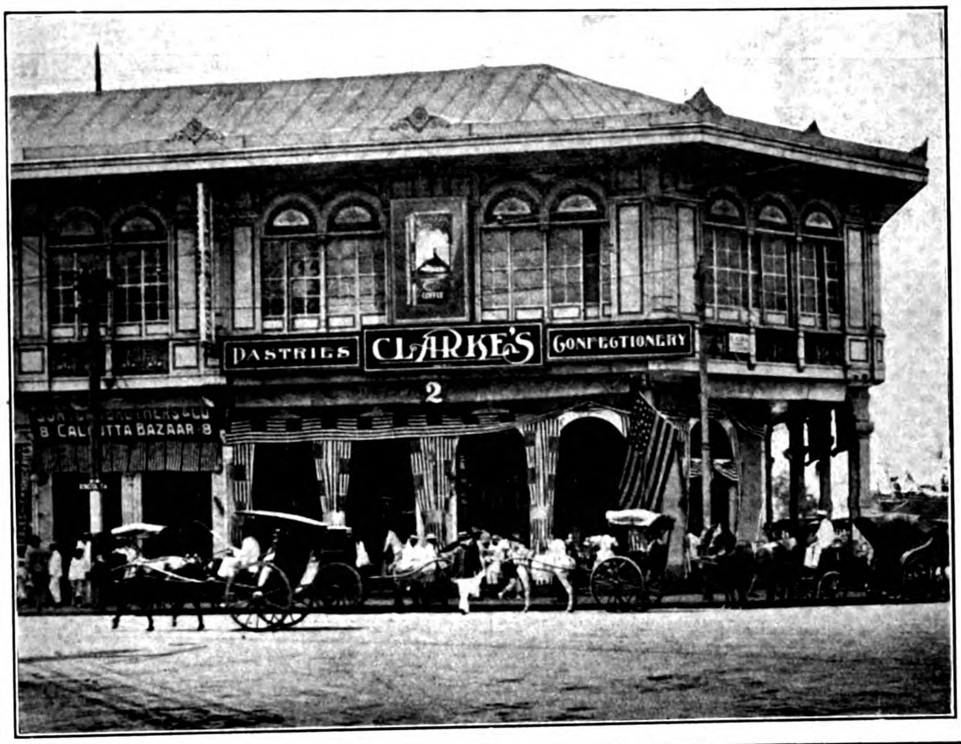

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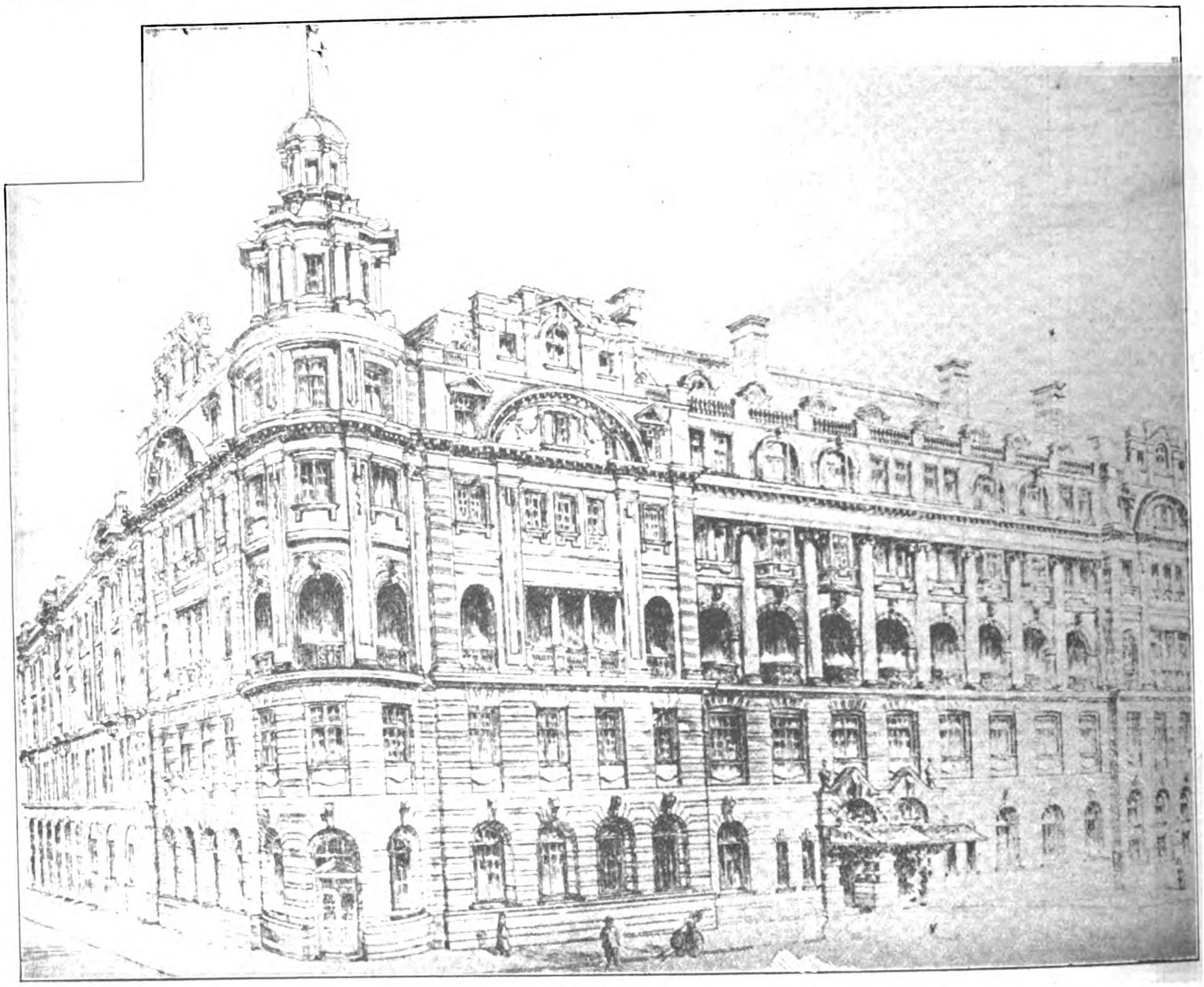

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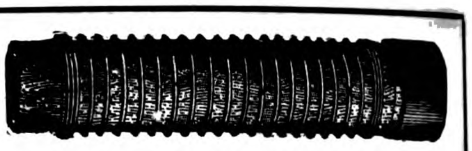

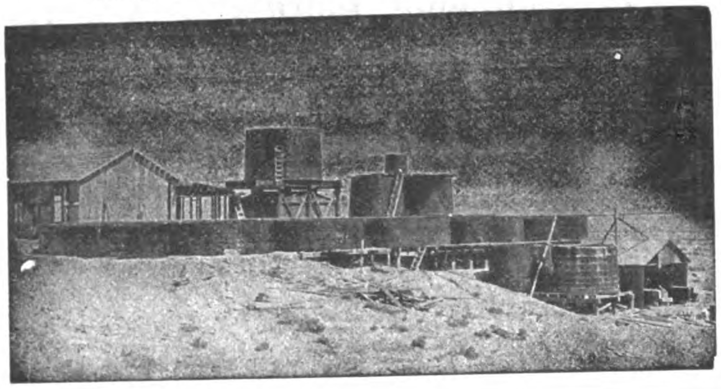

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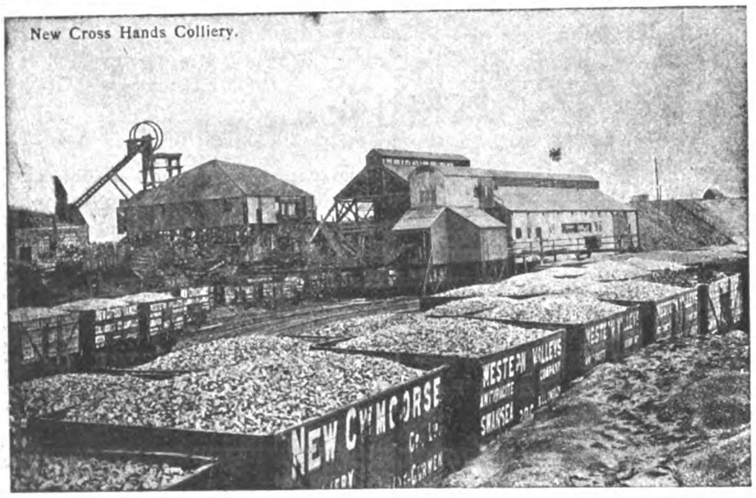
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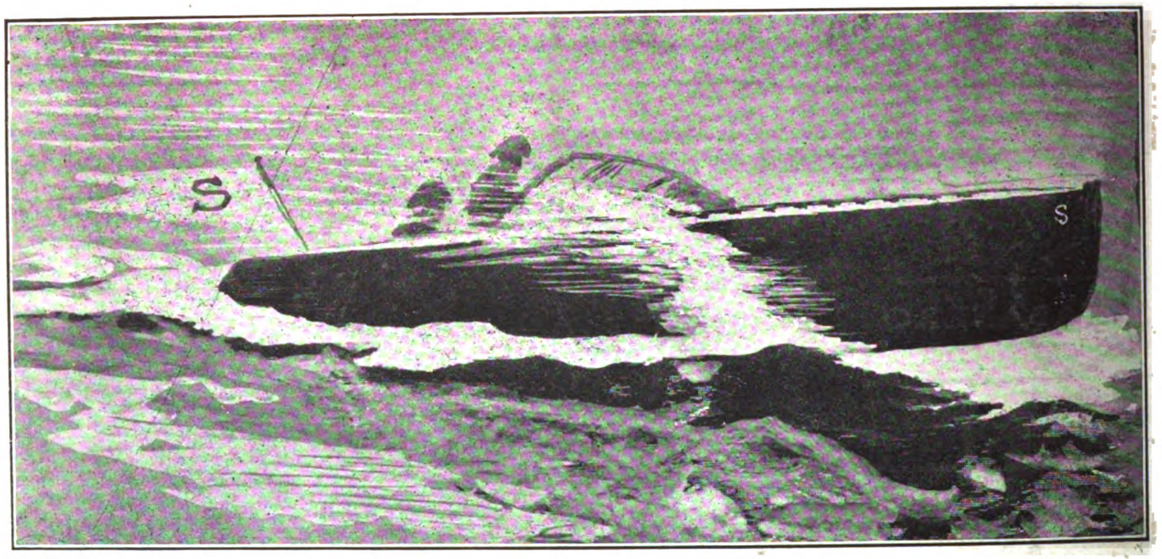

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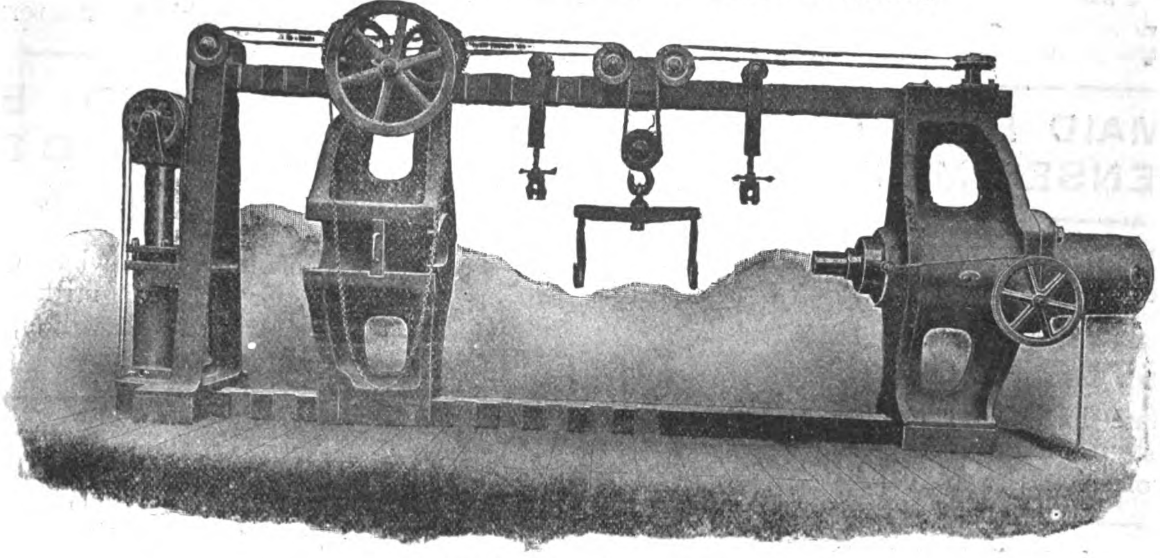

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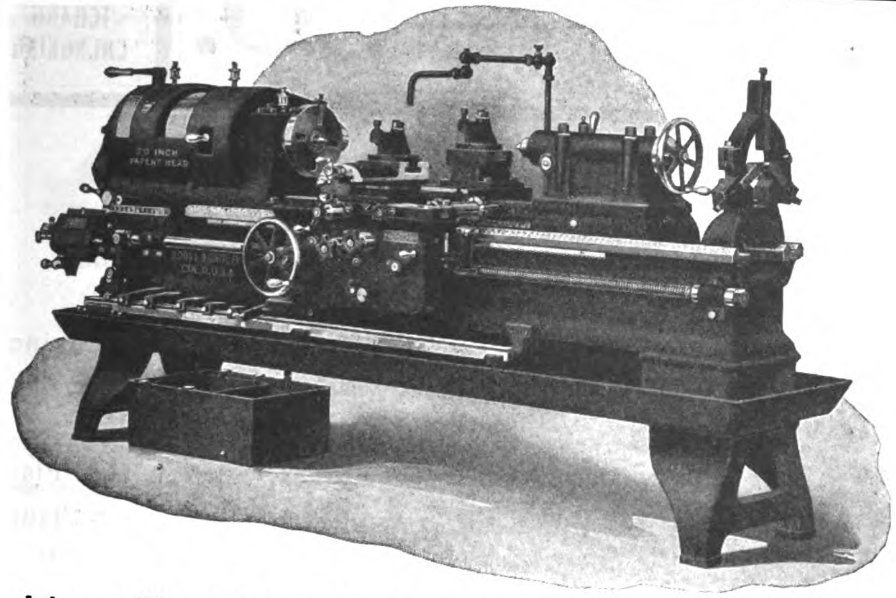

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Illustration shows 20″ swing (10″ centers) lathe. We manufacture sizes from 7 to 24 inch centers. Ask for our 112 page free catalog giving complete details.

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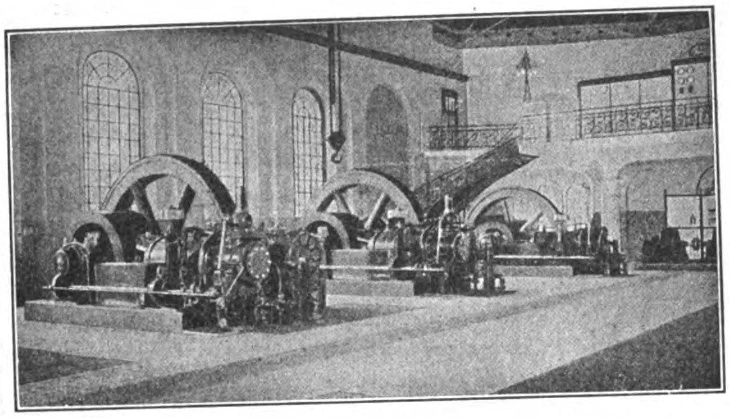

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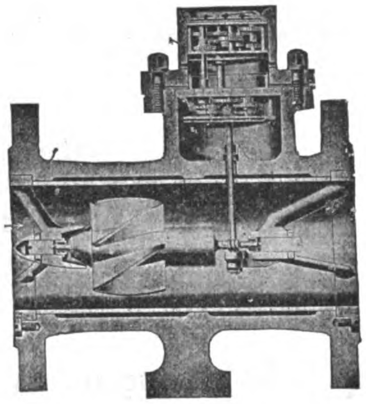

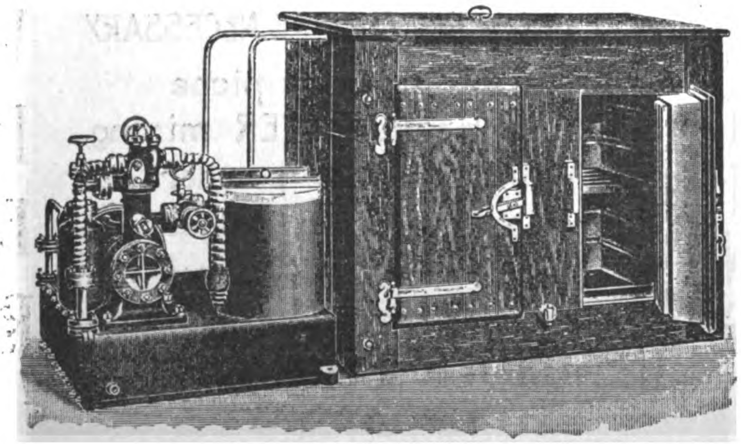

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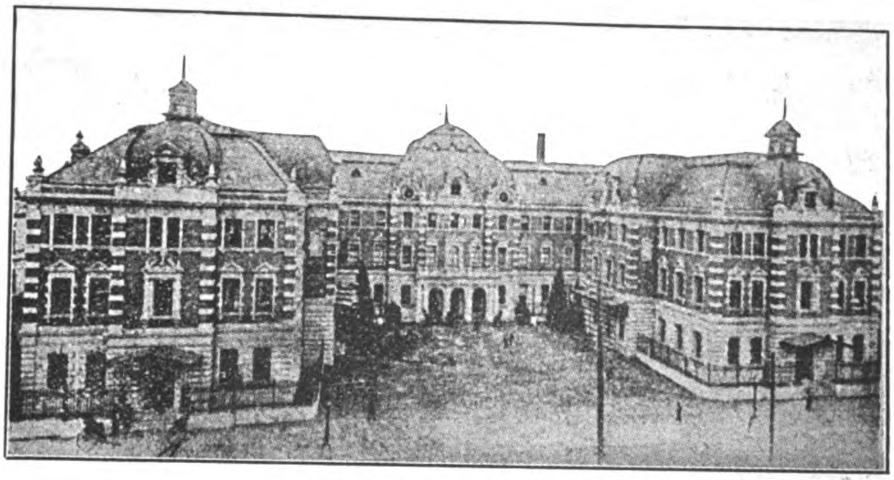

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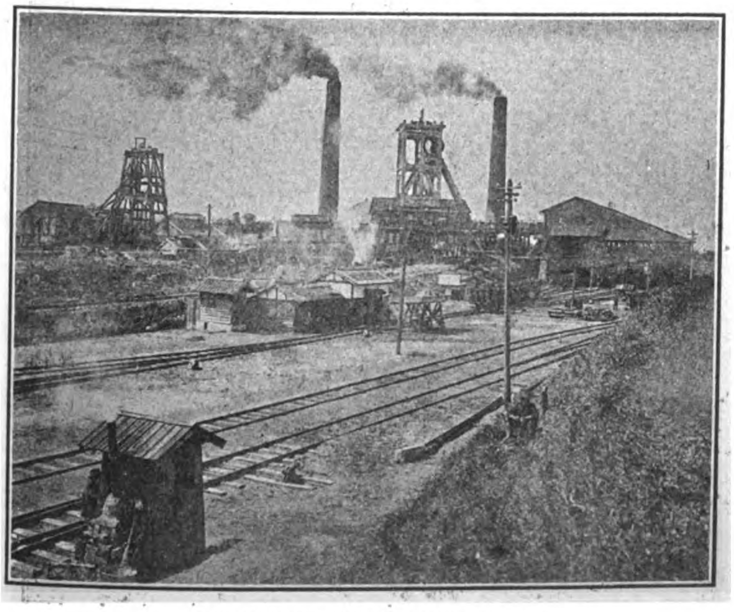

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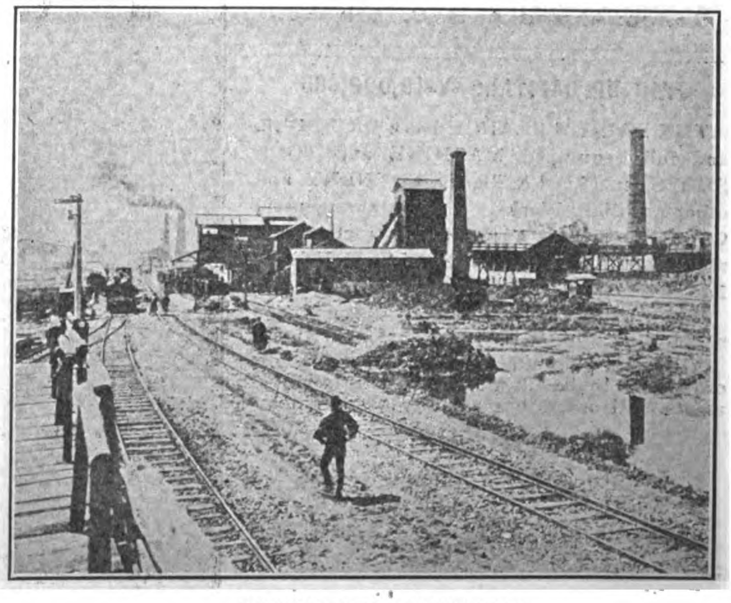

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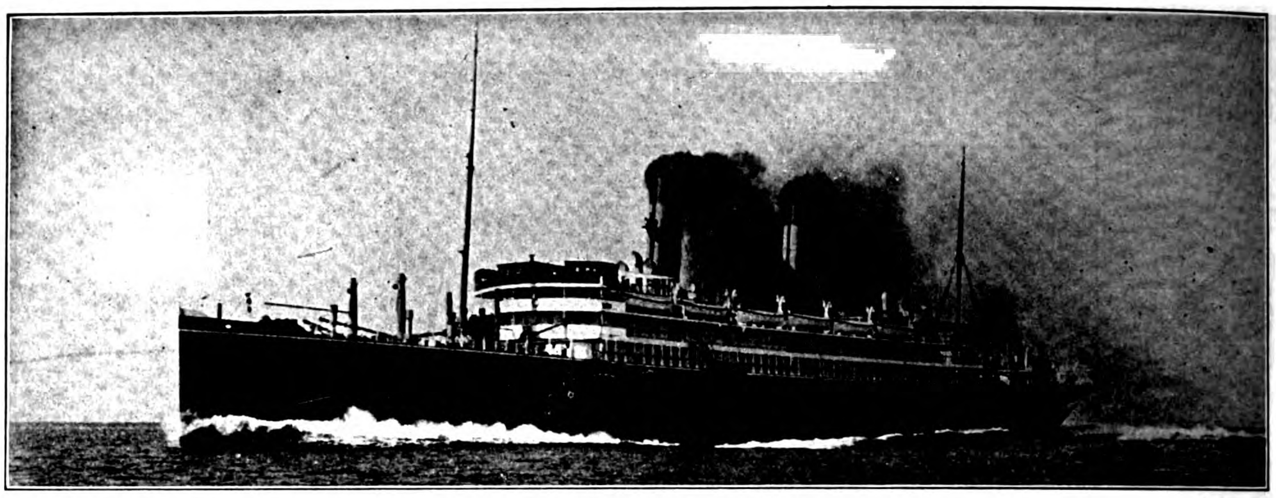

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TRANS-PACIFIC TURBINE DRIVEN PASSENGER STEAMER "CHIYO-MARU" FOR T. K. K.—Built and engined by the Mitsu Bishi Dockyard and Engine Works, Nagasaki, November 1908.—Length (overall), 570 feet 0"; Breadth, moulded, 63 feet 0"; Depth (shelter deck), 46 feet 6"; Gross tonnage, 13,426 tons; Displacement, 18,725 tons; Engines, Parsons' Three Shaft Arrangement; Boilers, Single Ended Scotch Boilers (13); I. H. P., 19.591; Speed, 21 knots. (This photo was taken on her full speed trials the 13th October, 1908.)

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EXTREME LENGTH	523	FT.	EXTREME LENGTH	371	FT.	EXTREME LENGTH	722	FT.
LENGTH ON BLOCKS	513	„	LENGTH ON BLOCKS	360	„	LENGTH ON BLOCKS	714	„
WIDTH OF ENTRANCE ON TOP	88	„	WIDTH OF ENTRANCE ON TOP	66	„	WIDTH OF ENTRANCE, TOP	99½	„
„ „ „ „ BOTTOM	77	„	„ „ „ „ BOTTOM	53	„	„ „ „ BOTTOM	88½	„
WATER ON BLOCKS AT SPRING TIDE	26½	„	WATER ON BLOCKS AT SPRING TIDE	22	„	WATER ON BLOCKS AT SPRING TIDE	34½	„

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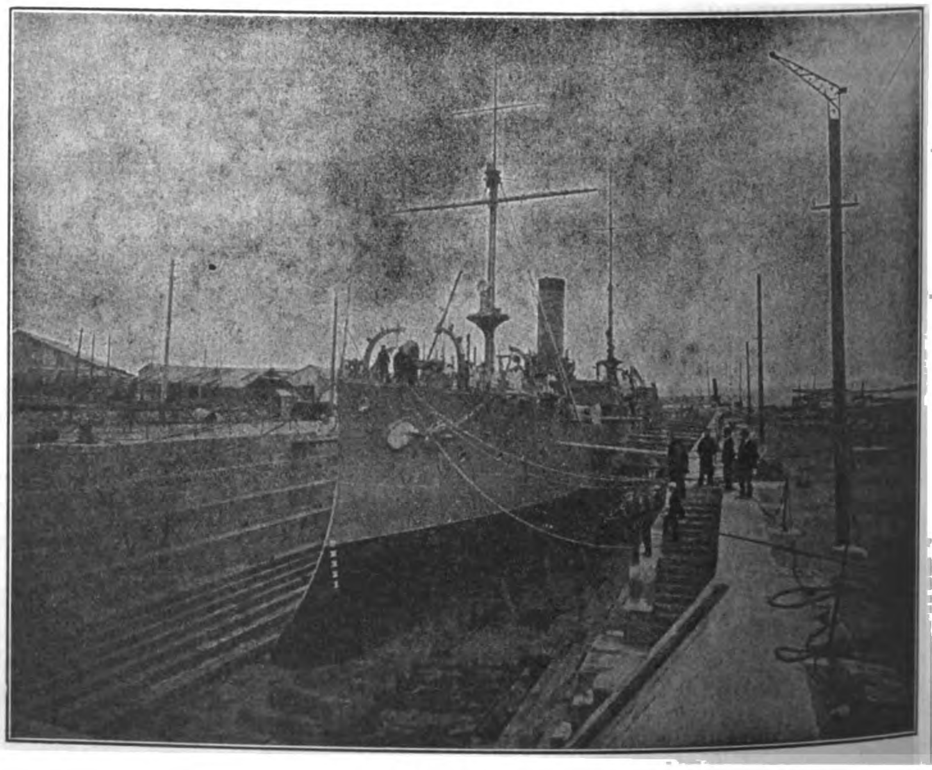

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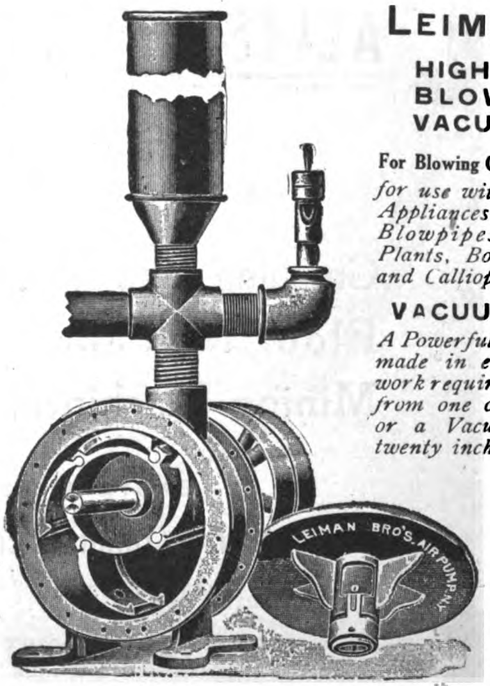

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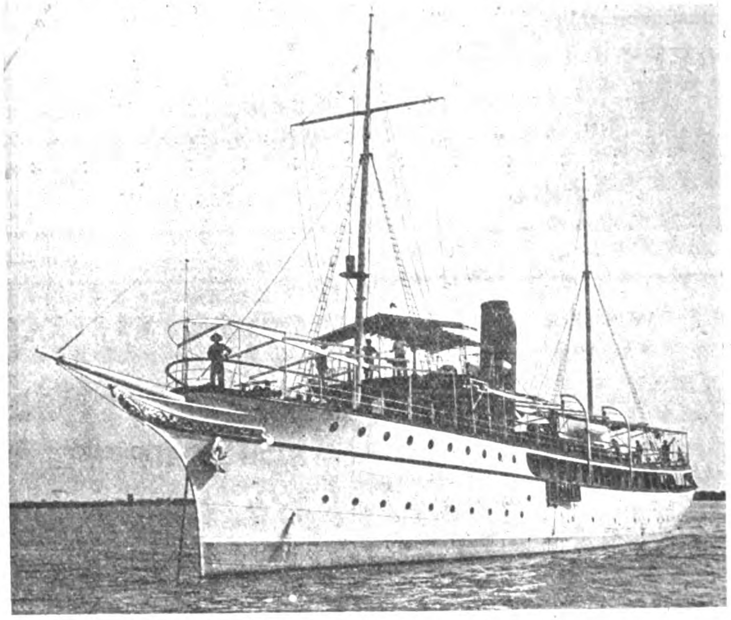

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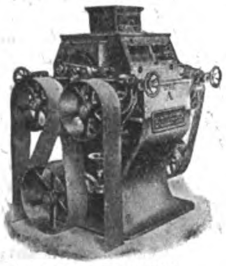

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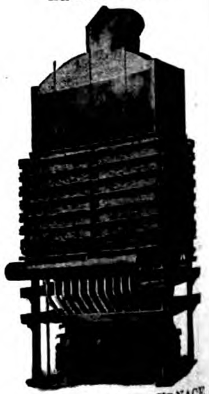

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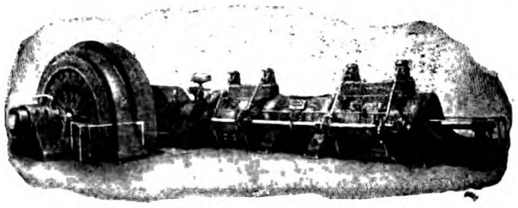

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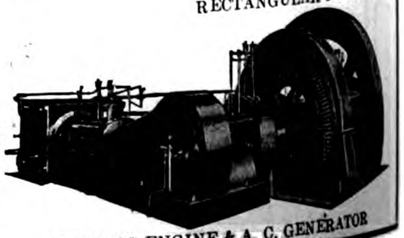

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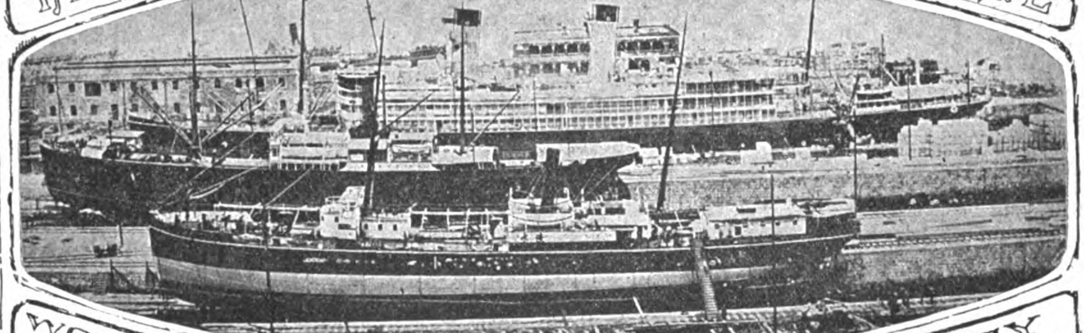

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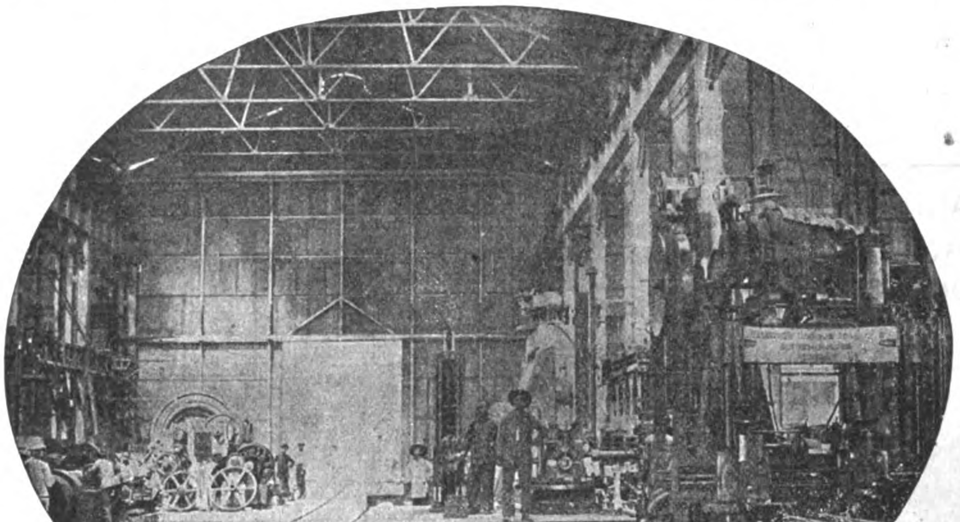

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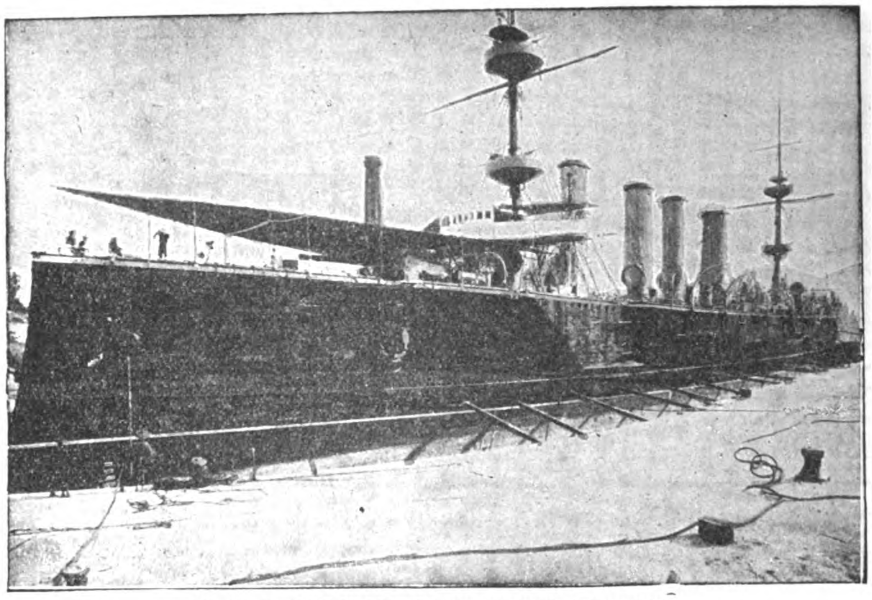

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The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	*Length on Keel Blocks*	*Entrance Breadth*	*Depth Over Sill at Ordinary Spring Tides*	*Rise of Tide*	
				Springs	*Neaps*
KOWLOON	*Feet*	*Feet*	*Feet*	*Feet*	*Feet*
No. 1 Dock, Kowloon.........	700	86 ft. top / 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon.........	871	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon.........	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon...	240	60′	14′	7′ 6″	—
Patent Slip, No. 2, Kowloon...	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock...........	466	85′ 6″	20′	7′ 6′	—
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Lamont Dock................	333	64′	16′	7′ 6″	—

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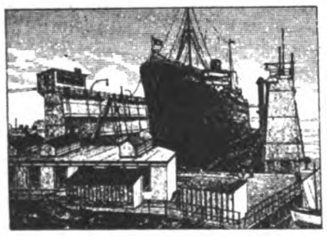

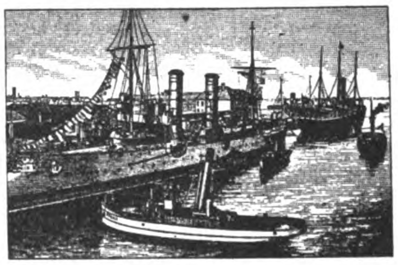

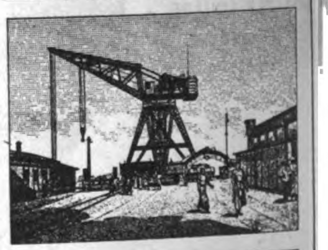

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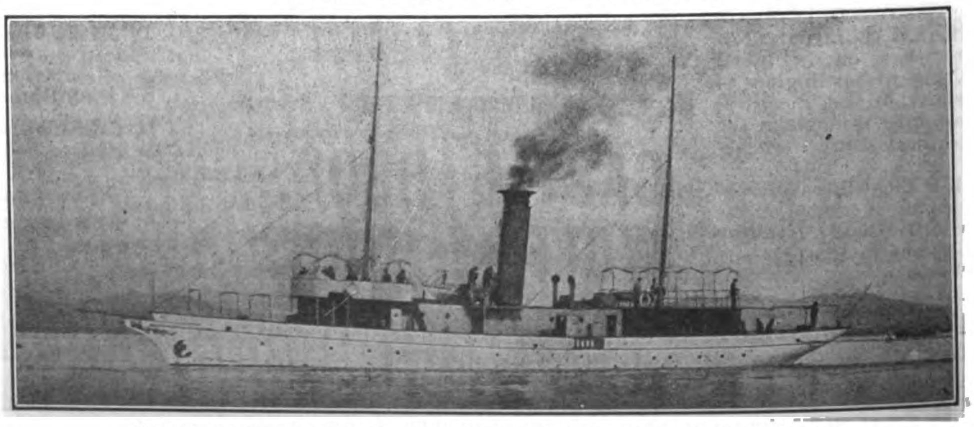

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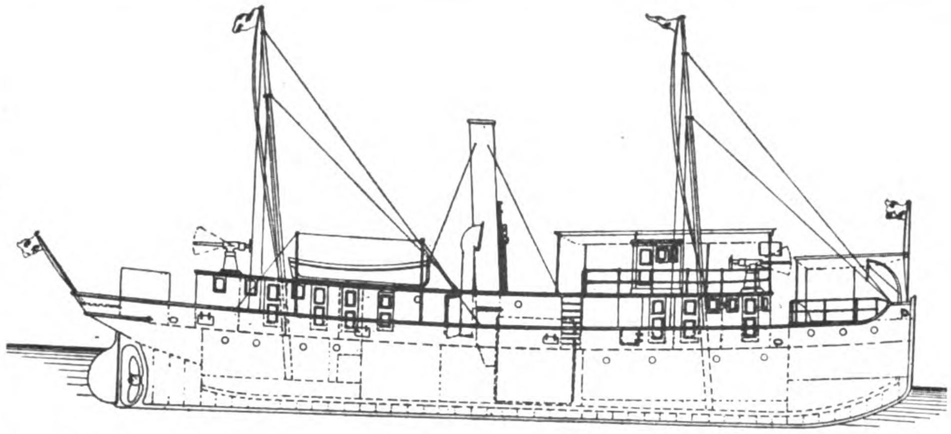

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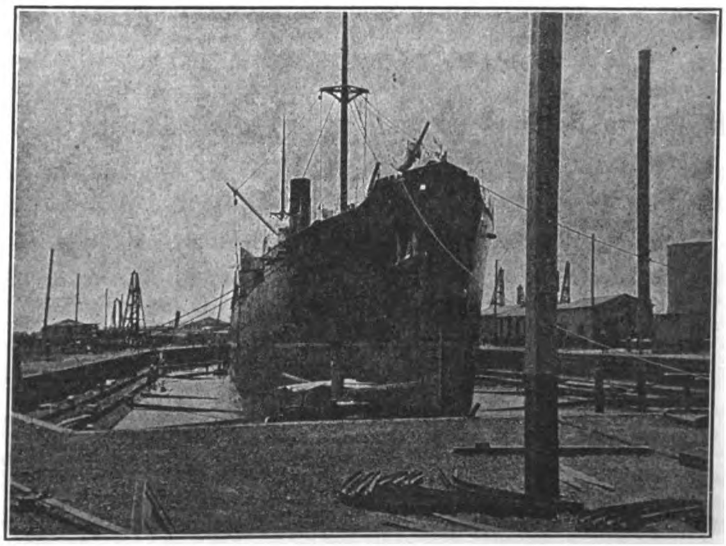

VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK

LENGTH ON BLOCKS 455′0″
" OVERALL - 469′0″
WIDTH, ENTRANCE 74′0″
" SILL - - 64′0″
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21′0″
DEPTH ON 3′0″ BLOCKS (H. W. O. S. TIDES) 19′0″
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
WORKSHOPS LOCATED AT HEAD OF DOCK

OFFICE, DOCK & WORKS, 37 YANGTSZEPOO ROAD, SHANGHAI

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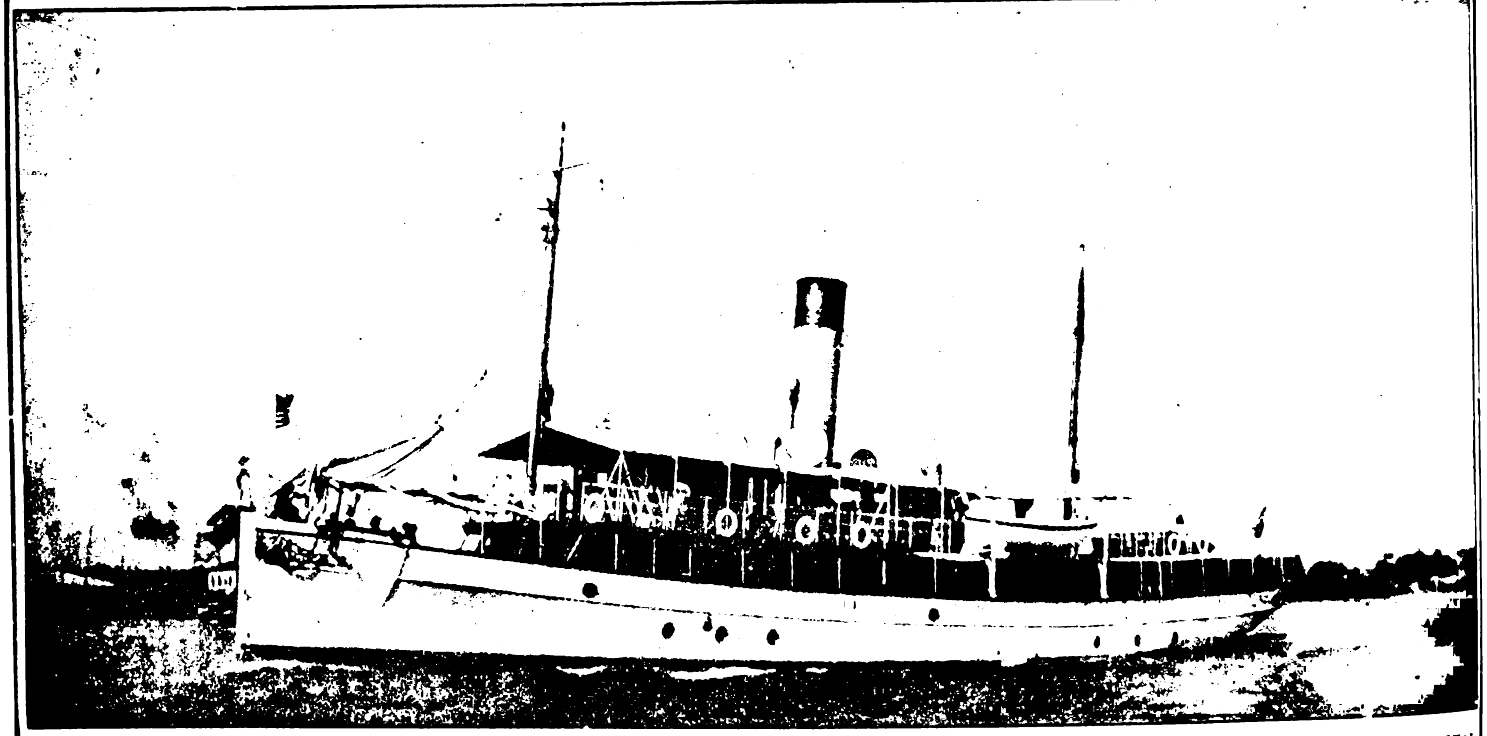

COMPOSITE COAST GUARD AND REVENUE CRUISERS FOR THE GOVERNMENT OF THE PHILIPPINE ISLANDS: BUILT AND ENGINED BY THE SHANGHAI DOCK AND ENGINEERING CO. LTD.; LENGTH OVERALL—148; LENGTH B. P.—140; BREADTH—25; DEPTH—11'9"; SIZE OF ENGINES: H. P. CYLINDER—18"; L. P. CYLINDER—86'; STROKE—24"; I. H. P. 600. S. S. BALALAC, BASILAN, BUSUANGA, CORREGIDOR, LEYTE, LUZON, MASBATE, MINDANAO, MINDORO, NEGROS, PALAWAN, PANAY, POLILLO, SAMAR, TABLAS.

The Model exhibited at St. Louis Exposition and awarded the Gold Medal in 1904

3-90 feet, and 3-60 feet Launches built for the Chief Quartermaster's Dept. Manila in 1910 and The Sea-going Tug "General Weeks" 140 feet long for the same Department

Low Pressure Hot Water and Steam Heating Installations

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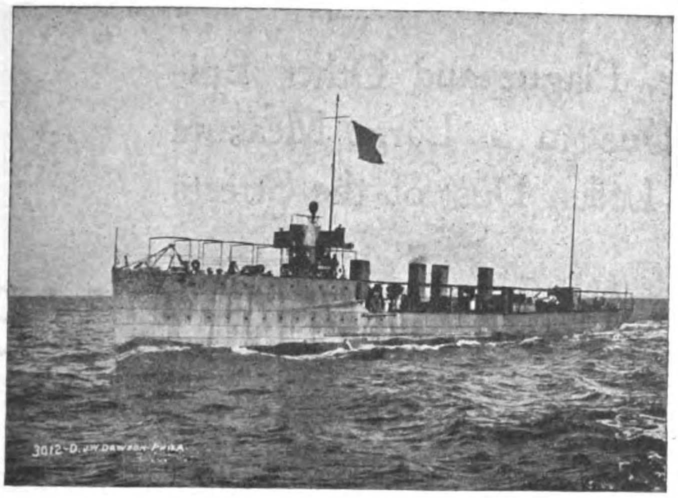

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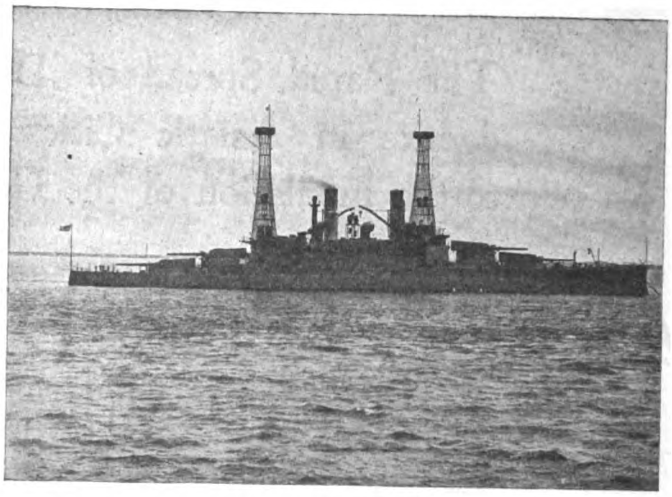

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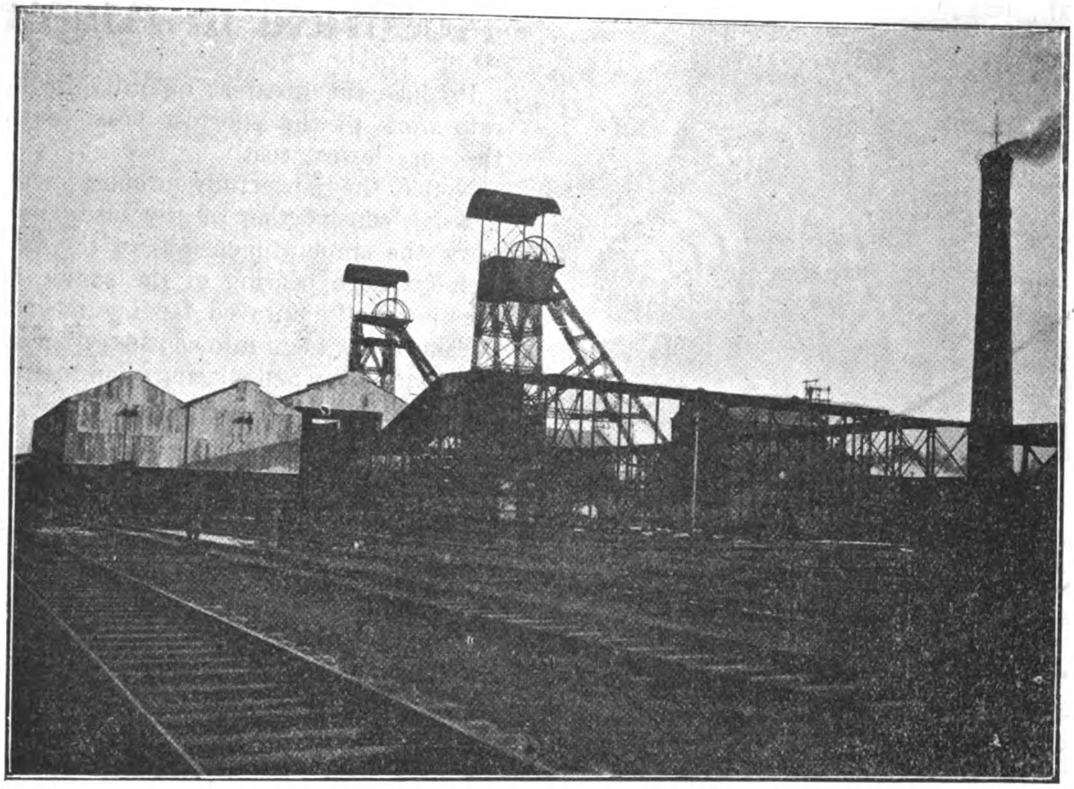

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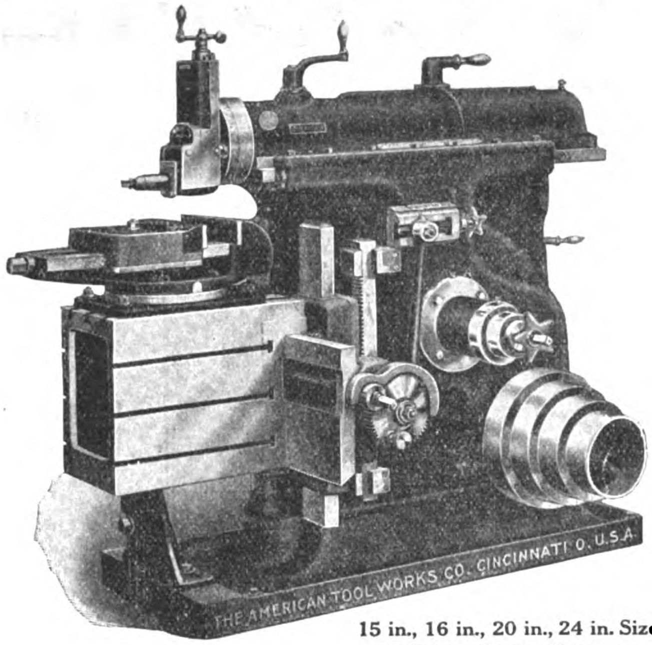

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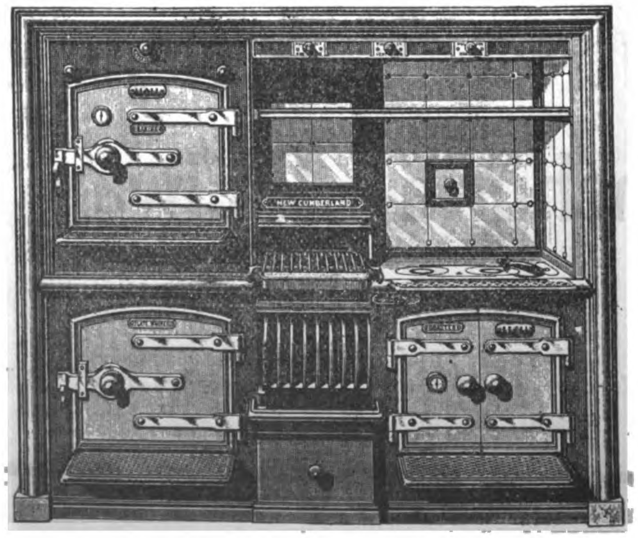

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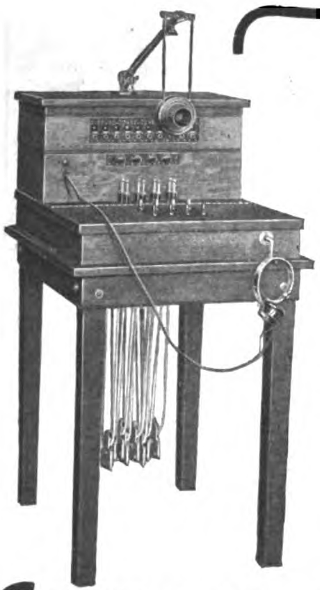

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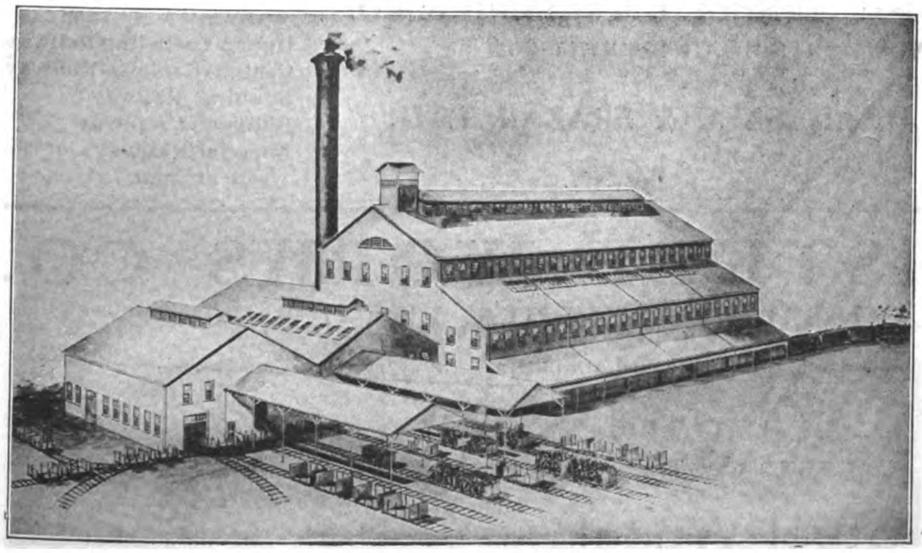

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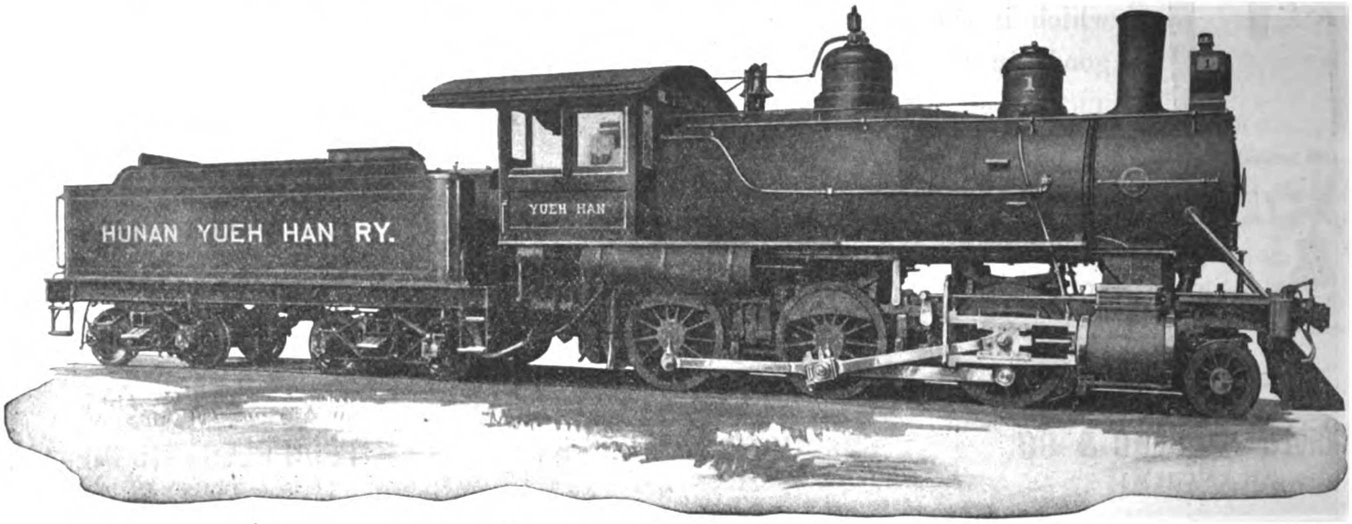

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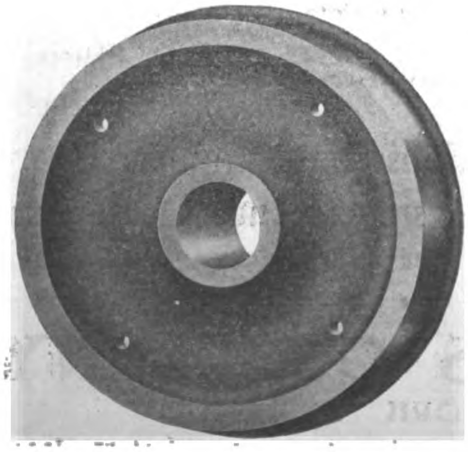

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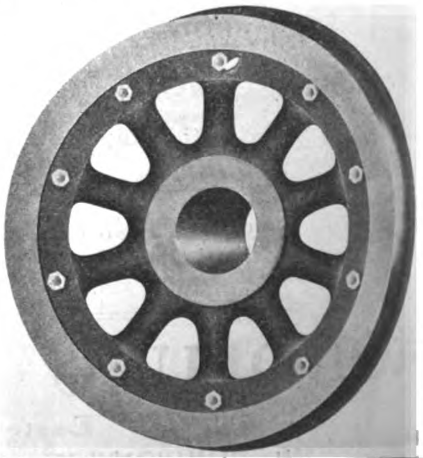

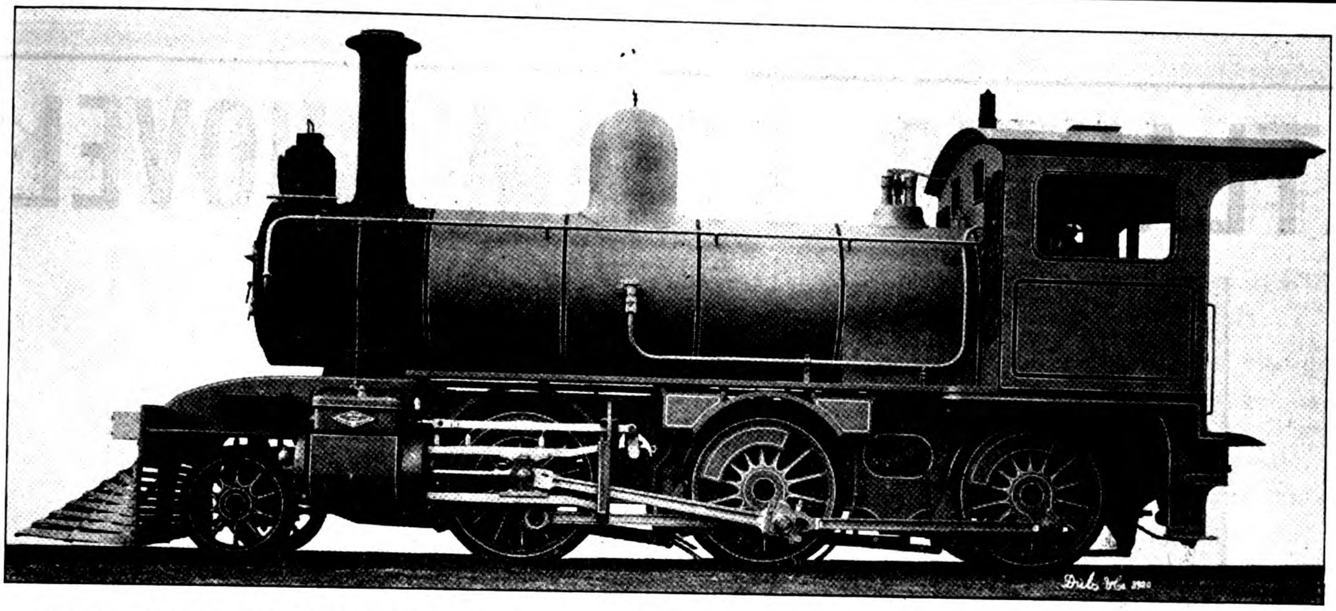

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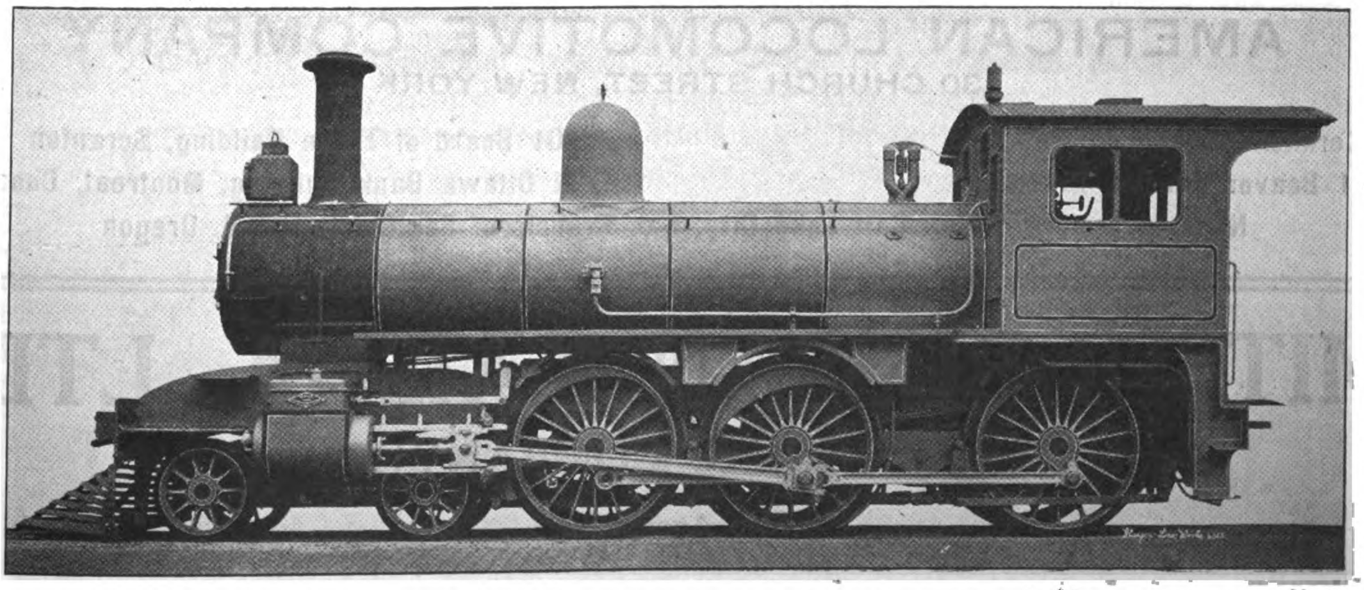

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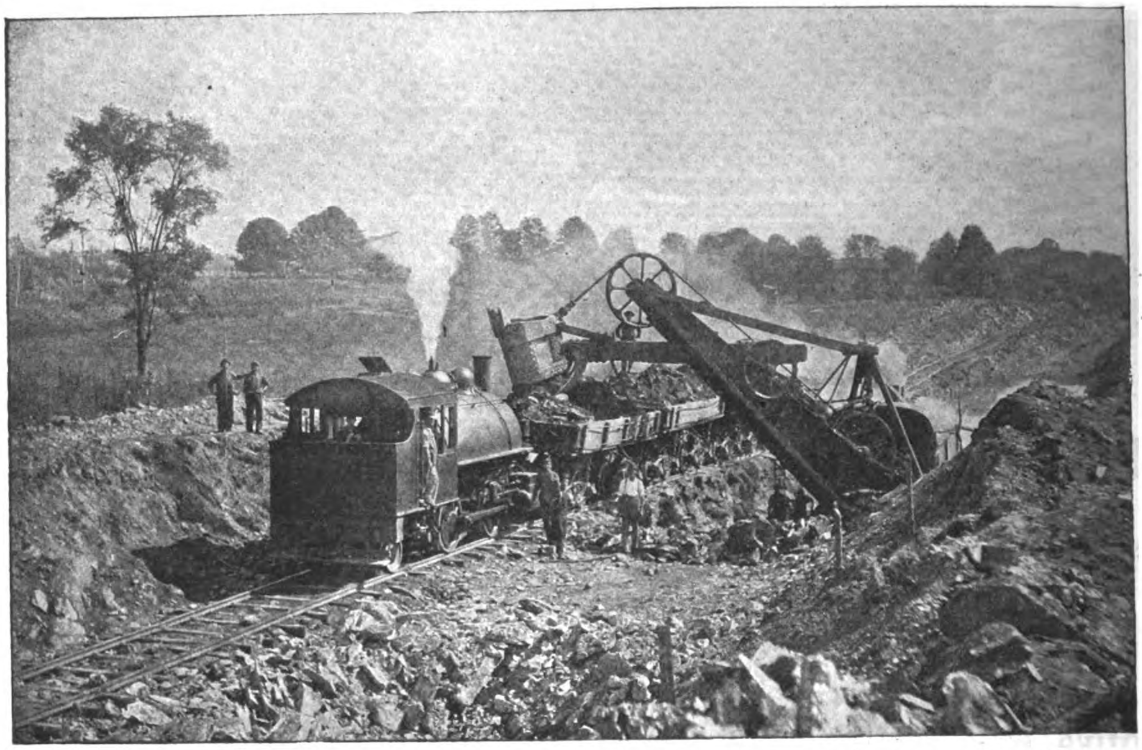

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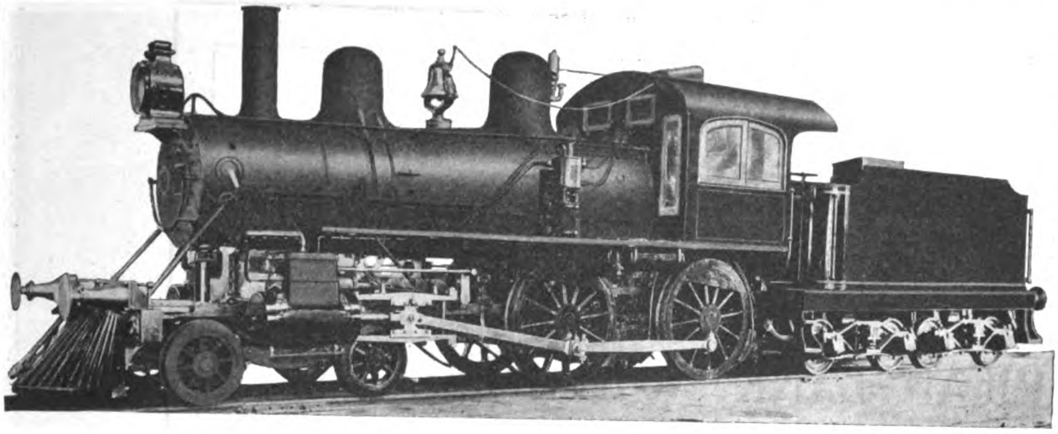

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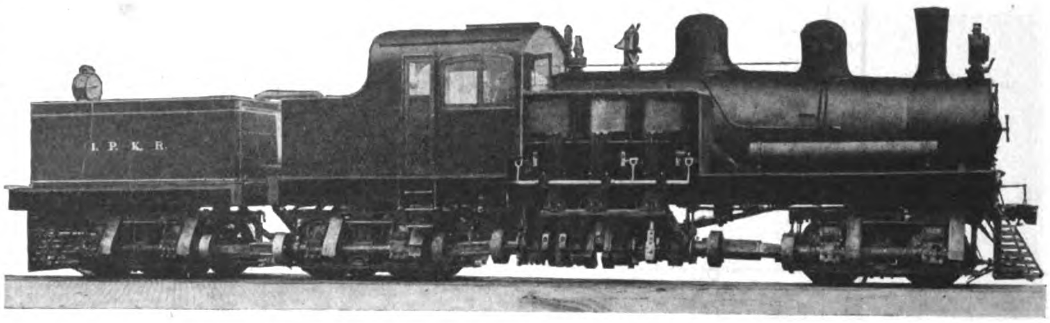

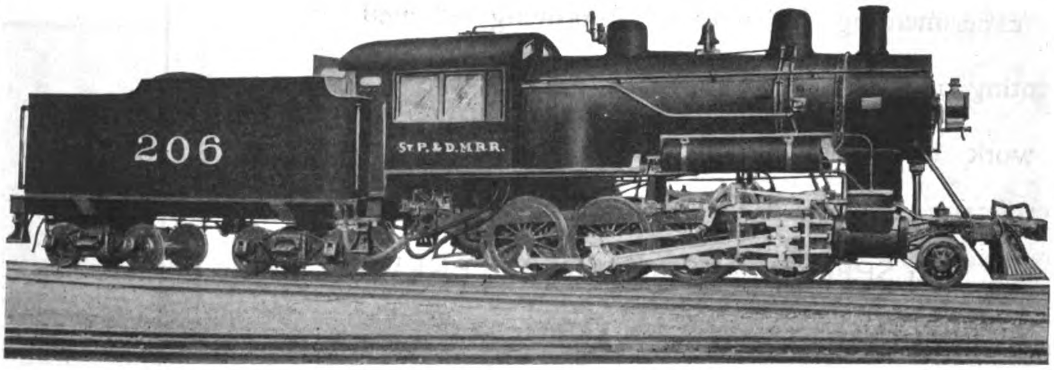

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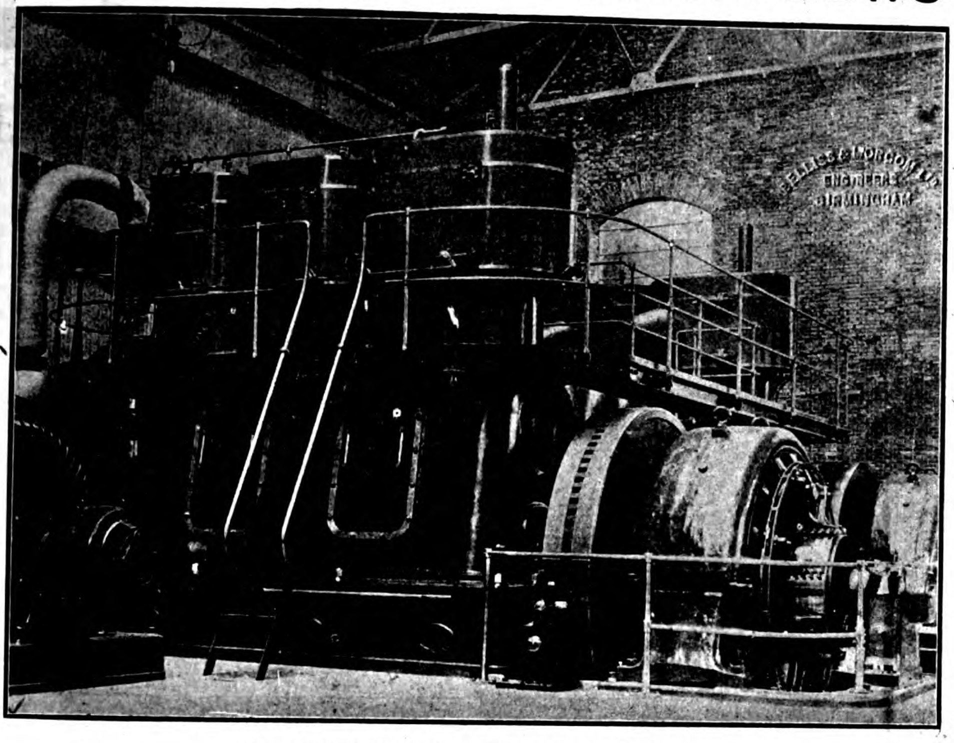

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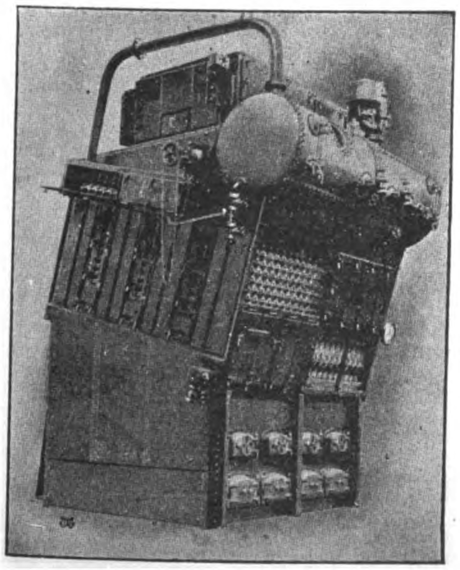

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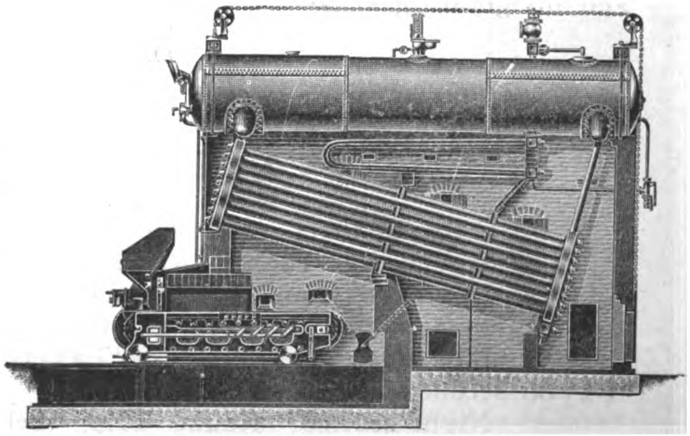

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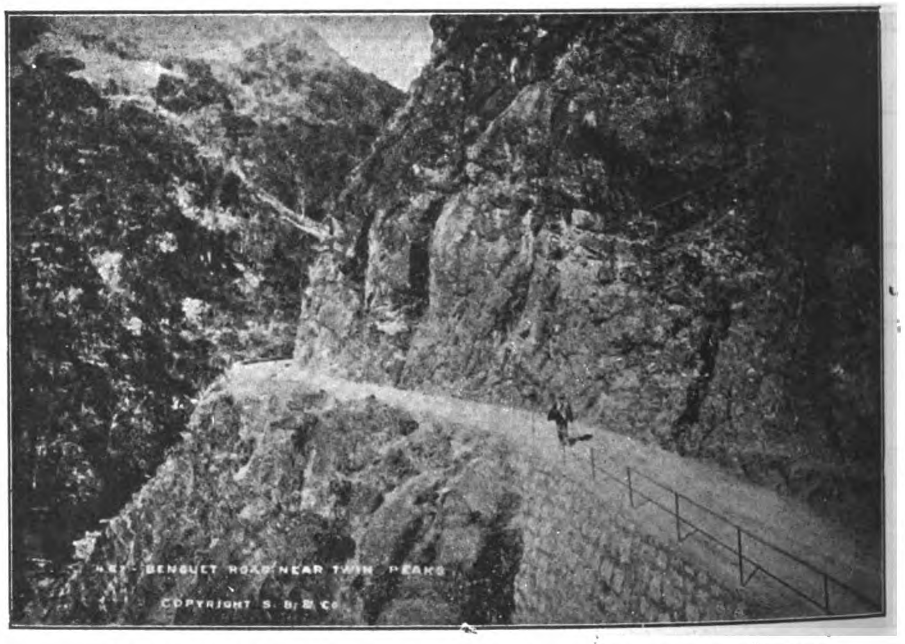

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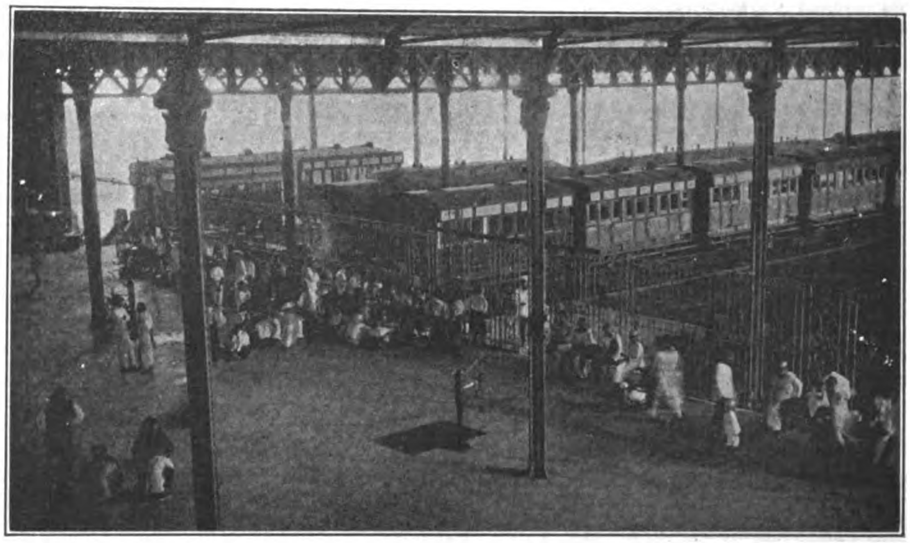

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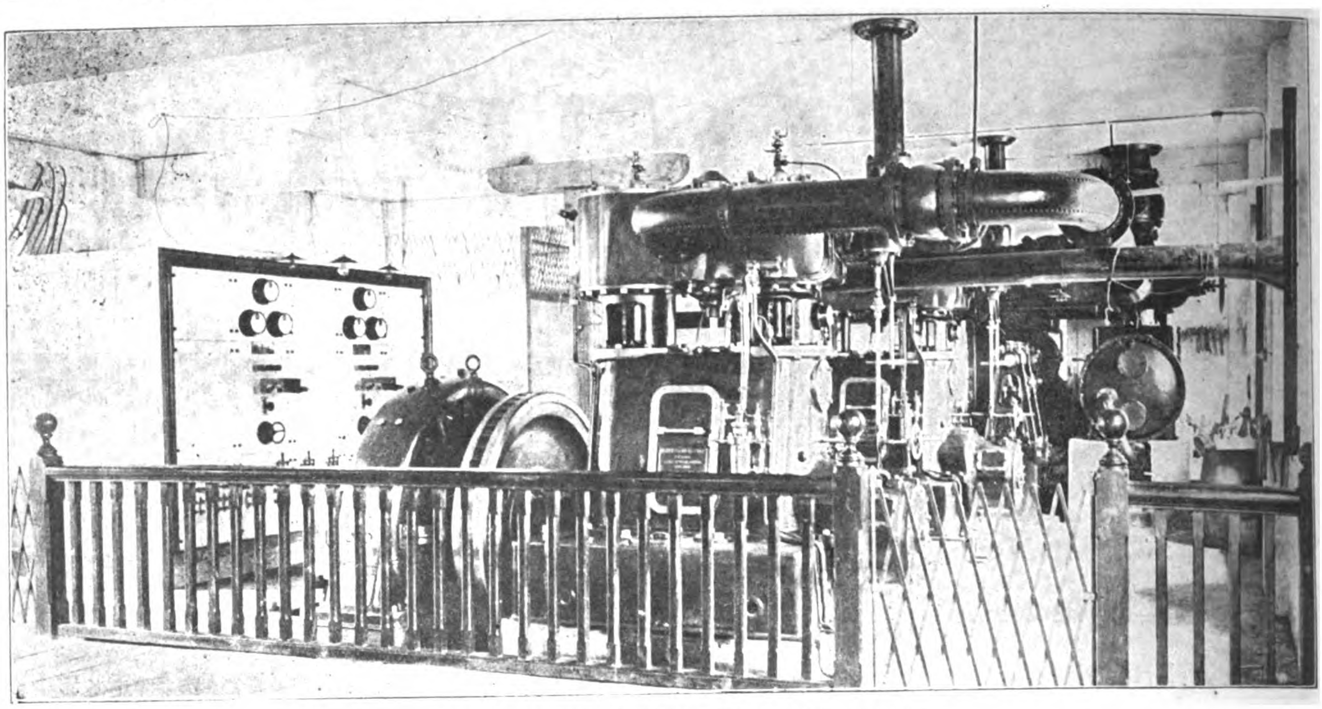

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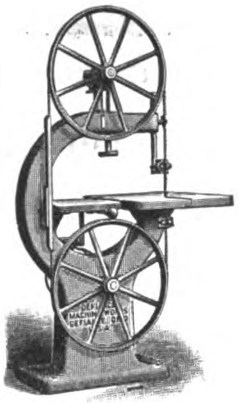
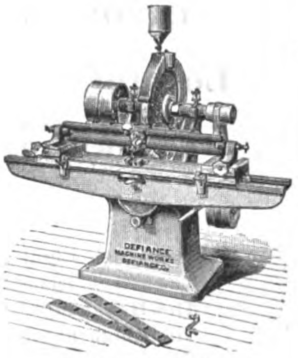


28" Band Saw



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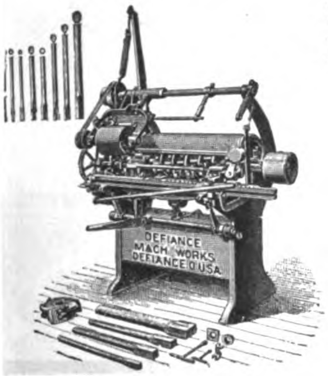
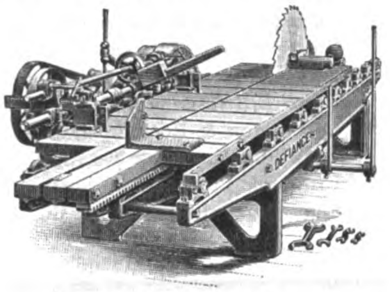
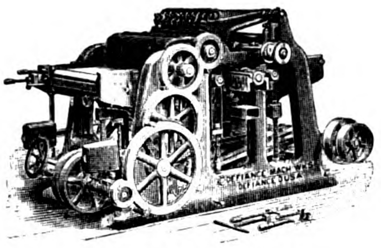


Spoke & Handle Lathe



No. 6 Bolting Saw



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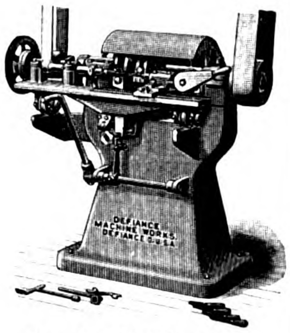

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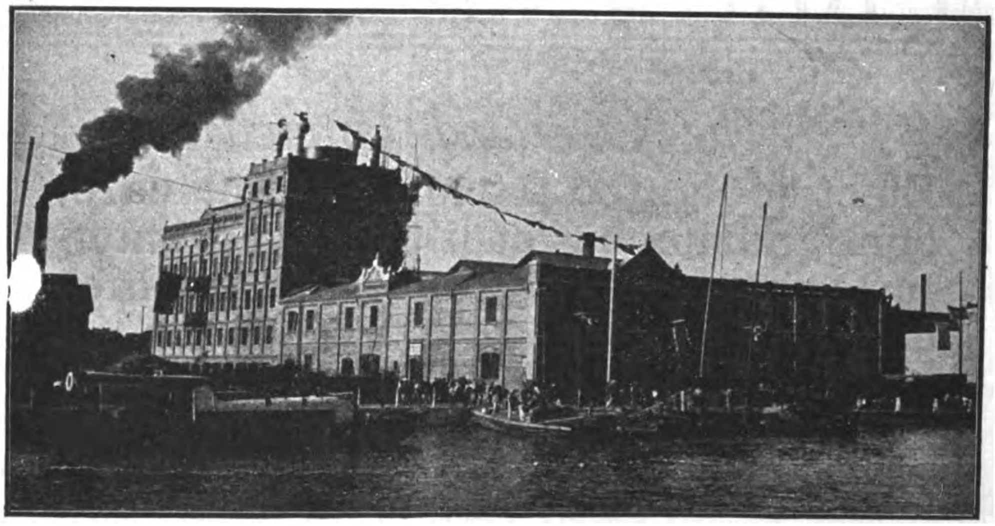

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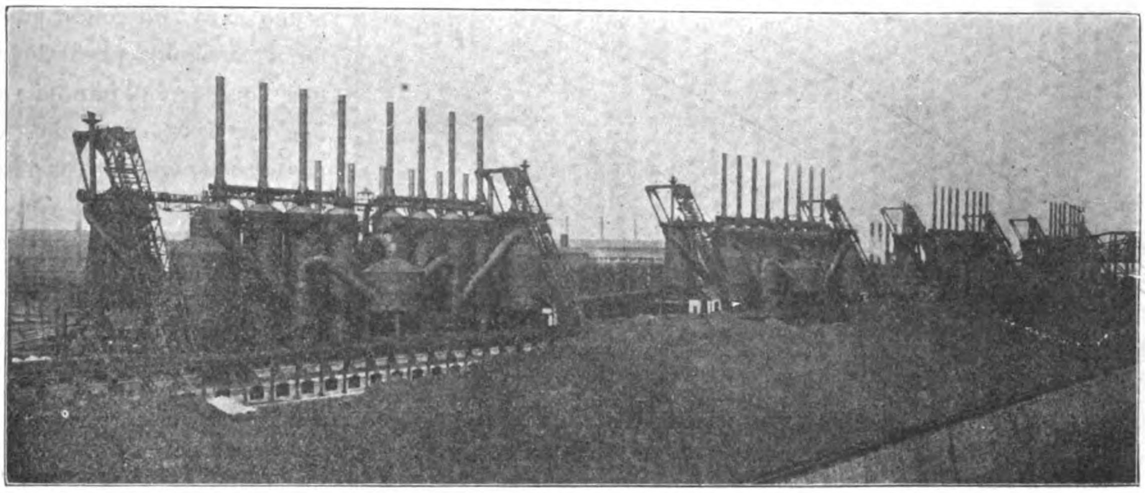

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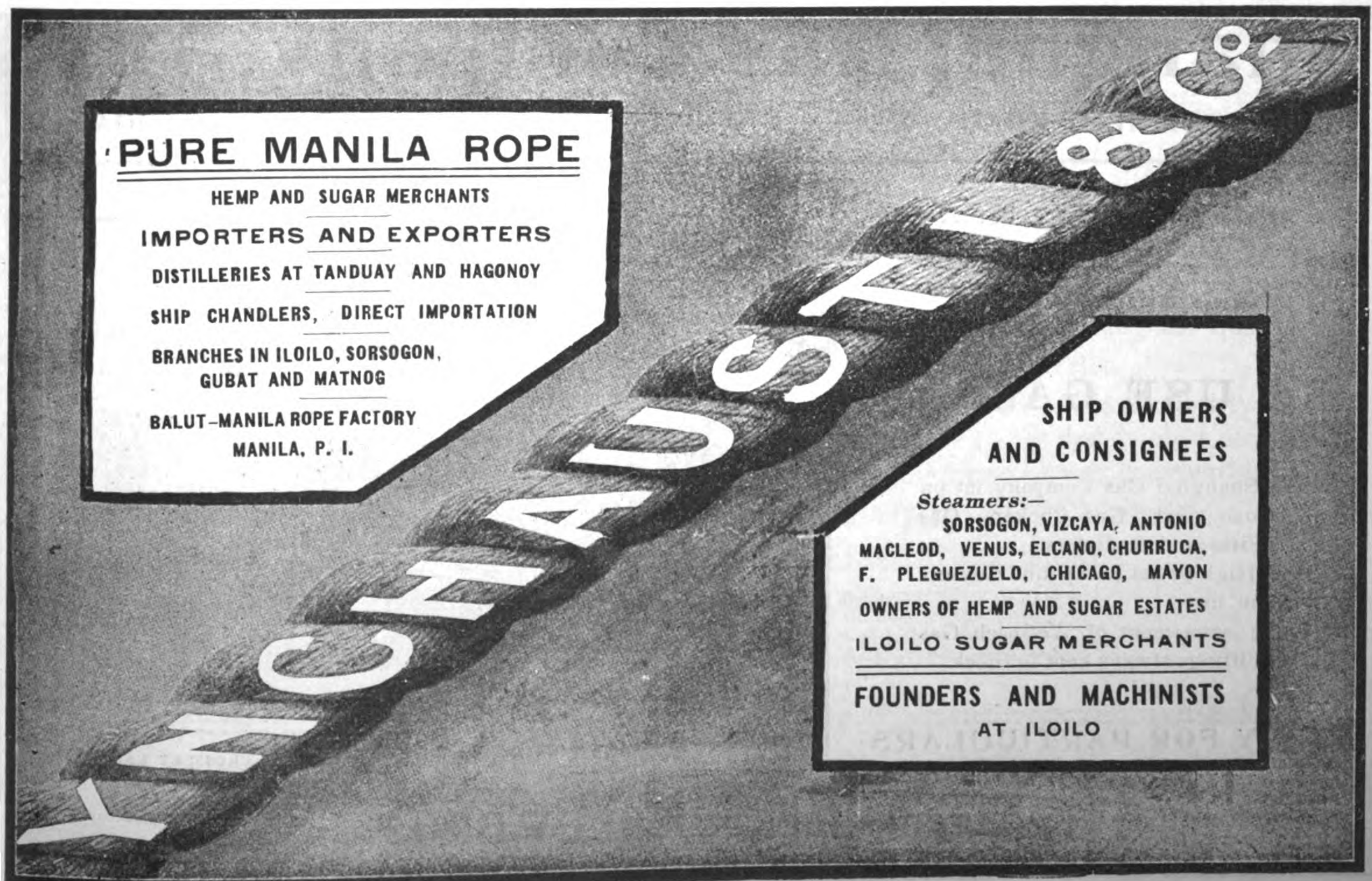

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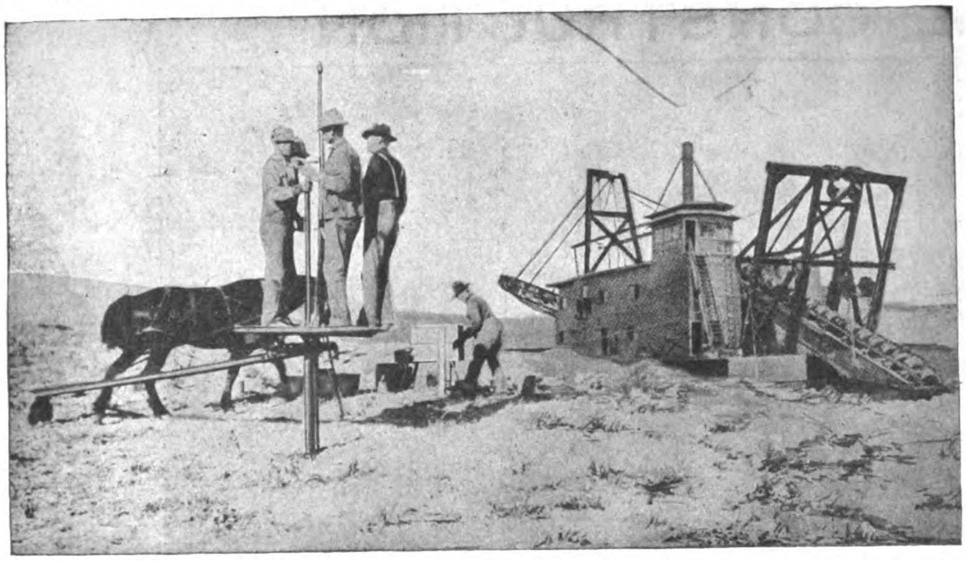

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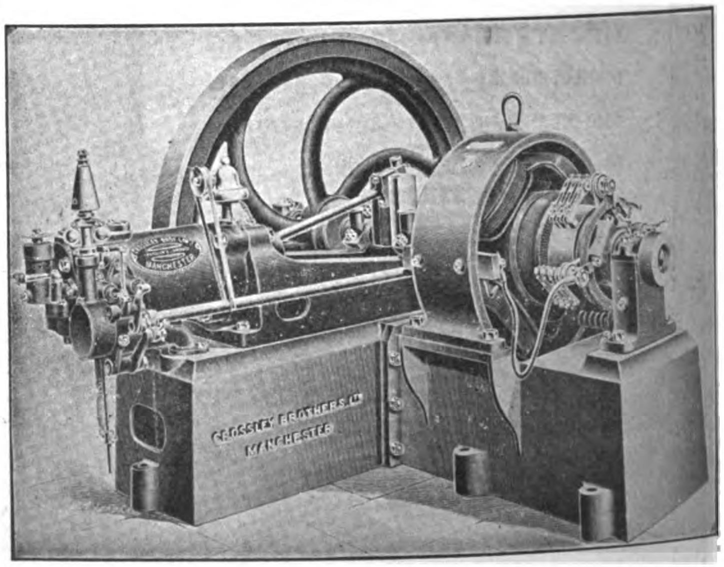

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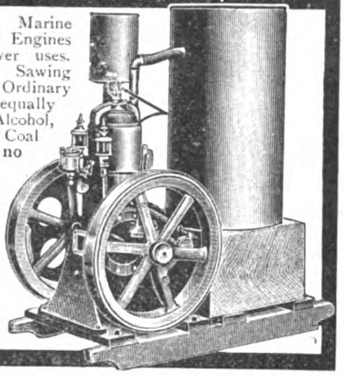

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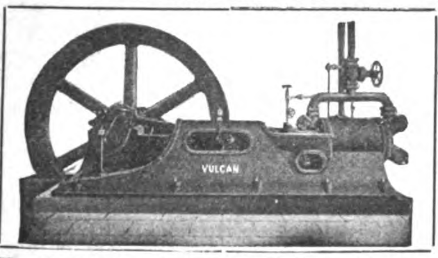

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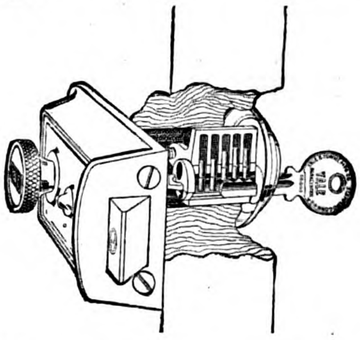

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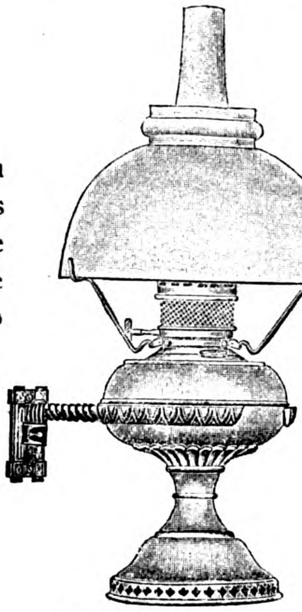

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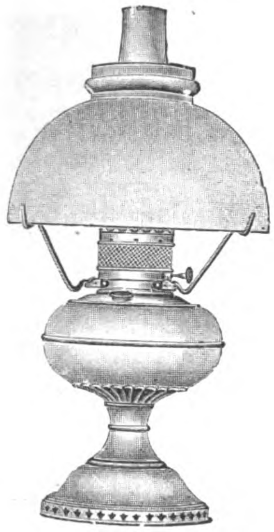

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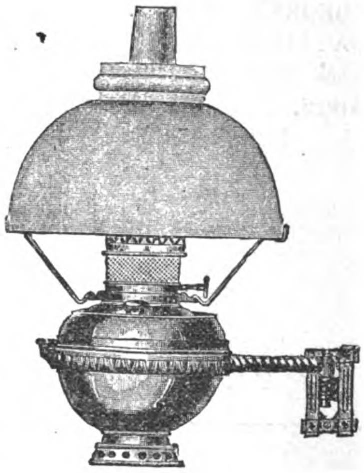

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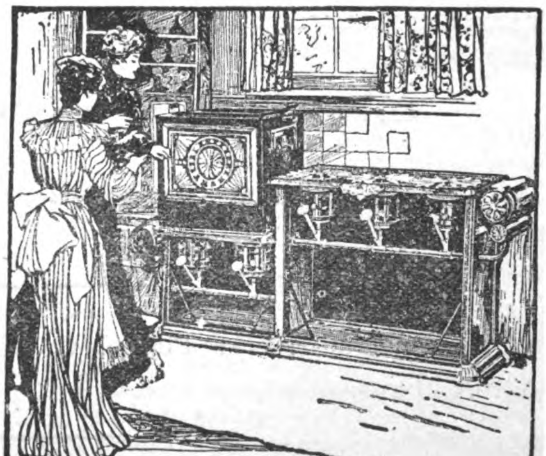

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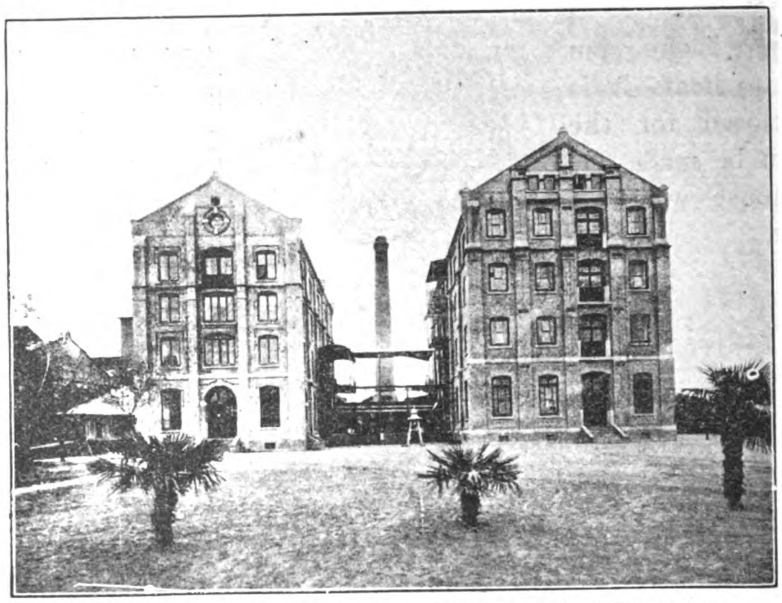

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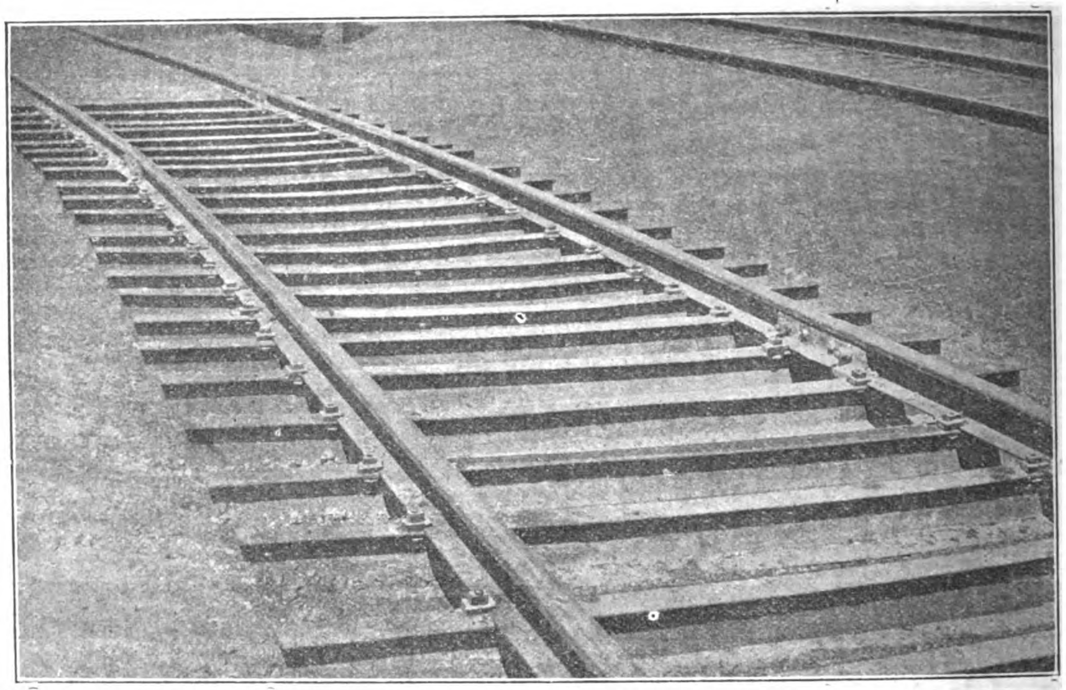

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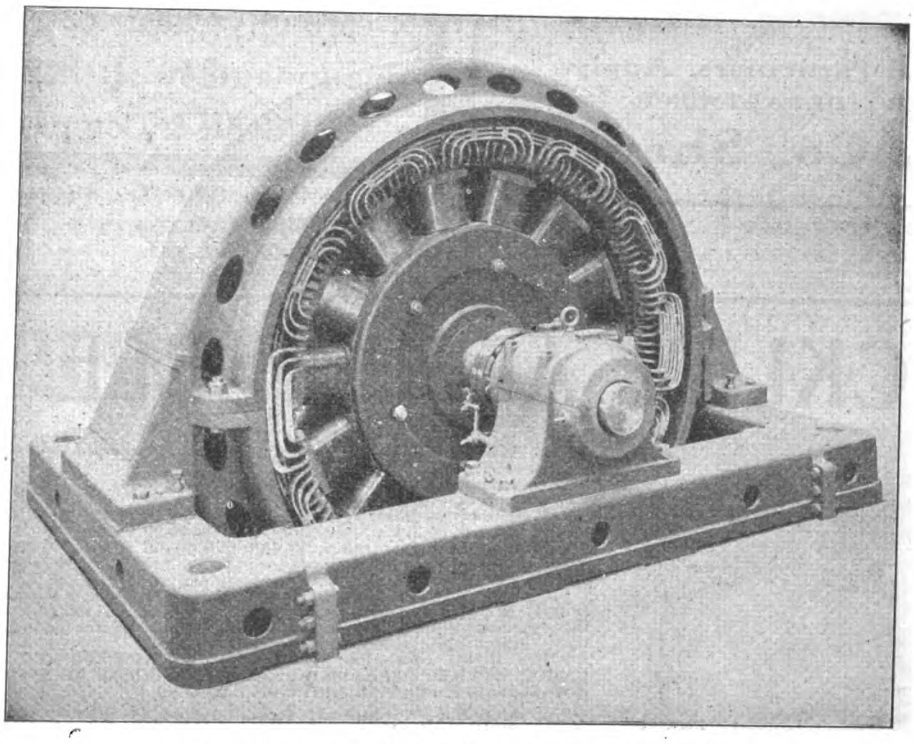

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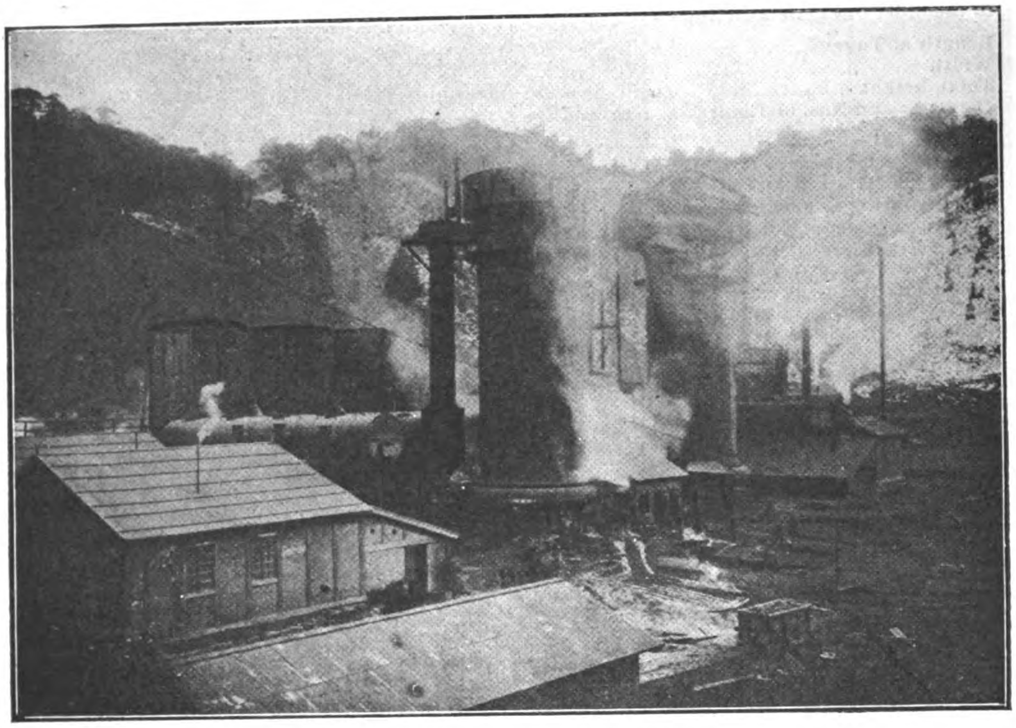


THE SMELTERS OF THE KAMANSHI MINE

electrolytic vats, are treated in an English cupellation furnace and sent to the Imperial Mint in the form of bullion.

Annual Production.—The production from the mine in the year 1908 was as follows:—

Gold 10,900 oz. Silver 1,127,000 oz. Copper 7,572 tons. Lead 378 tons.

Motive Power and Number of Workmen—Electricity is the sole motive power used throughout the mine, being generated at the four hydro-electric power stations on the bank of the River Oyu. Shortly after the discovery of the three-phase alternate current generator, that system was adopted by the mine; and, for the first time in Japan, the transmission of the extra high tension current was successfully effected. The total horse-power generated is 3,800, and is thus utilized:—

880 H. P. for Electrolysis
600 H. P. ,, Electric Railway.
2,320 H. P. ,, Stationary Motors.

In addition, a generating plant of 1,000 H. P. is now in course of construction in connection with the converter plant.

Altogether 8,295 workmen are employed at the mine, 1,377 of whom work underground and 6,918 on the surface.

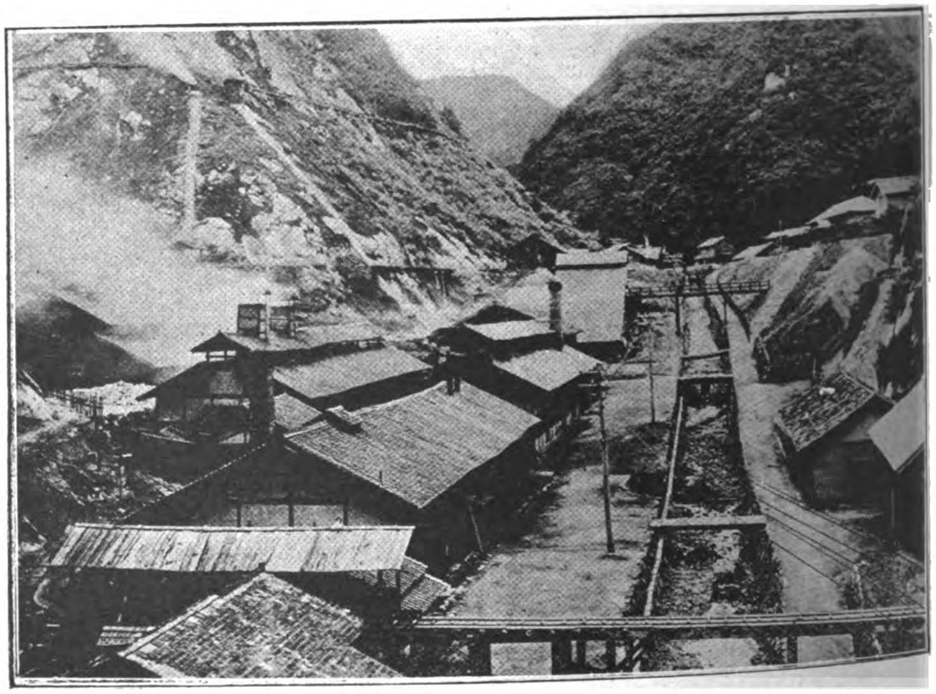
Accessories.—The smiths', carpenters', and machine shops are completely equipped with all necessary appliances. A saw-mill situated in the famous Sugi forest near by supplies the mine with all the timber required. An aqueduct brings excellent water to the mine and keeps the fire hydrants constantly ready for use. Electric illumination and a complete telephone system are another feature of the mine. Two well-equipped hospitals are provided for the accommodation of the sick, while three elementary schools afford good educational facilities for the children of the miners.

Awards of Merit.—Among the awards received by the Kosaka Mine, the principal are the following:—

Gold Medal of Honour at the Fifth National Industrial Exhibition held in Osaka, in 1905; Grand Prize at the Louisiana Purchase Exposition held in St. Louis in 1904, and Grand Prix at the Universal Exposition held in Liege in 1906.

THE OMORI MINE.

Situation.—This mine is situated in a mountainous region in the province of Iwami, in the north-west of Hondo, near the coast of the Japan Sea.



THE OMORI COPPER IWAMI MINE, SITUATED IN PROVINCE OF ON THE JAPAN SEA

History.—The Omori Mine is said to have been discovered some 600 years ago. At the beginning of the Tokugawa Shogunate (which lasted from 1615 until 1868) the mine was managed by the famous Okubo Iwami-no-Kami, and under him it is said to have flourished greatly. In 1872 an earthquake caused so much damage to the underground workings that it was found necessary to close the mine altogether. In 1884, however, on the mine being transferred to the Fujita Company, it was re-opened and after the sinking of considerable capital was equipped with a modern installment.

Geological Formation.—Geologically, the district is composed of tertiary tuffs and sandstone, interspersed with a great mass of andesite containing ore. The ore deposit consists of true fissure veins from 3 to 7 feet in thickness, parallel to one another, and sloping at an angle of from 70 to 80 degrees to the horizon. Some of the veins are 2,000 feet in length, being composed principally of chalcopyrite, galena, and zinc blende containing gold and silver, and banded together in structure. Five of the veins are now being worked.

The ore is mainly composed as follows:—Au 0.0014%; Ag 0.0560%; Cu 7.75%; Pb 0.8000%.

Mining.—The veins are worked by stopings and the material is removed by way of adits and shafts, the hoisting being done by a skip driven by a water-wheel. The water, which accumulates to the extent of 35 cubic feet a minute, is drained off by electric pump from the depth of 500 feet.

Dressing.—The ore, after being cobbed and picked, is mechanically dressed by means of breakers, rolls, trommels, jiggers, &c.

Metallurgy.—The ore, with the requisite quantity of limestone and coke, is smelted raw in an ordinary jacketed circular furnace, and the matte formed from this partial pyritic smelting, after calcination in stalls, is once more smelted, forming blister copper, containing gold, silver and lead. This last operation is carried out according to the Japanese Mabuki process.

Annual Production.—In 1908 the quantity of ore mined was 22,500 tons, which produced metals in the following proportions:—

Gold, 1,694.0 oz. Silver, 96,764.0 oz. Copper, 315.0 tons. Lead, 4.1 tons.

The blister copper from the Omori Mine is shipped to the Kosaka Mine, and there refined electrically.

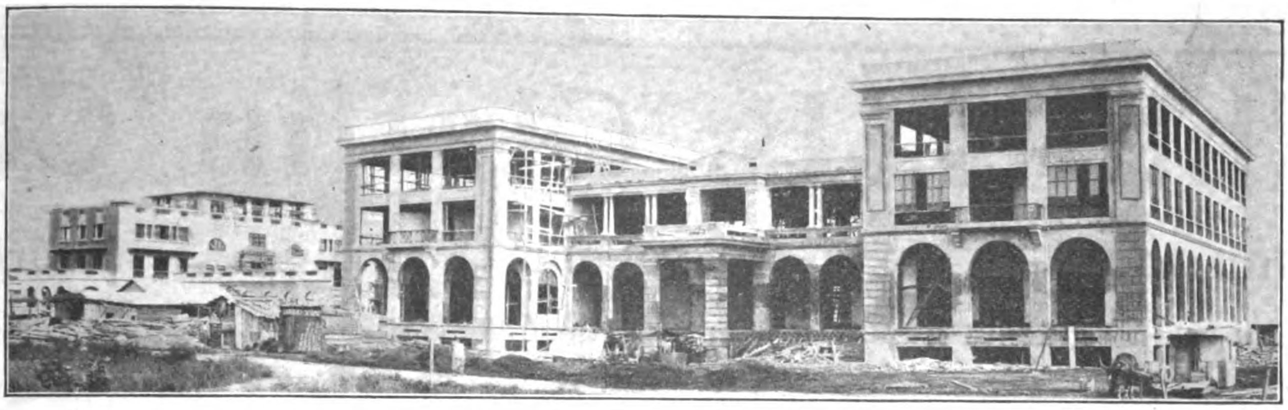
Motive Power and Number of Workmen.—There are three different forms of motive power in use at this mine, viz:—

Steam, 823 H. P.; Electricity, 255 H. P.; Water, 188 H. P.

Altogether 682 miners are employed here, 291 working below, and 391 above the surface.

THE ZUIHO GOLD MINE.

Soon after Formosa came into the possession of Japan the Fujita Company opened up a gold mine in Zuiho, in 1895, and by adopting the



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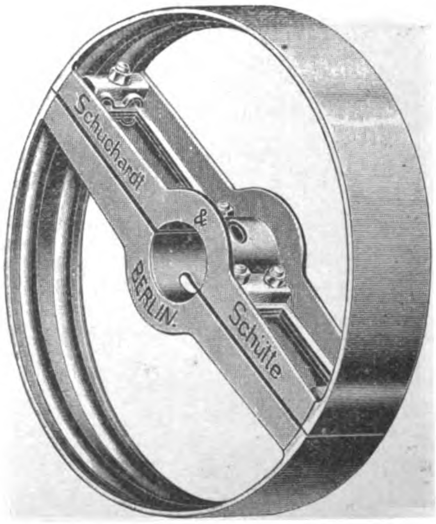

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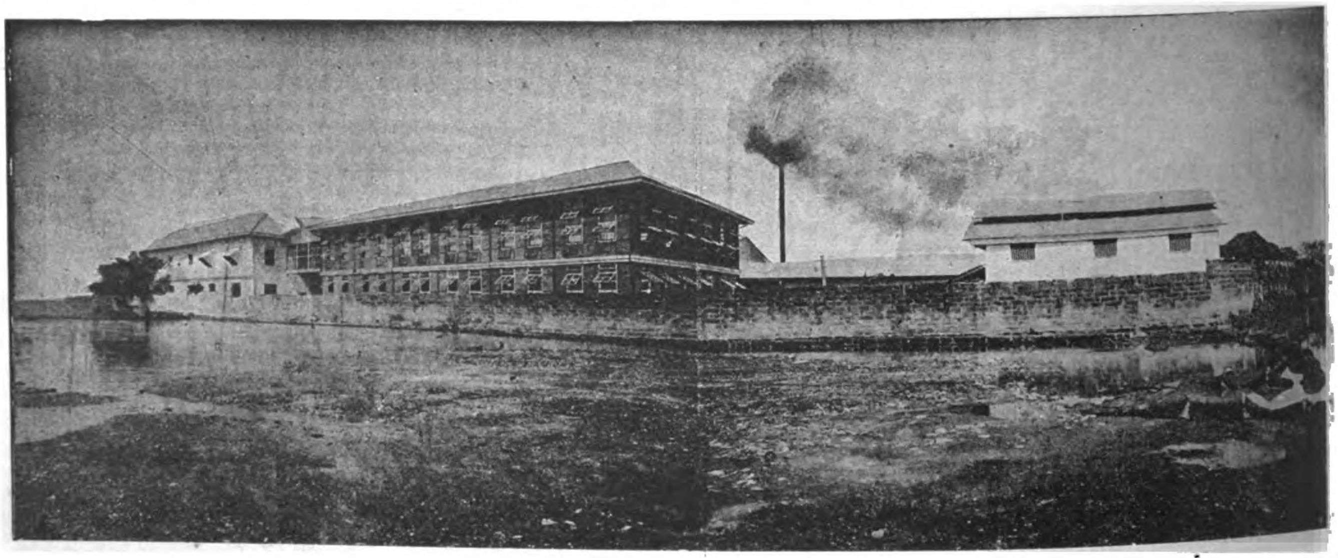

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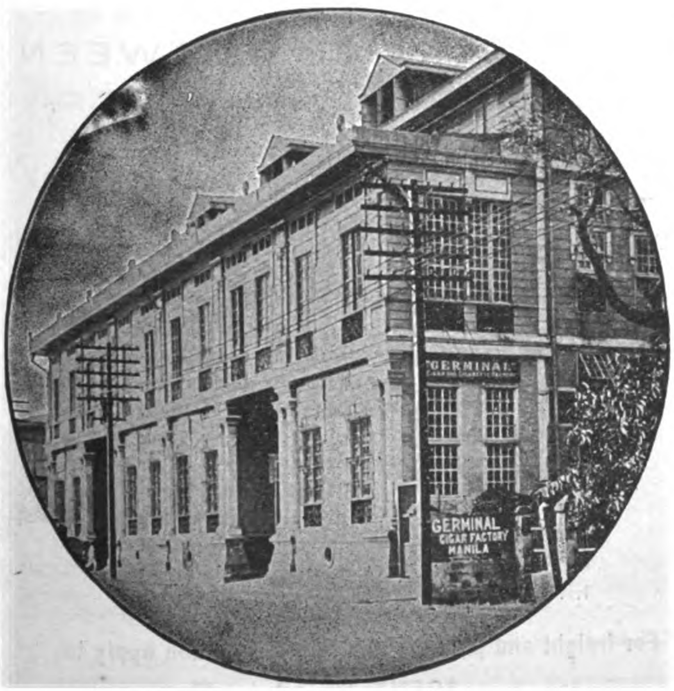

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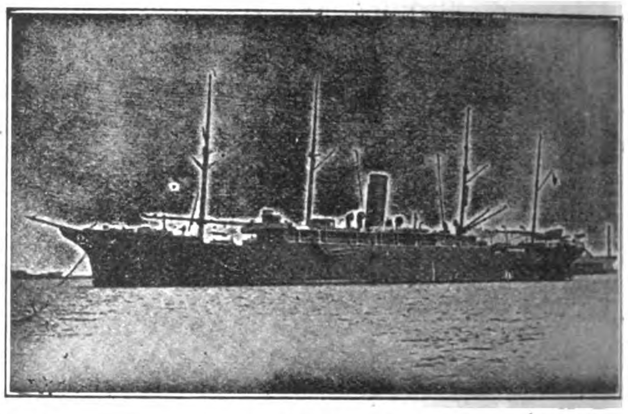

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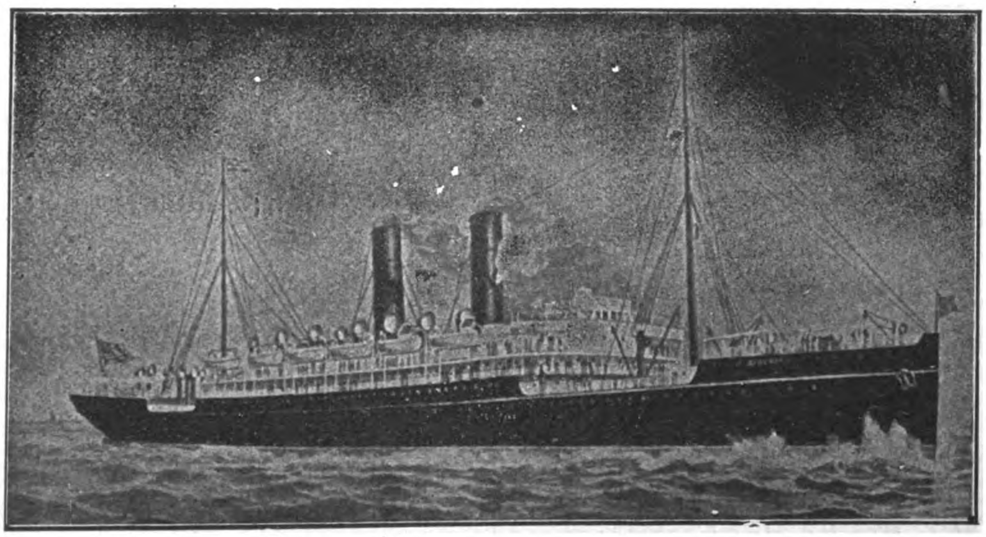

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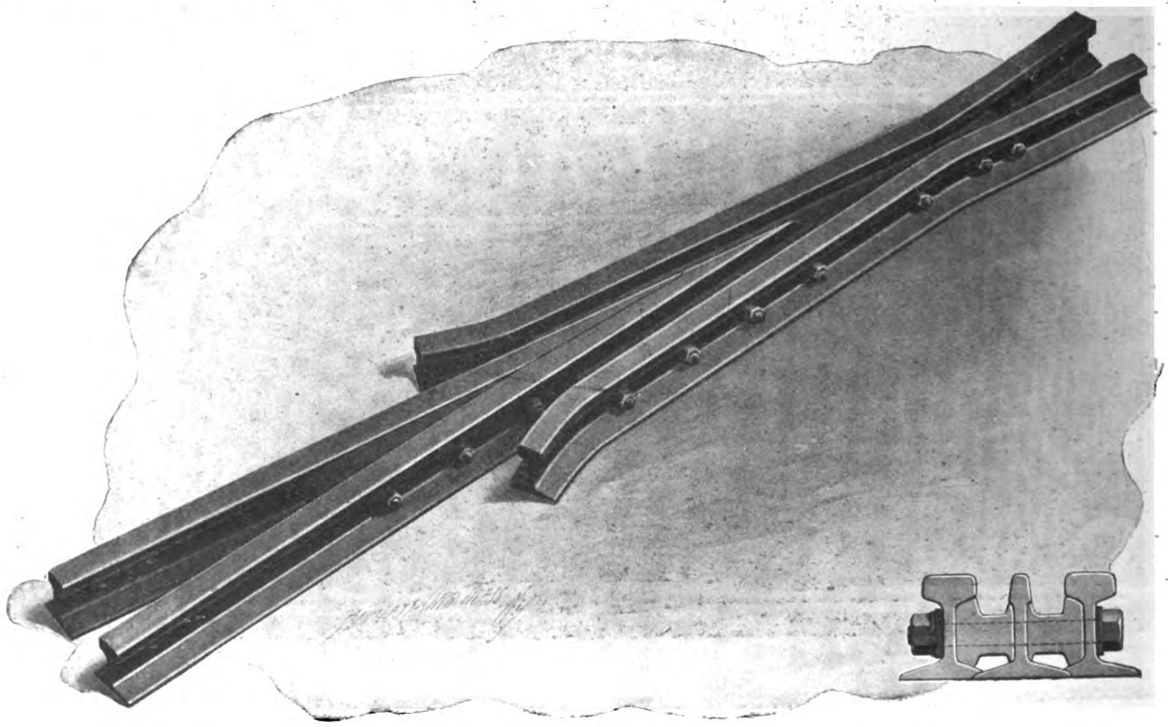

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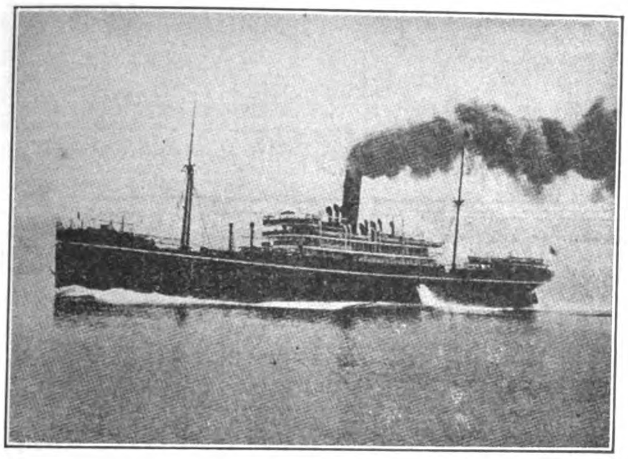

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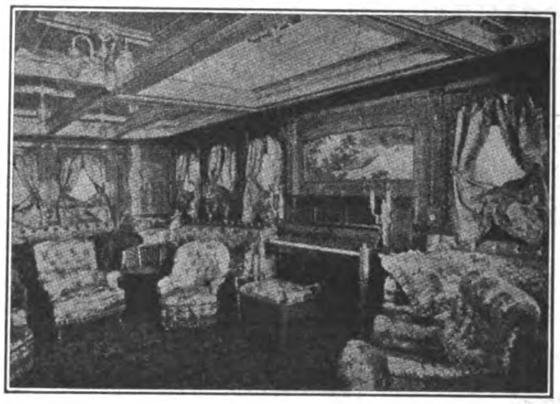

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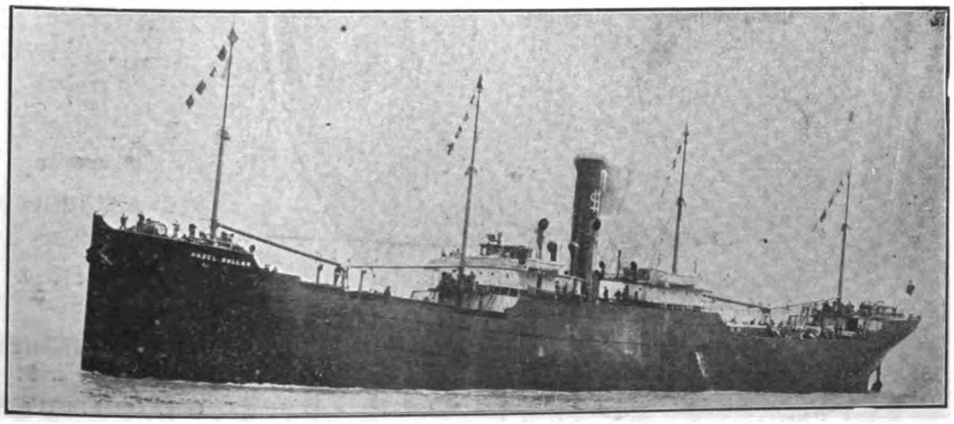

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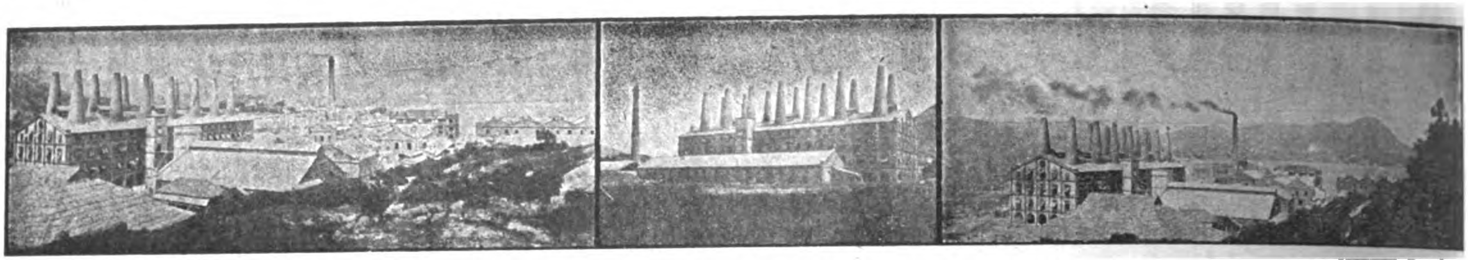

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Glazed Stoneware

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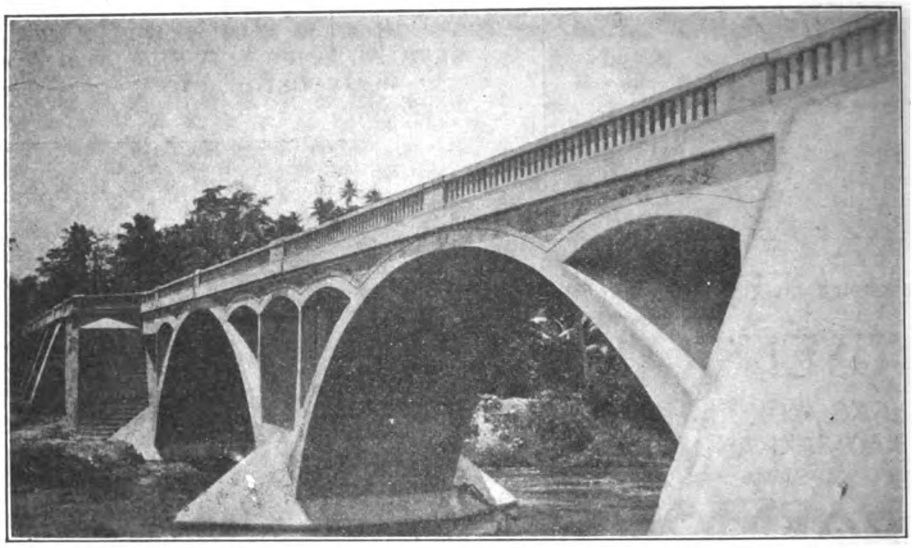

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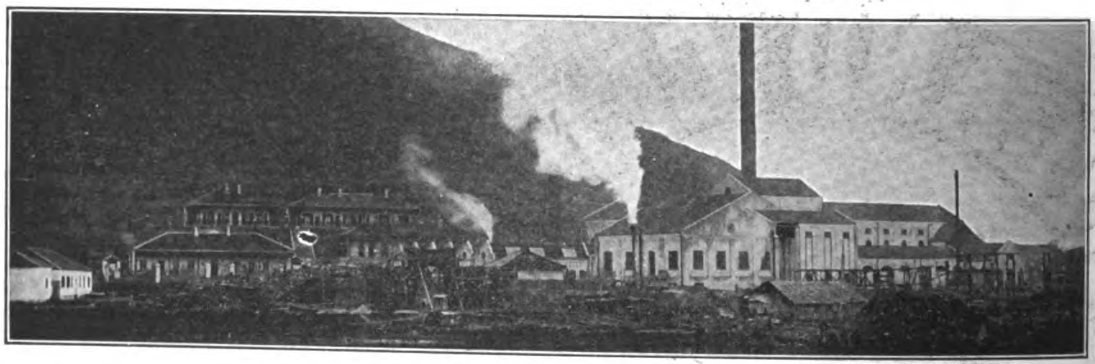

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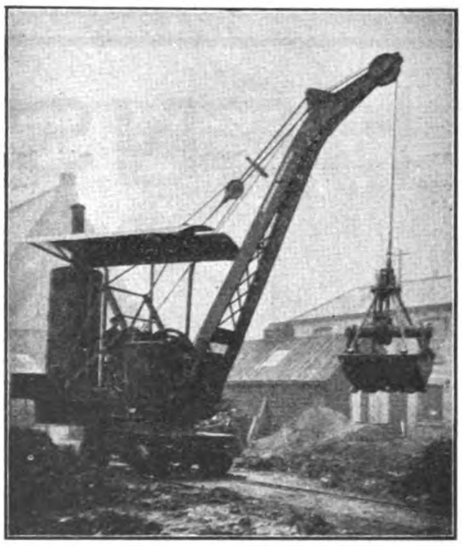

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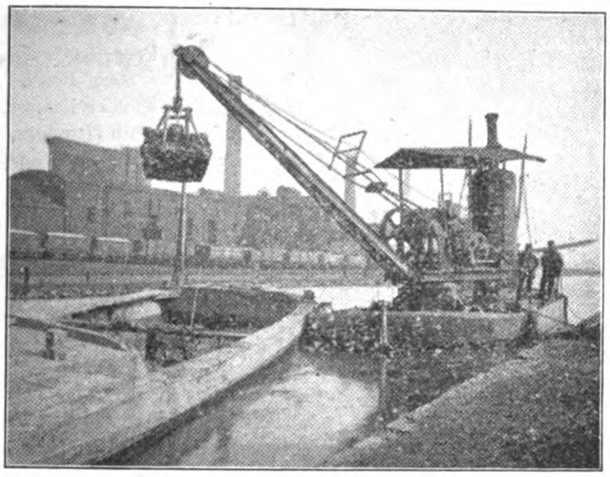

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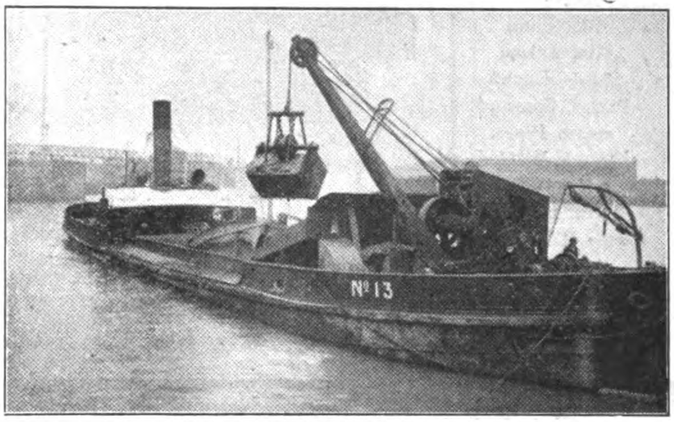

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Boiler Plates, Boiler Ends, Tubes, Dished and Flanged Plates, Domes, etc. Black and Galvanised Sheets, Buckle Plates, Gas and Steam Pipes, Electric Welded and Riveted Drums, Steel Casks, Trucks for Collieries, etc., etc.

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Annual Capacity, 800 Locomotives. Total Output exceeds 10,300.

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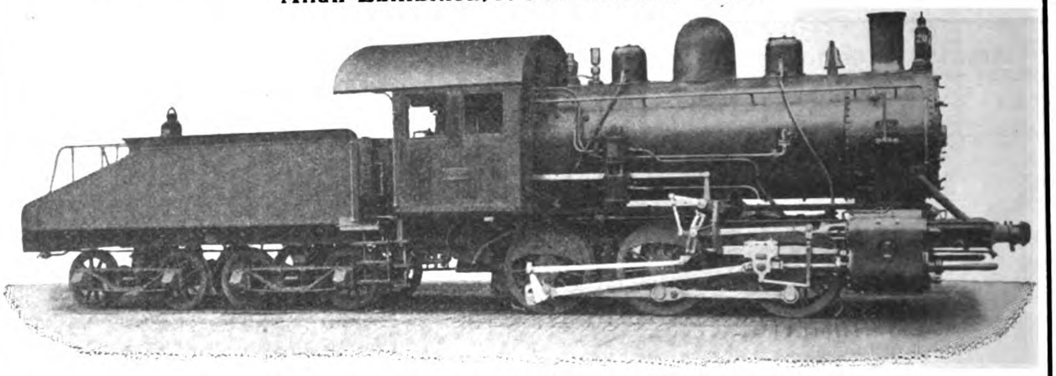

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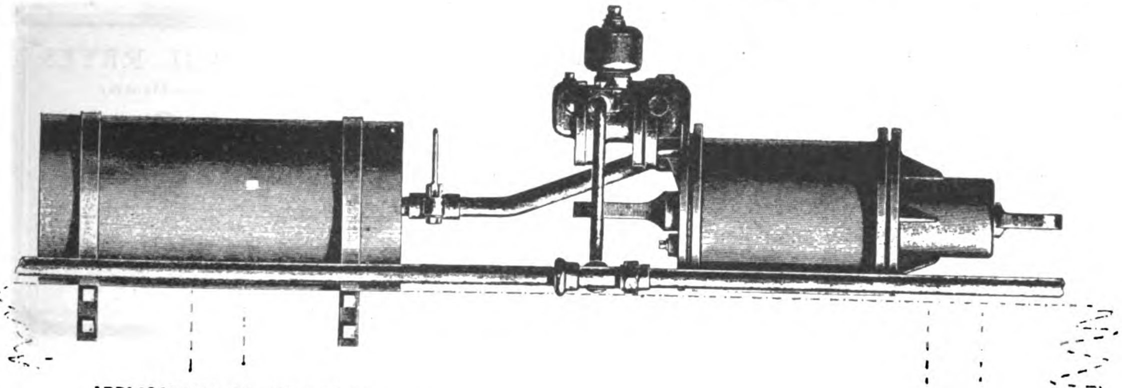

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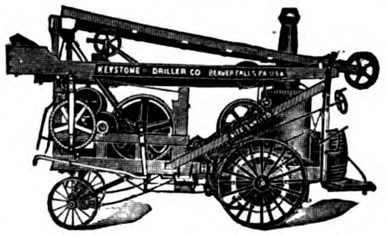

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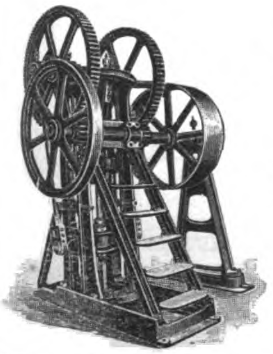

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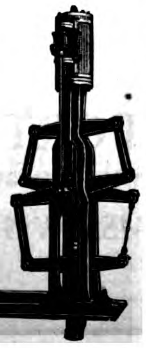

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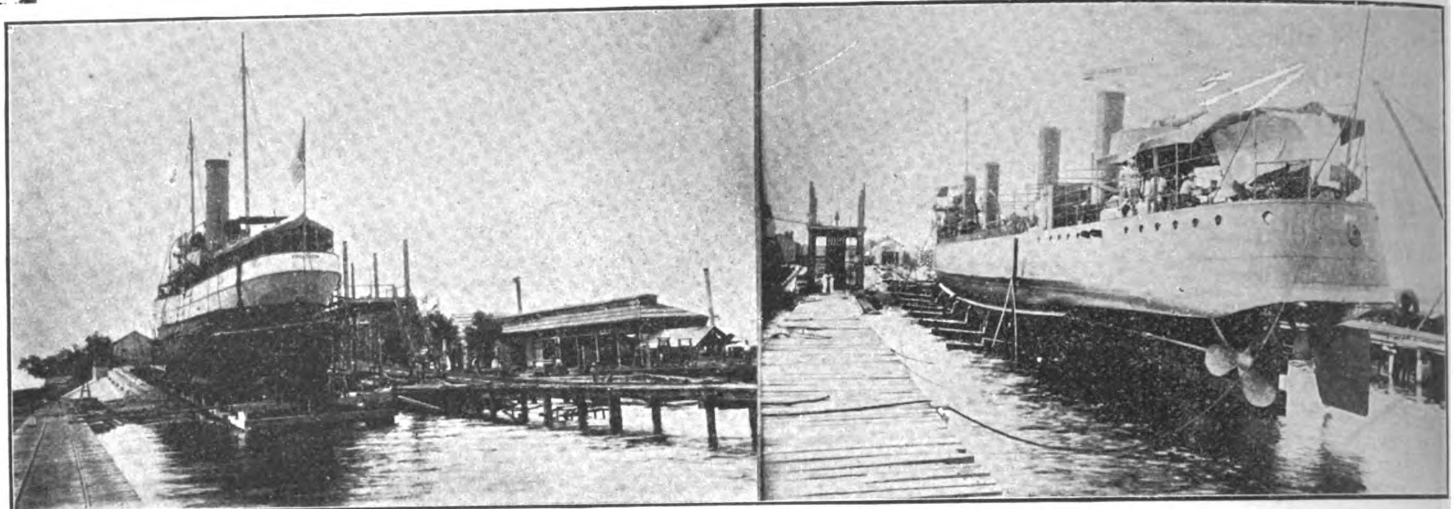

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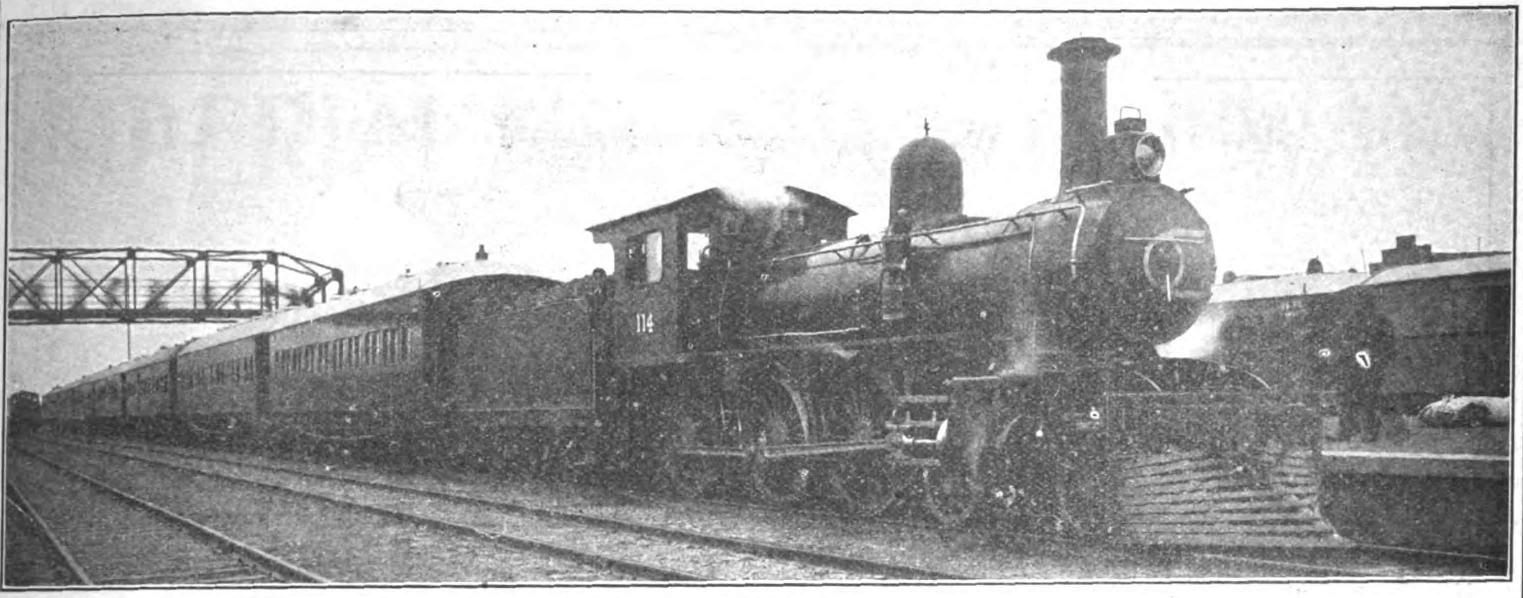

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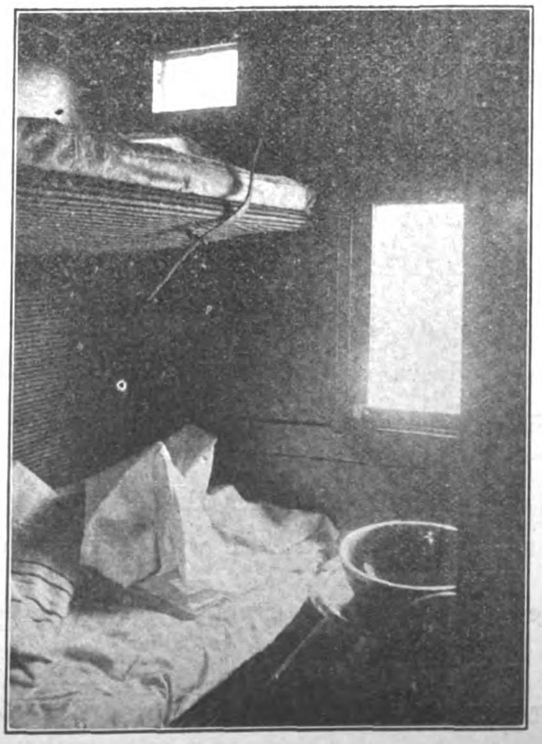

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THE THROUGH TRAINS ARE EQUIPPED WITH BUFFET AND DINING CAR SERVICE, AND A COMFORTABLE, MODERN TRAIN DE LUXE OF COMPARTMENT SLEEPING COACHES HAS BEEN PLACED IN OPERATION THIS SEASON TO CONNECT WITH THE THROUGH SERVICE OF THE TRANS-SIBERIAN AND SOUTH MANCHURIAN RAILWAYS

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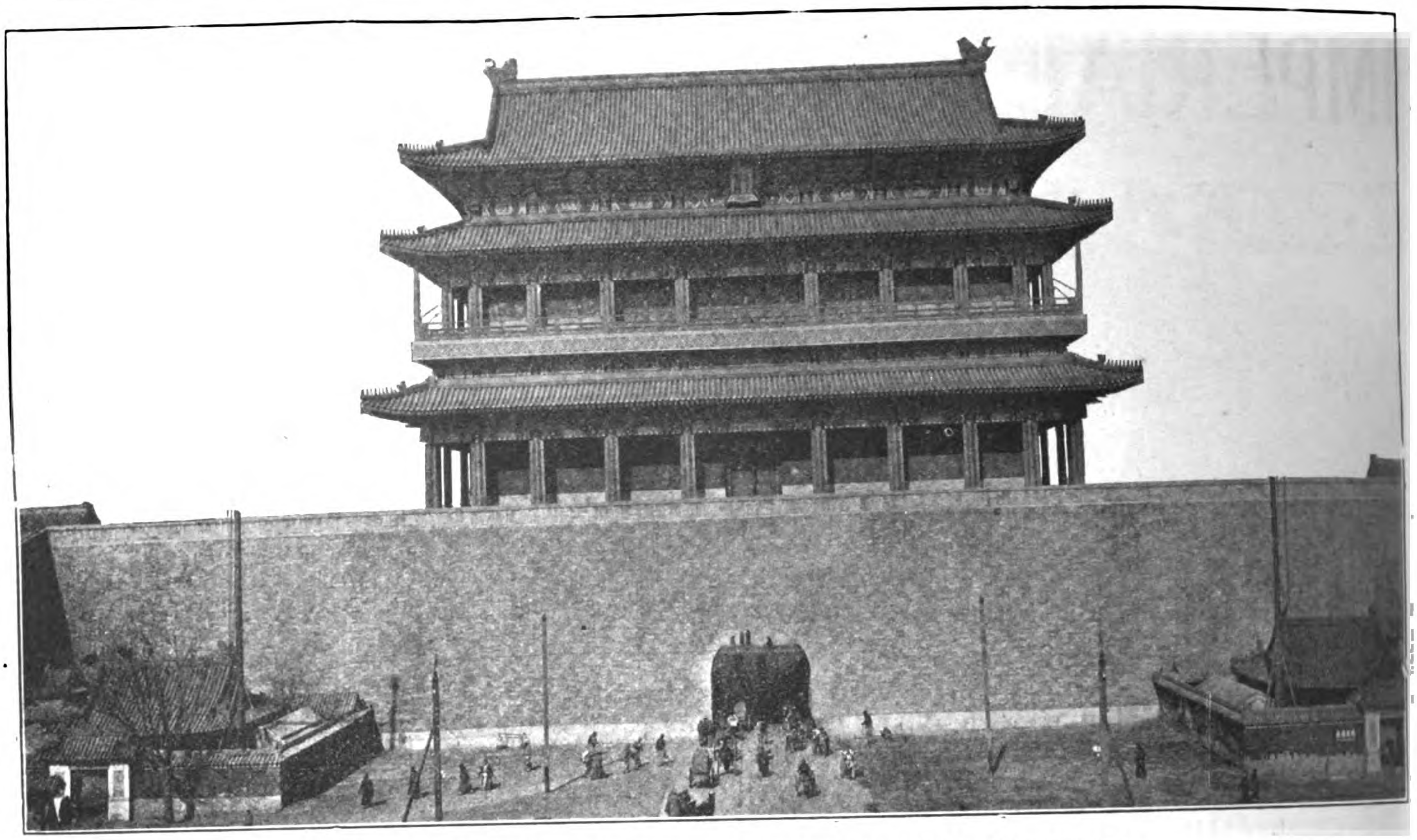

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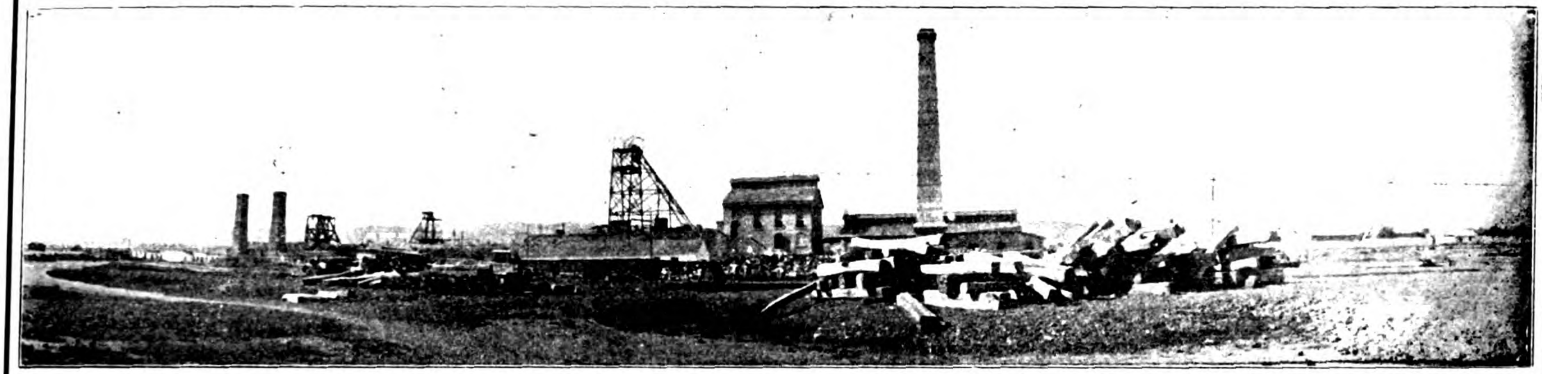

GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

"China's Road of Anthracite"

THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

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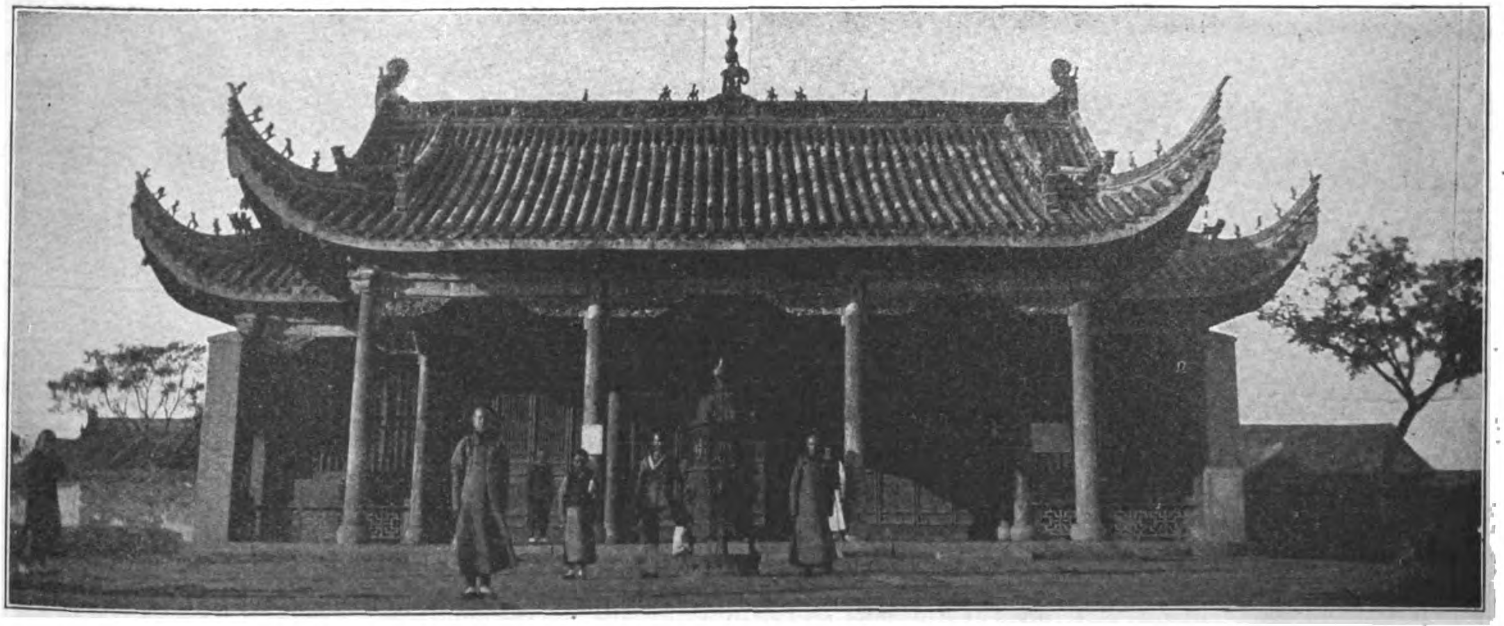
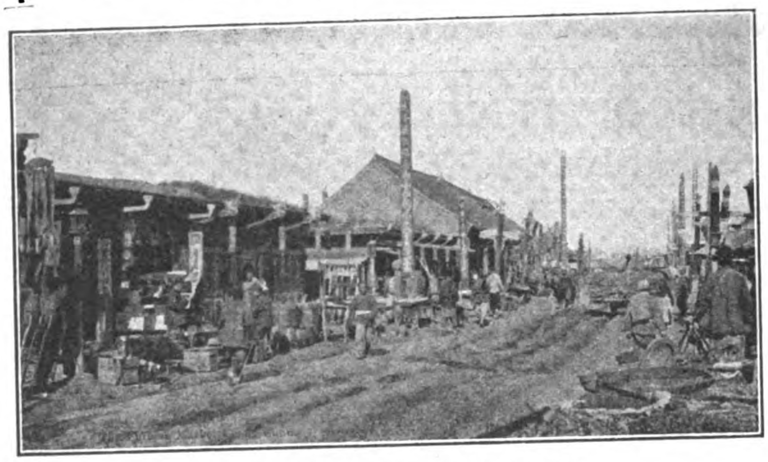
(KAIFENG-FU TO HONAN-FU)
"THE FIRST SECTION OF THE PROJECTED CENTRAL TRUNKLINE"



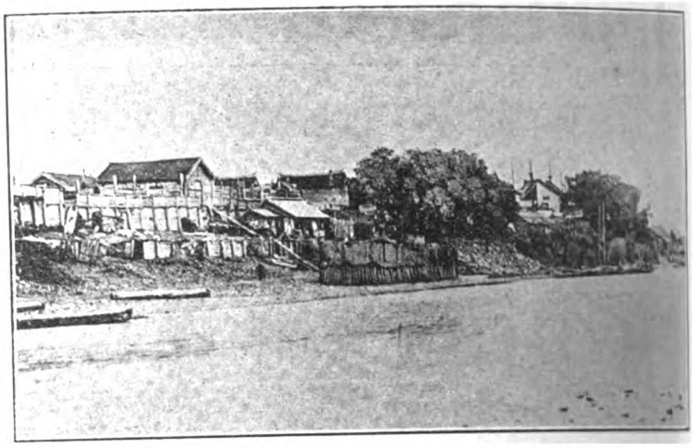
CHUNG-HUAN TEMPLE, KAIFENG-FU.

This line connects with the through service of the Peking-Hankow Railway at Tcheng Tchéou, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

IMPERIAL CHINESE RAILWAYS
KIRIN-CHANGCHUN LINE



CHINESE MARKET AT CHANG-CHUN



VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

TIME TABLE

The Kirin-Changchung Railway

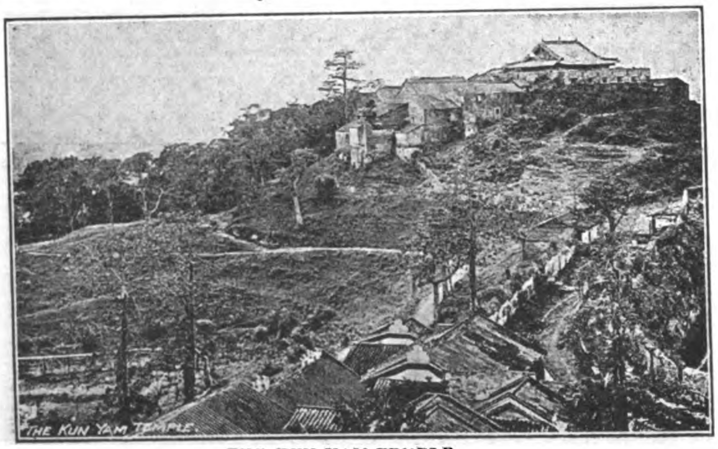
DOWN TRAIN

Station	*No. 1* a. m.	*No. 2* a. m.
Changchung	7:00	12:00
Coran	8:17	1:17

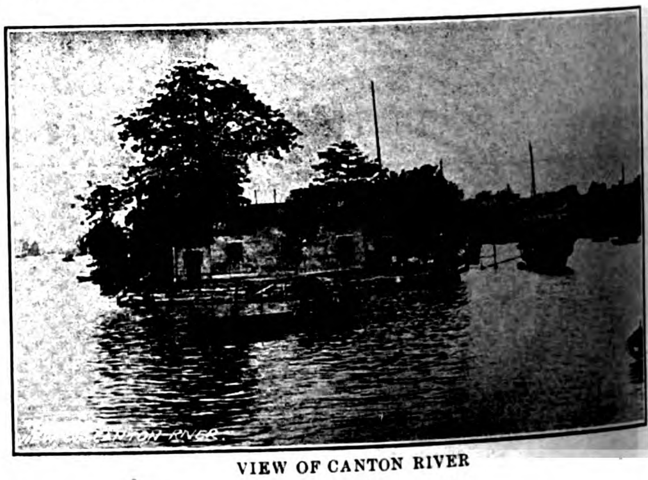
UP TRAIN

Station	*No. 2* a. m.	*No. 4* p. m.
Coran	10:00	5:00
Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS
CANTON-KOWLOON LINE



THE KUN YAM TEMPLE



VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 24th APRIL, 1911, UNTIL FURTHER NOTICE.

Canton (Ta Sha Tou) to Shek Lung

Miles	STATION		Daily Passenger Trains. No. 1 A. M.	No. 3 P M.	No. 5 A. M.
	Canton (TAI SHA TOU)	dep	7.30	11 00	3 00
3.63	Shiek Pai	arr	7.39	11 09	3 09
		dep	7.42	11.12	3 12
7.90	Che Pi	arr	7.53	11.23	3 23
		dep	7.56	11.26	3 26
12 58	Wu Chung	arr	8 07	11.37	3 37
		dep	8.10	11 40	3.40
17.09	Nam Kong	arr	8.21	11.51	3.51
		dep	8.25	11.55	3.55
21.67	Sun Tong	arr	8.37	12.07	4.07
		dep	8.41	12.11	4.11
23.61	Tong Mei	arr	8.46	12.16	4.16
		dep	8.50	12 20	4.20
25.54	Nga Yeo	arr	8 55	12 25	4 25
		dep	8 58	12.28	4 28
29.00	Sien Tsun	arr	9.07	12.37	4.37
		dep	9.11	12 41	4 41
32.25	Shek Ha	arr	9 22	12 52	4 52
		dep	9-24	12,54	4 54
34.77	Shek Tan	arr	9.33	1.03	5.03
		dep	9.37	1.07	5 07
36.34	Shek Lik Kou	arr	9.43	1.13	5.13
		dep	9.45	1.15	5.15
40.15	Shek Lung	arr	9.58	1.28	5.28

Shek Lung to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2 A. M.	No. 4 P. M.	No. 6 P. M.
	Shek Lung	dep	7·35	11.05	3 05
3 31	Shek Lik Kou	arr	7.48	11 18	3.18
		dep	7·50	11.20	3.20
5.38	Shek Tan	arr	7.56	11.26	3.26
		dep	8 00	11.30	3 30
7.90	Shek Ha	arr	8.09	11.39	3 39
		dep	8.11	11.41	3.41
11.15	Sien Tsun	arr	8.22	11 52	3 52
		dep	8.26	11.56	3 56
.61	Nga Yeo	arr	8 35	12 05	4 05
		dep	8.38	12 08	4 08
16.54	Tong Mei	arr	8.43	12.13	4.13
		dep	8.47	12.17	4.17
18. 48	Sun Tong	arr	8.52	12 22	4.22
		dep	8.56	12 26	4 26
23 06	Nam Kong	arr	9.08	12.38	4.38
		dep	9.12	12.42	4.42
27 57	Wu Chung	arr	9 23	12.58	4.53
		dep	9.26	12.56	5.06
32 25	Che Pi	arr	9.37	1.07	5 07
		dep	9 40	1.10	5.10
36.52	Shek Pai	arr	9.51	1.21	5 21
		dep	9.54	1.24	5.24
40.15	Canton (TAI SHA TOU)	arr	10.03	1.33	5 33

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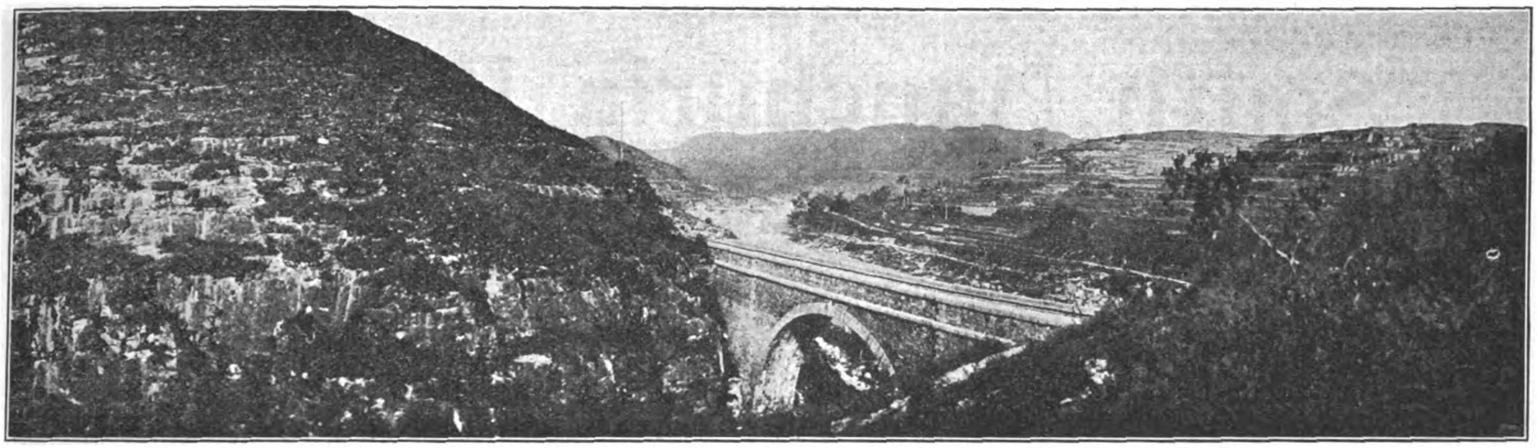

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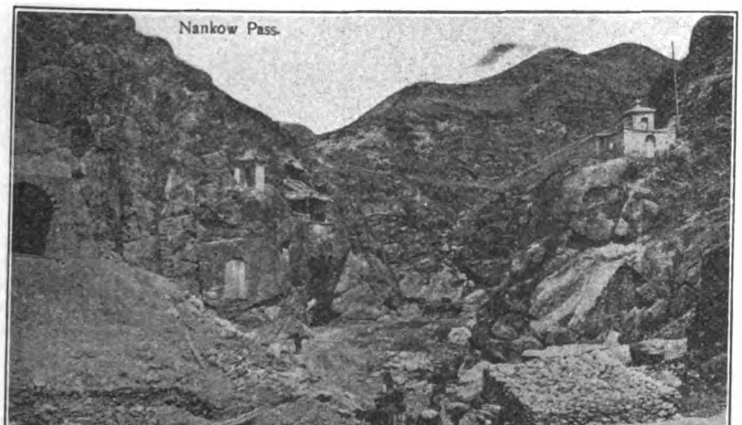

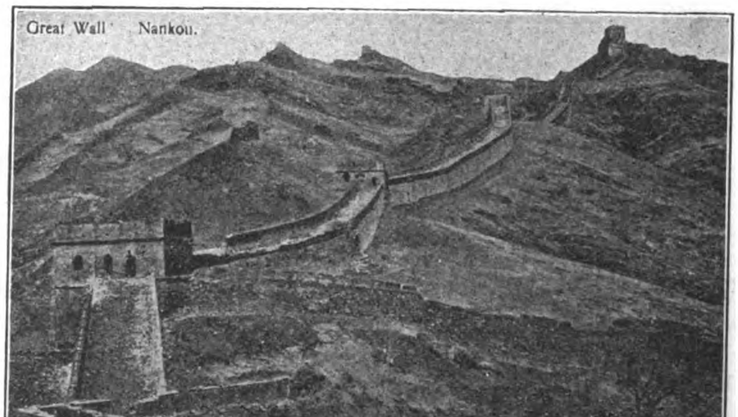

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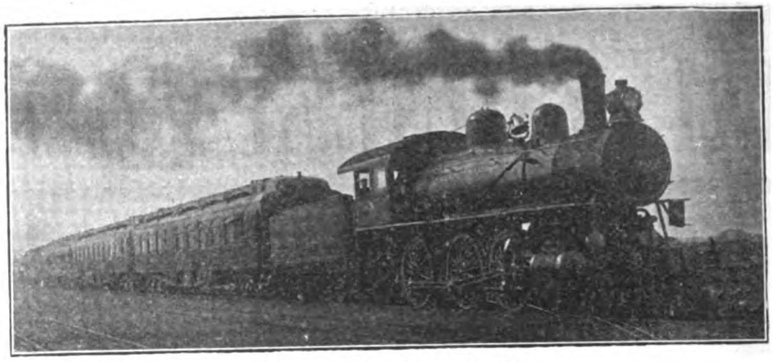

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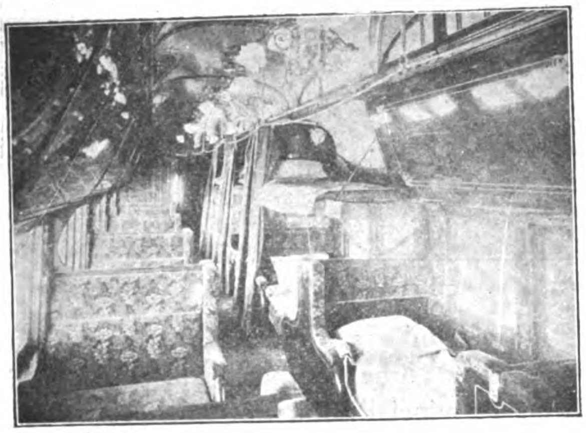

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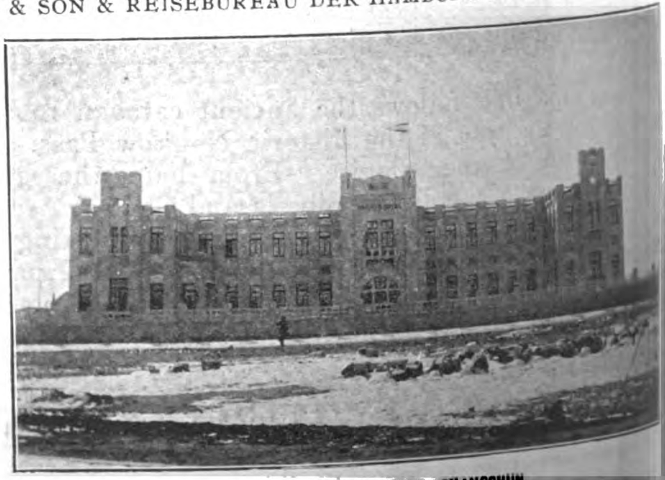

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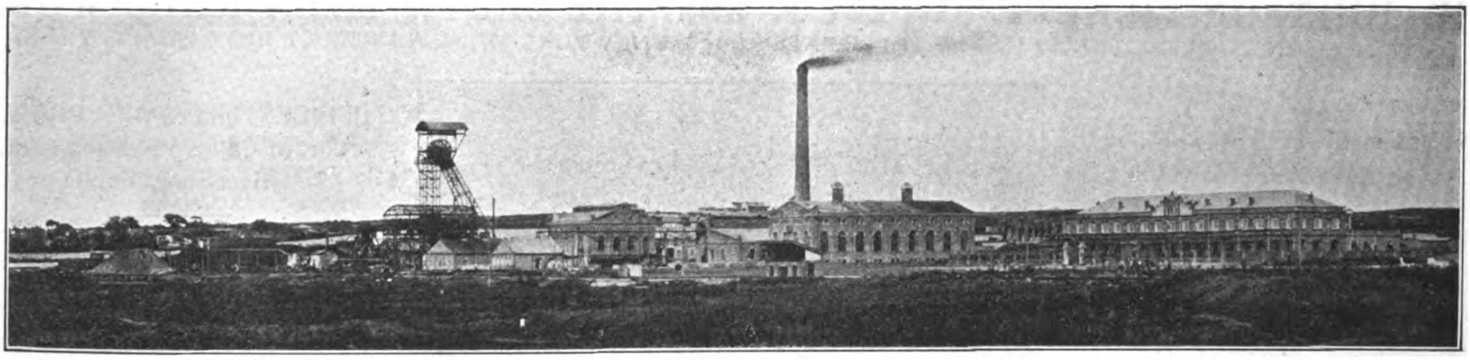

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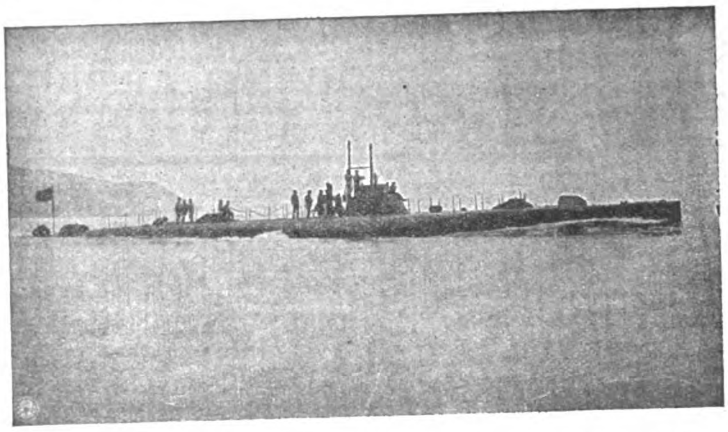

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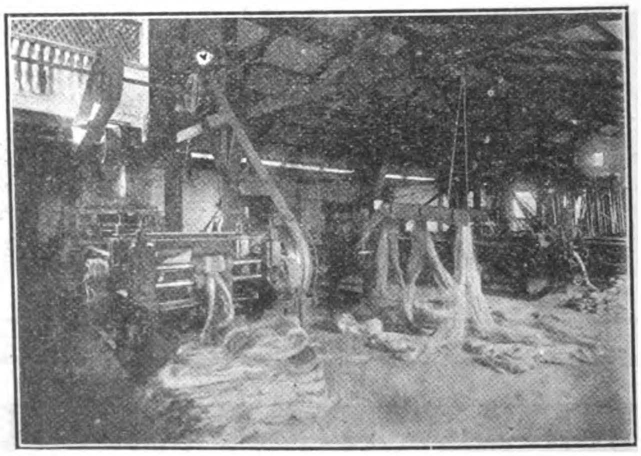

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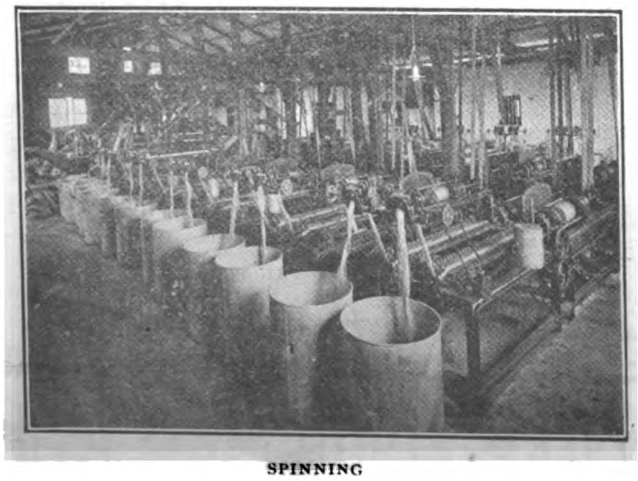

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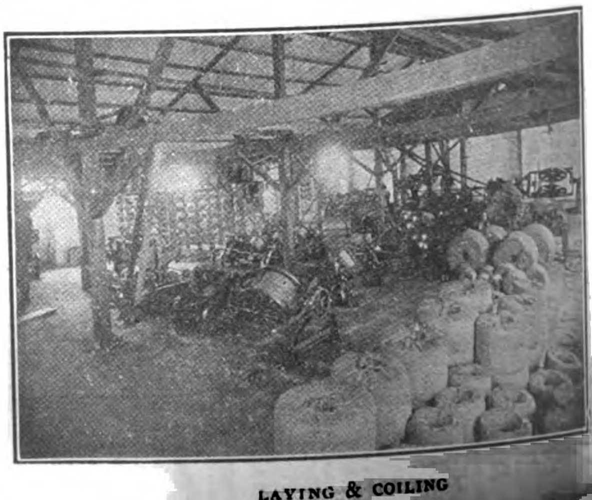

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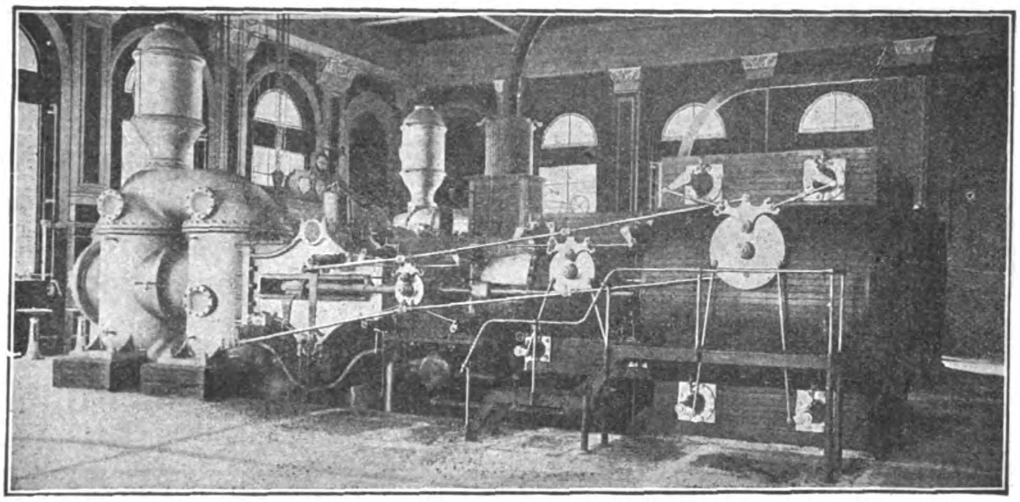

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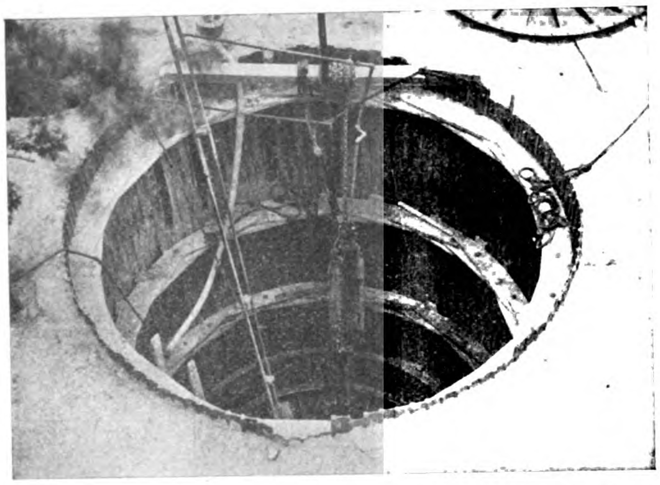

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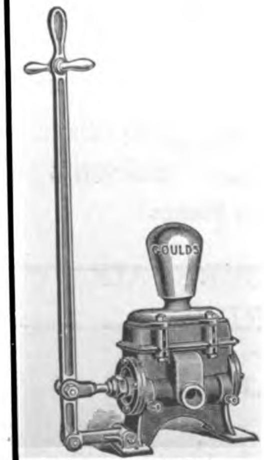

Figure 1334

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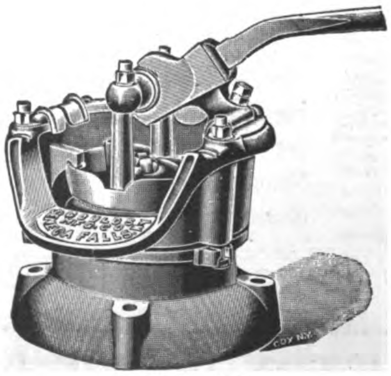

Figure 1222

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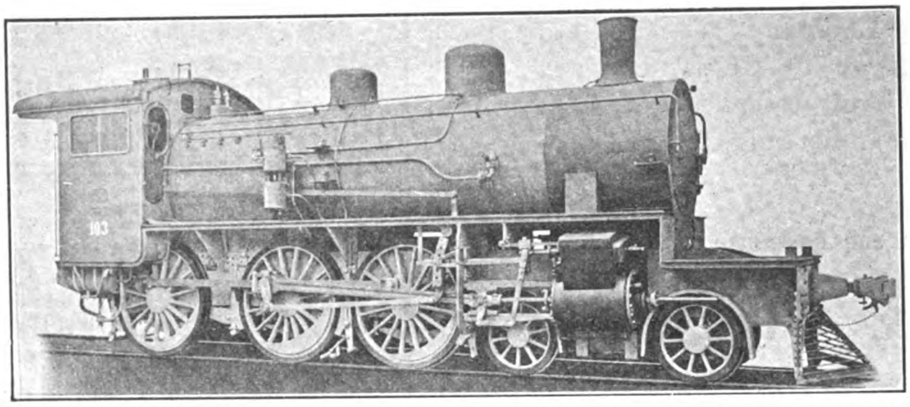

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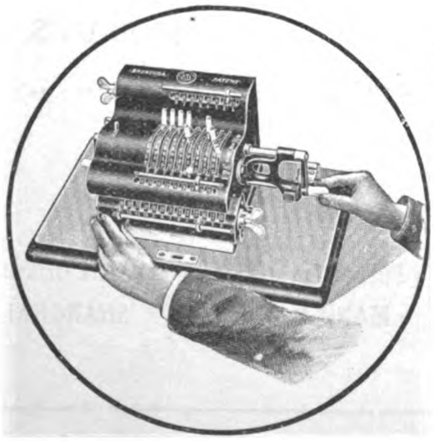

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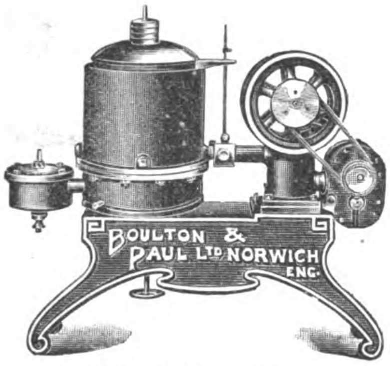

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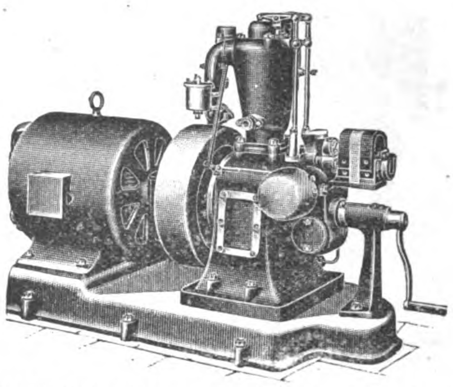

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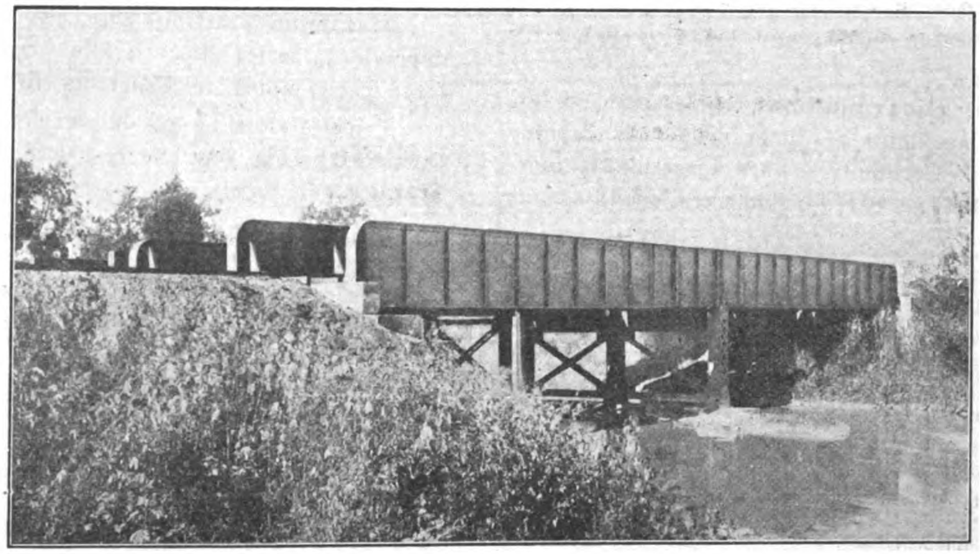

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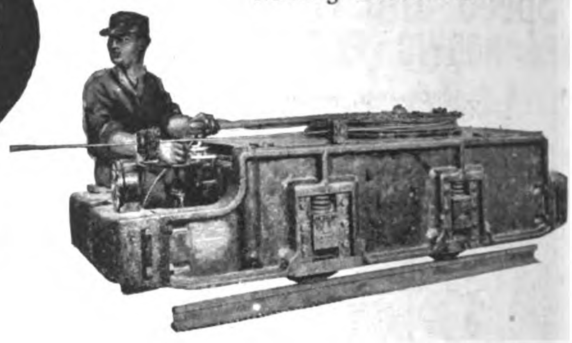

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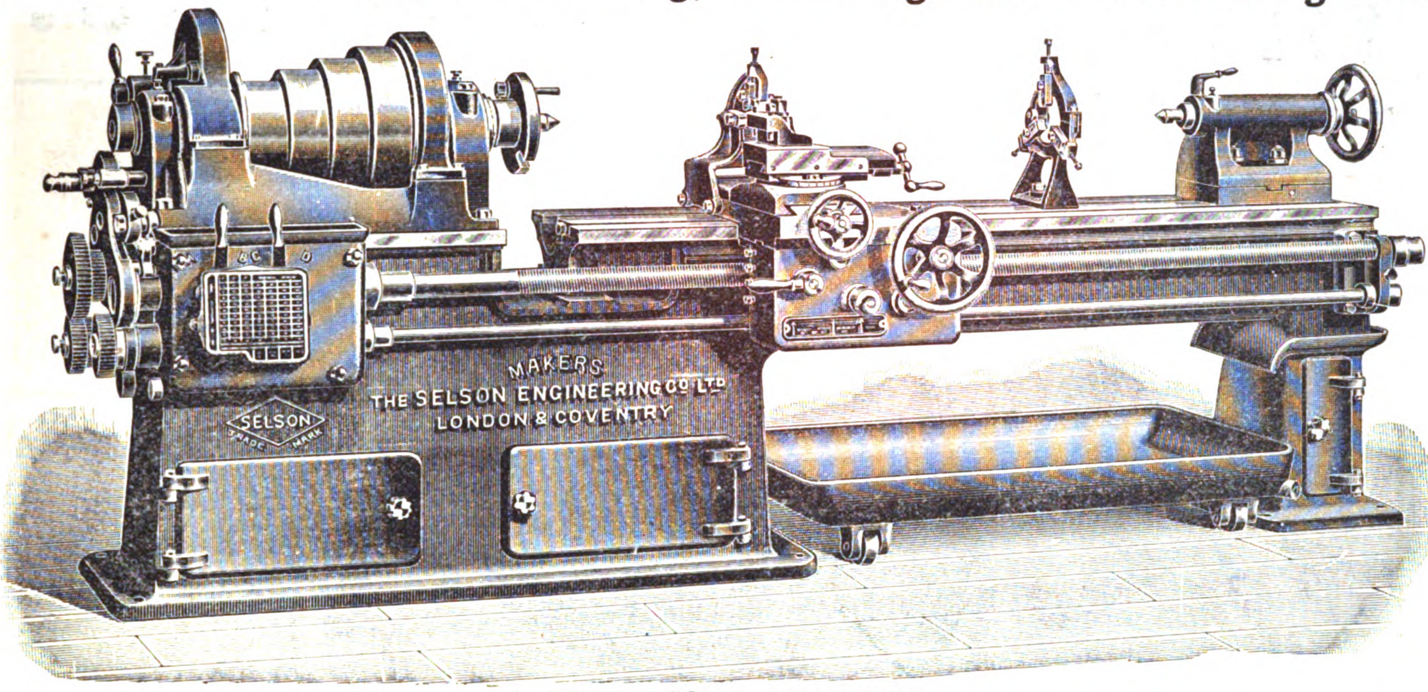

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Hollow spindle. Quick thread-cutting attachment. Improved labour-saving feed box. Dropping worm for disengaging feeds. All self-acting traverses interlocked. Narrow guide on bed, insuring greater steadiness to carriage. Top of bed quite flat.

Height of Centres	8½ ins.	10 ins.	12 ins.
Takes between Centres	4 ft.	7 ft. 6 ins.	11 ft.
Length of Bed	8 ft. 3 ins.	12 ft. 3 ins.	16 ft. 6 ins.
Swing in Gap	28½ ins.	33½ ins.	42 ins.

Approximate weight, cwts.	30	47	85
Price (Code Word)	*Pacifying.*	*Paciozza.*	*Paciscamus.*
Fixed steady extra		*Hornwrack.*	

Reverse motion on apron for sliding and surfacing, extra ... ... *Horrendo.*
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Automatic trip for sliding feeds, extra ... ... *Hornwork.*
Quick withdraw to cross slide, extra ... ... *Horoskop*

Above are also made with **All-Geared Headstock** for belt or motor drive. No idle-running gears. Sizes and dimensions as above.

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The Extension Bed, owing to its depth and special section, ensures great rigidity.

By its use the width of Gap can be increased, likewise distance between centres.

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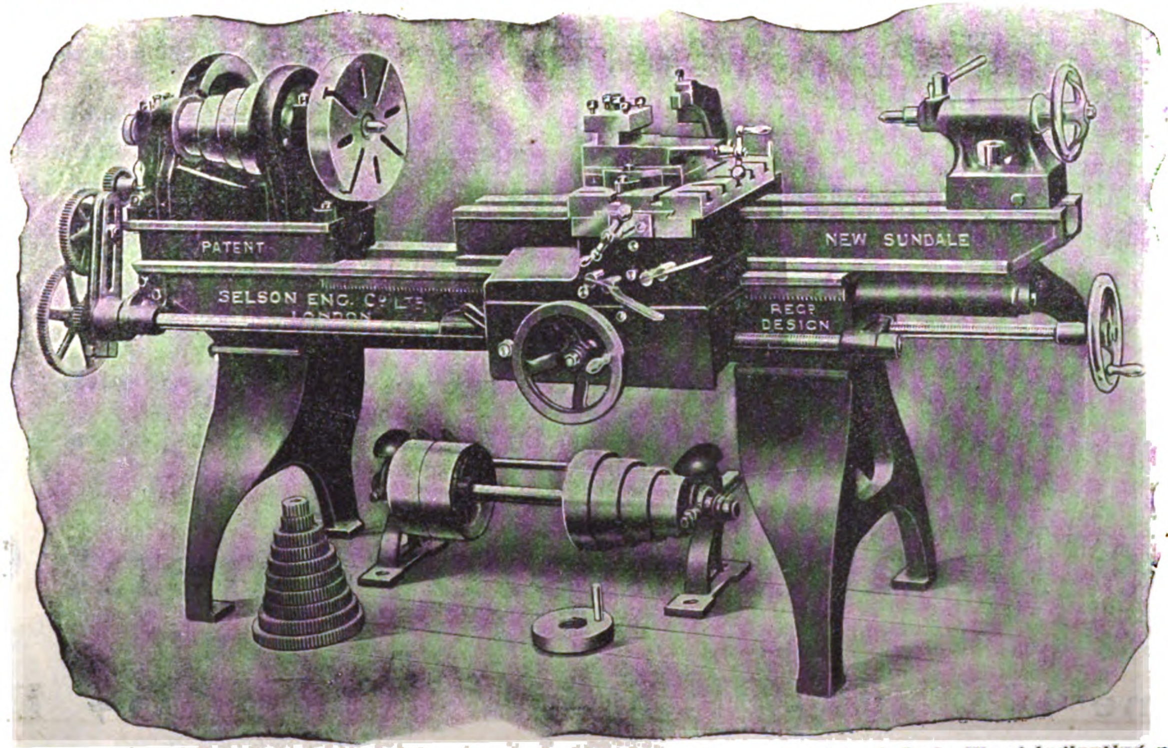

Both Saddle and Extension Bed are adjustable independently.

Distance between Centres, 2 ft. 9½ ins., can be increased to 4 ft. 3½ ins.

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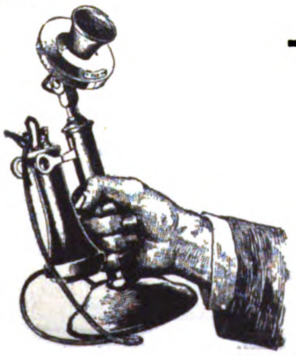

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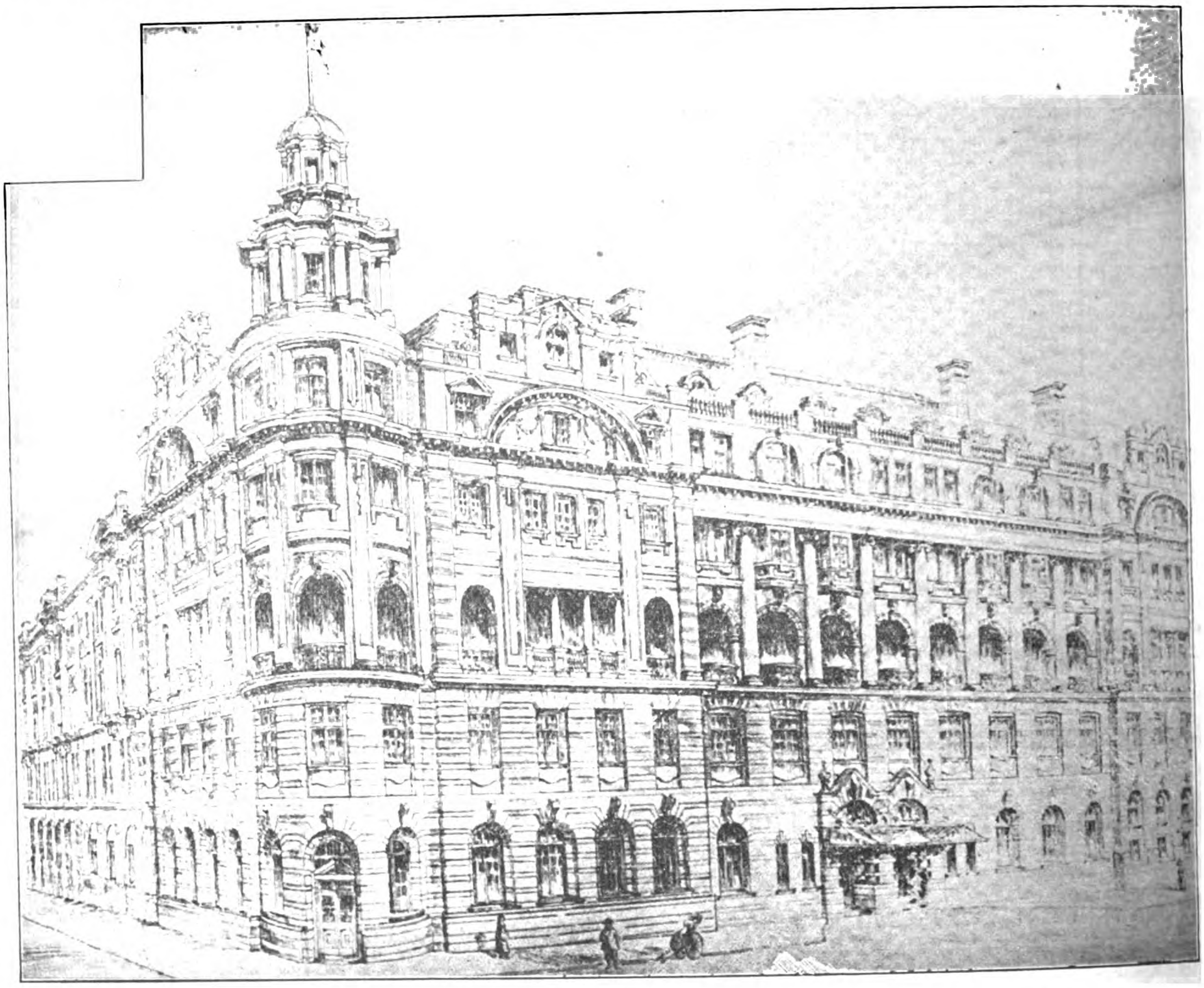

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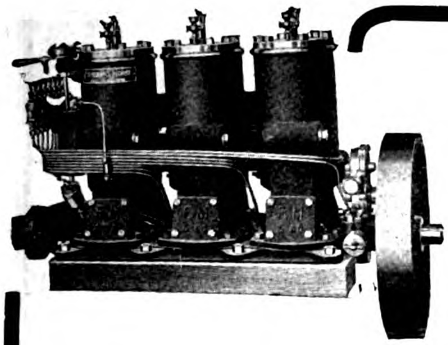

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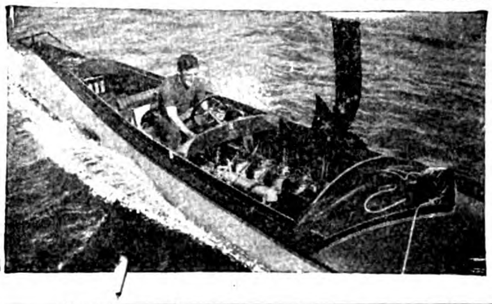

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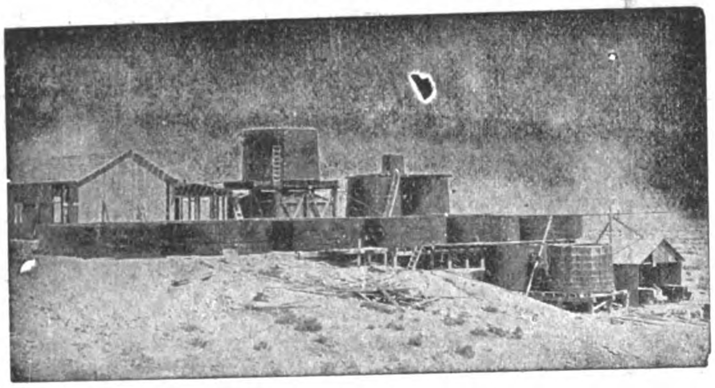

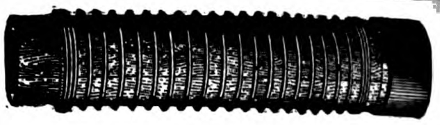

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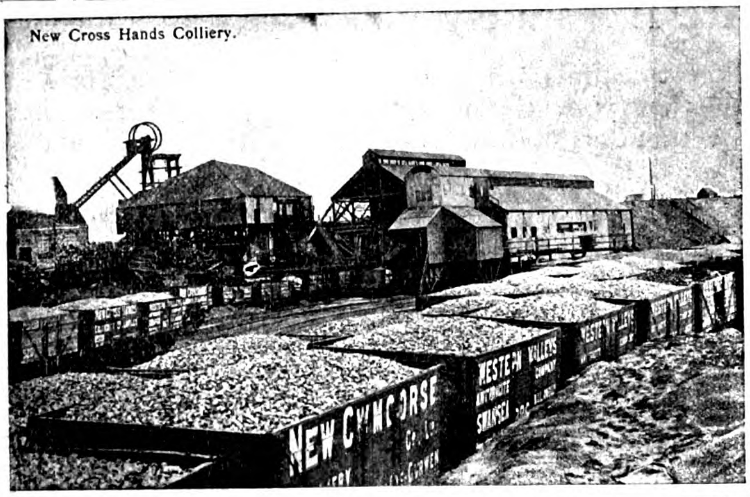

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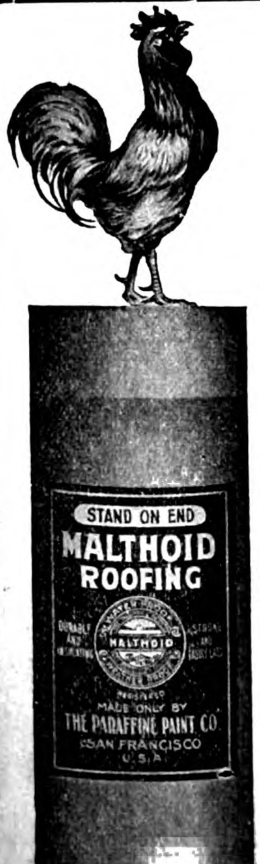

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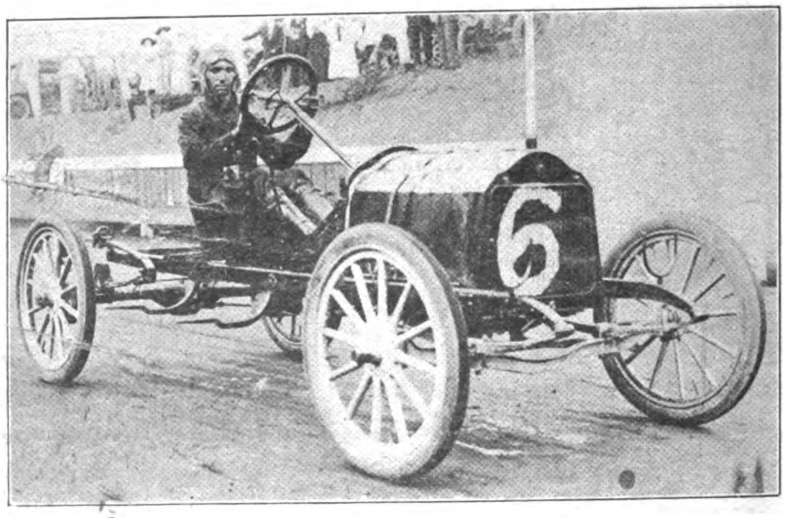

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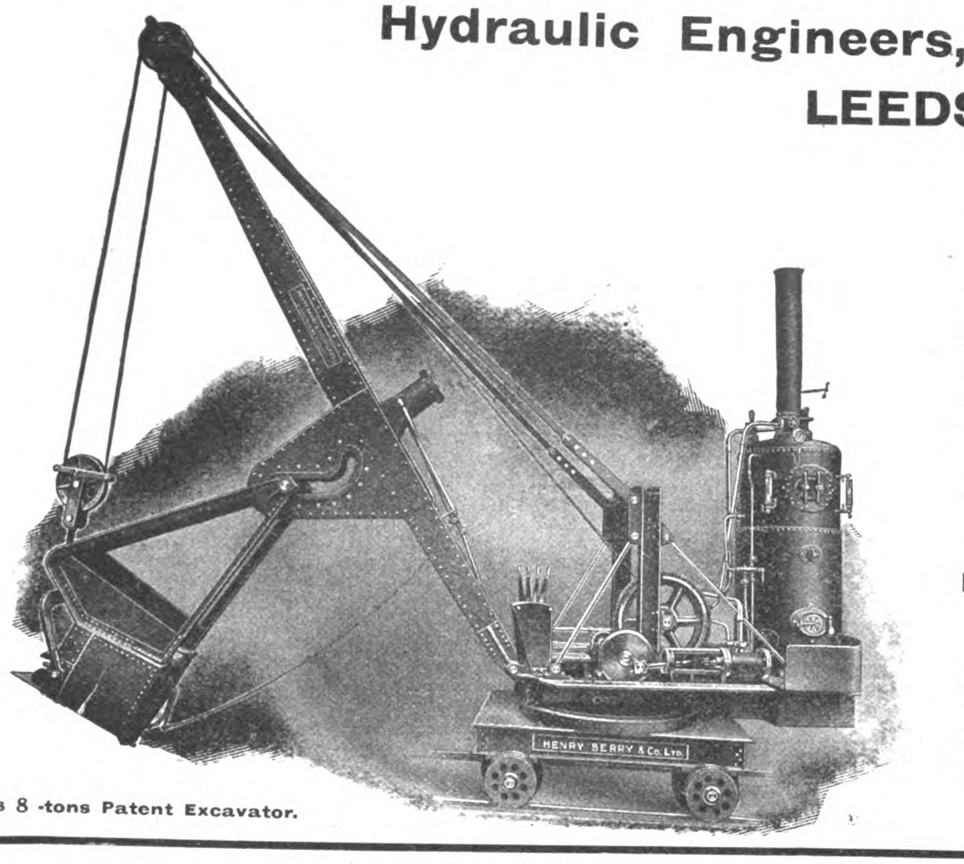

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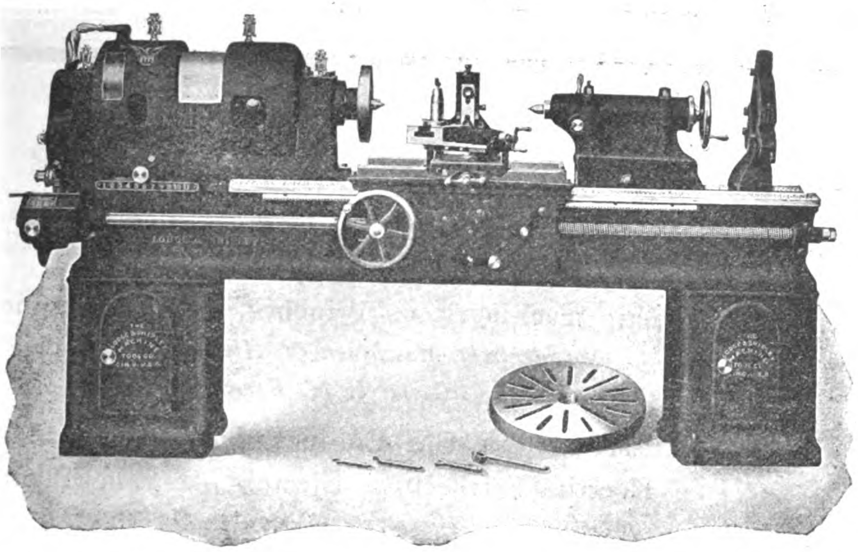

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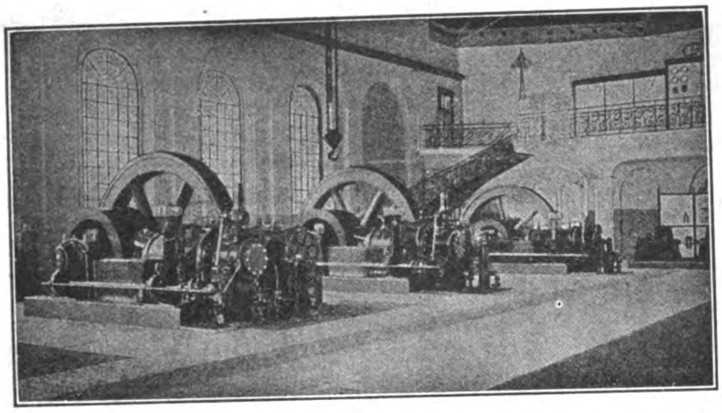

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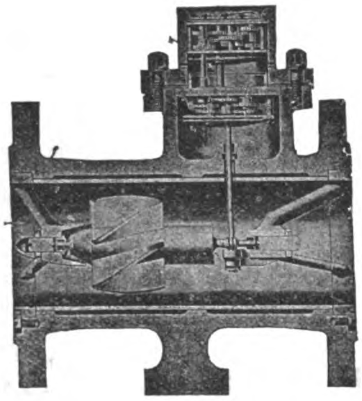

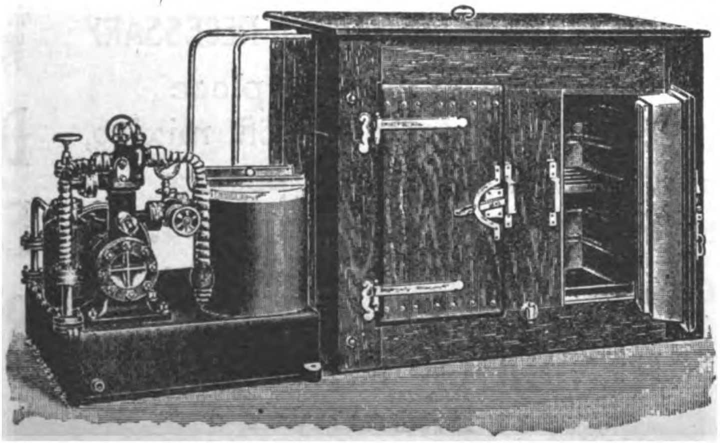

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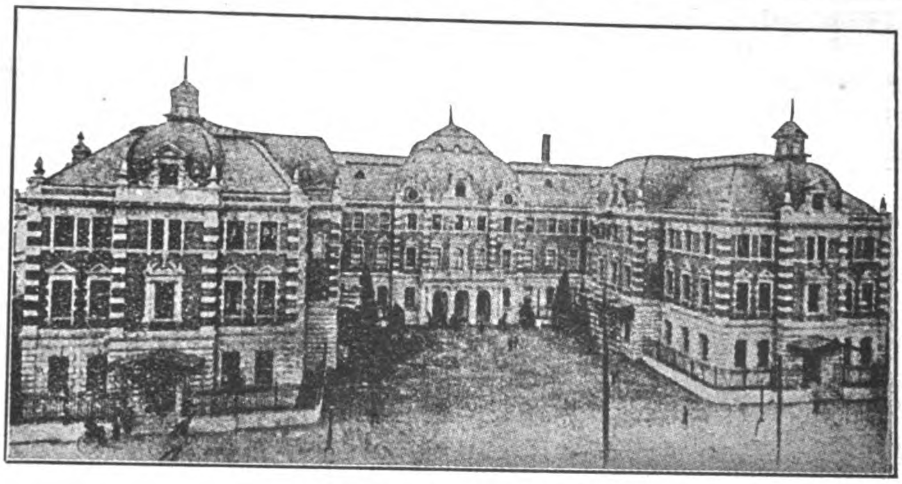

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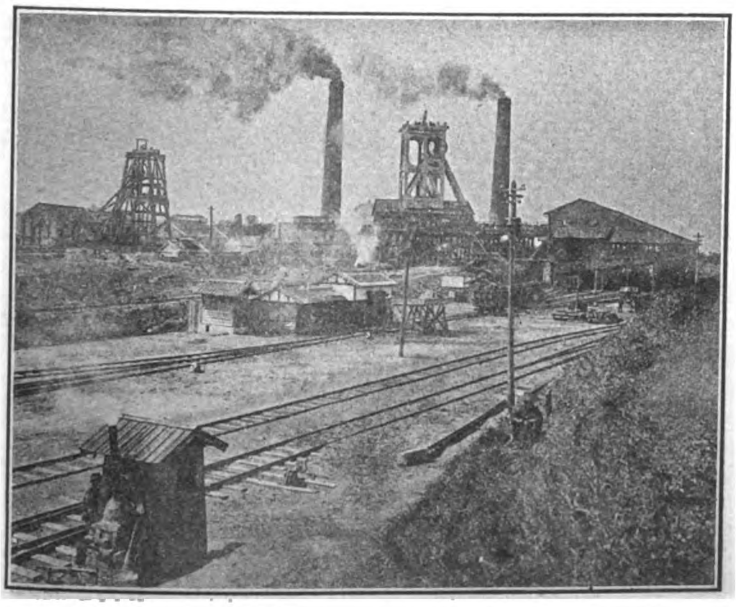

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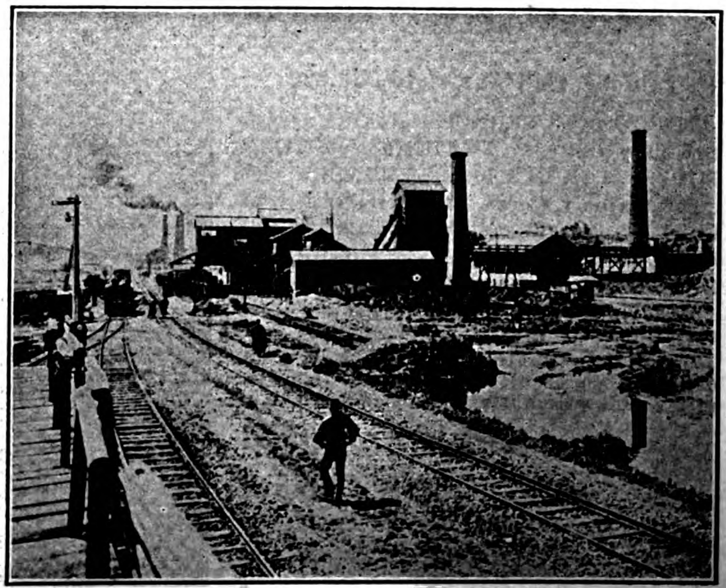

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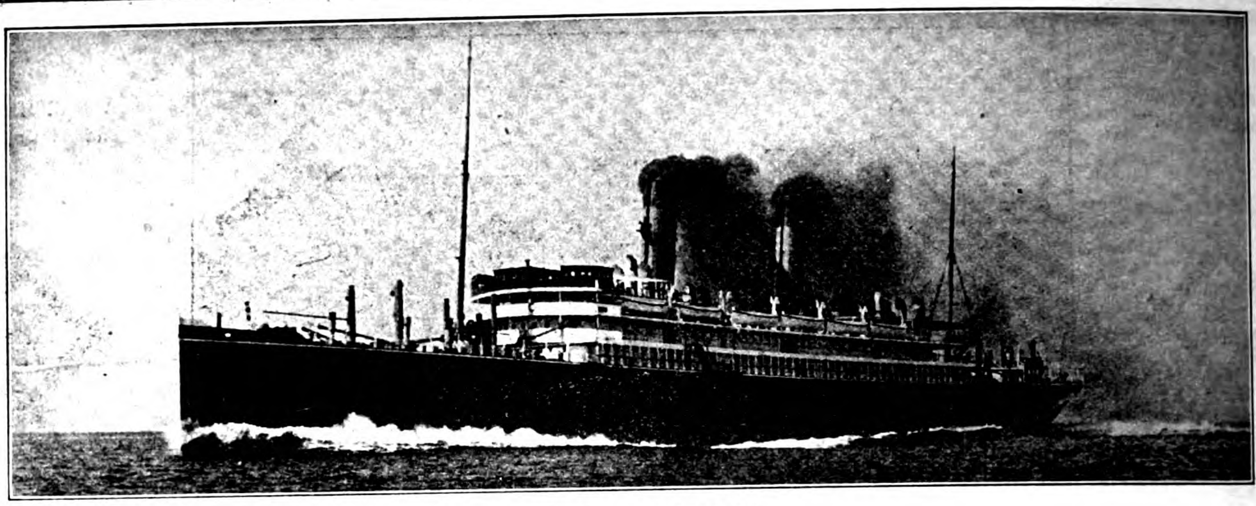

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TRANS-PACIFIC TURBINE DRIVEN PASSENGER STEAMER "CHIYO-MARU" FOR T. K. K.—Built and engined by the Mitsu Bishi Dockyard and Engine Works, Nagasaki, November 1908.—Length (overall), 570 feet 0"; Breadth, moulded, 63 feet 0"; Depth (shelter deck), 46 feet 6"; Gross tonnage, 13,426 tons; Displacement, 18,725 tons; Engines, Parsons' Three Shaft Arrangement; Boilers, Single Ended Scotch Boilers (13); I. H. P., 19 591; Speed, 21 knots. (This photo was taken on her full speed trials the 13th October, 1908.)

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	DOCK NO. 1.	DOCK NO. 2.	DOCK NO. 3.
EXTREME LENGTH	523 FT.	371 FT.	722 FT.
LENGTH ON BLOCKS	513 "	360 "	714 "
WIDTH OF ENTRANCE ON TOP	88 "	66 "	99½ "
" " " BOTTOM	77 "	53 "	88½ "
WATER ON BLOCKS AT SPRING TIDE	26½ "	22 "	34½ "

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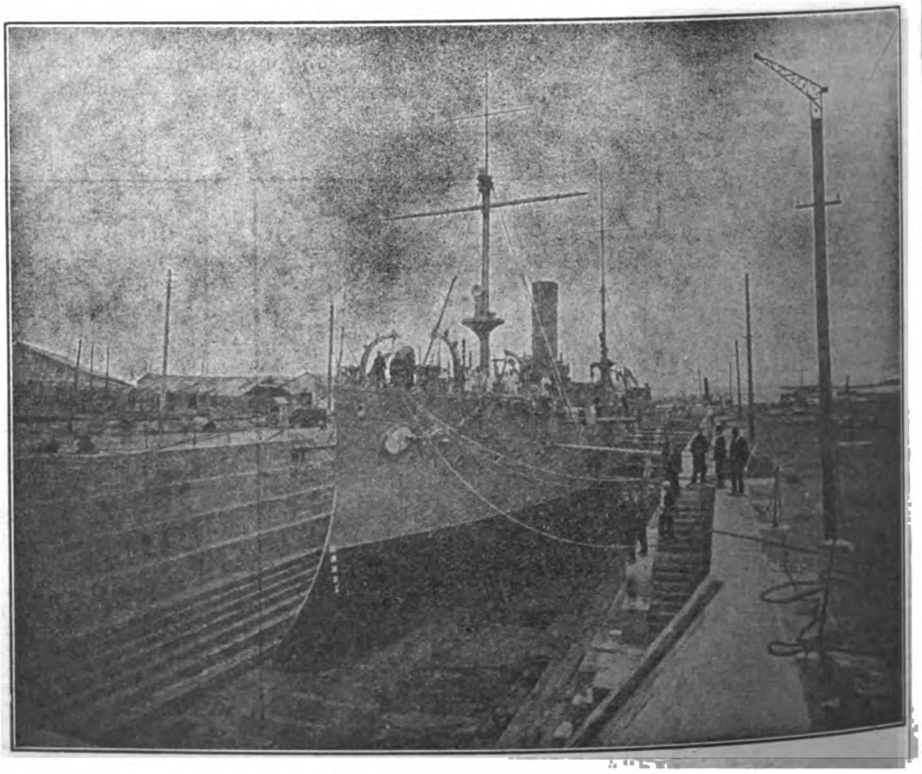

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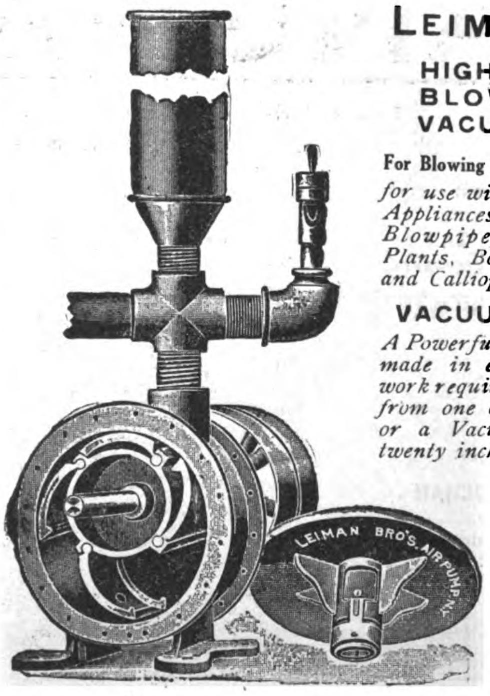

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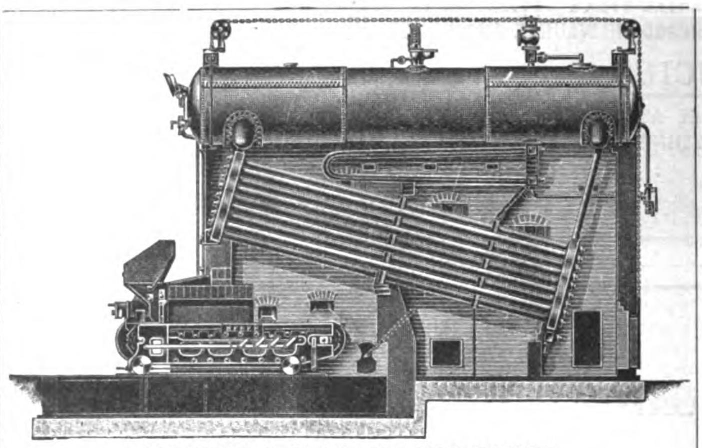

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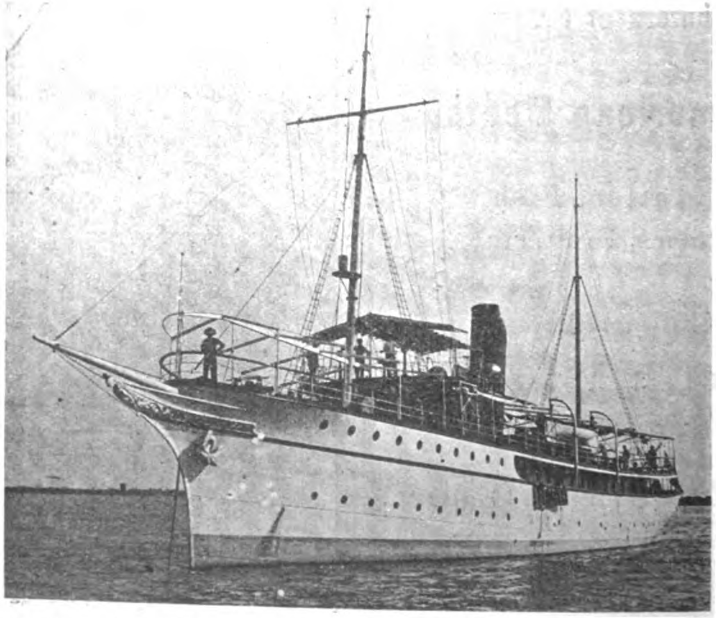

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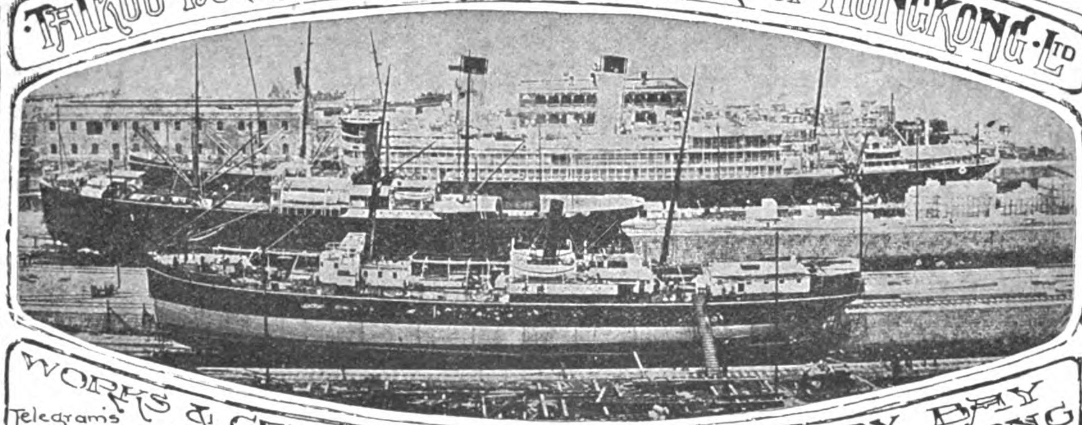

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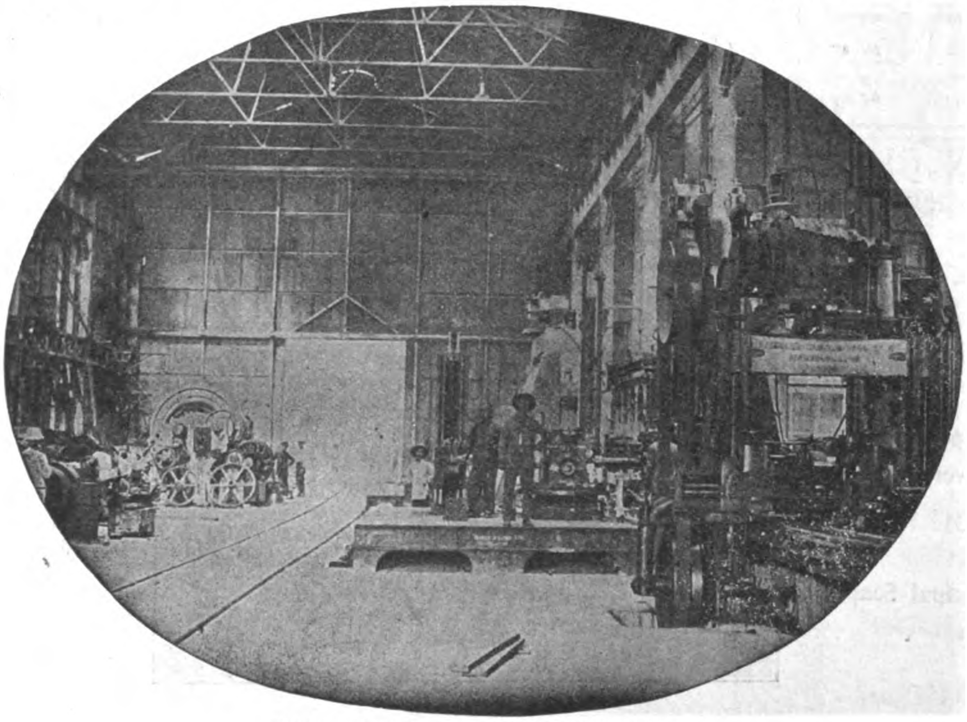

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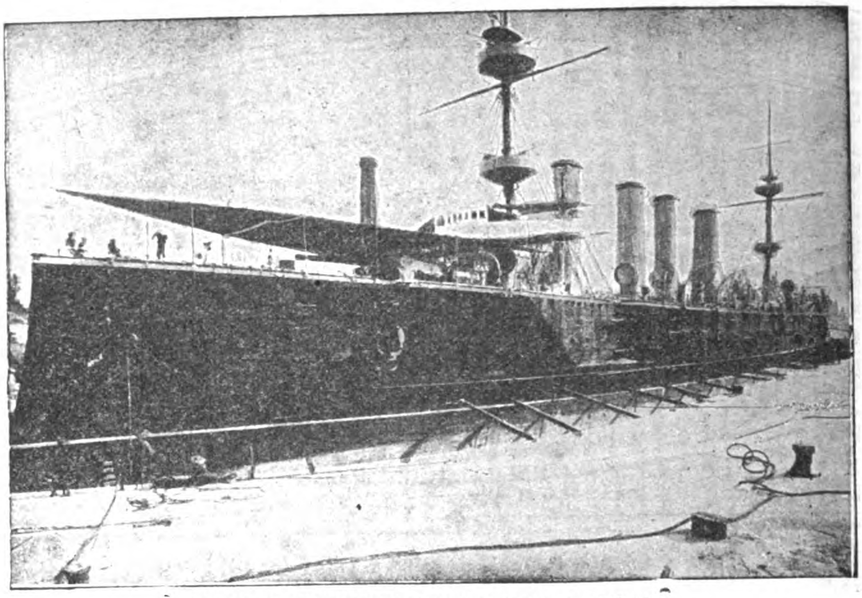

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KOWLOON	*Feet*	*Feet*	*Feet*	*Feet*	*Feet*
No. 1 Dock, Kowloon.........	700	86 ft. top / 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon.	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon...	240	60′	14′	7′ 6″	—
Patent Slip, No. 2, Kowloon...	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
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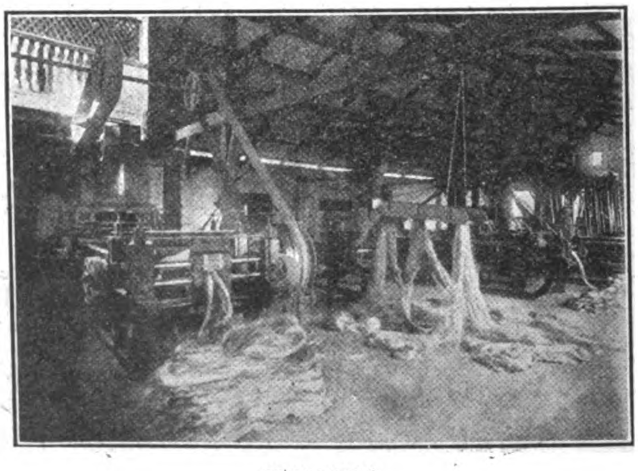

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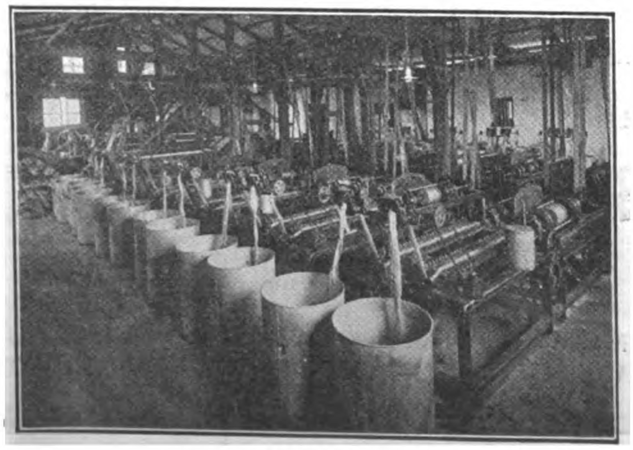

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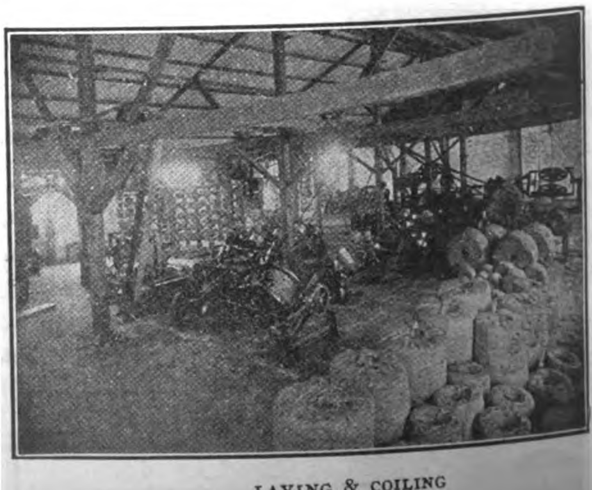

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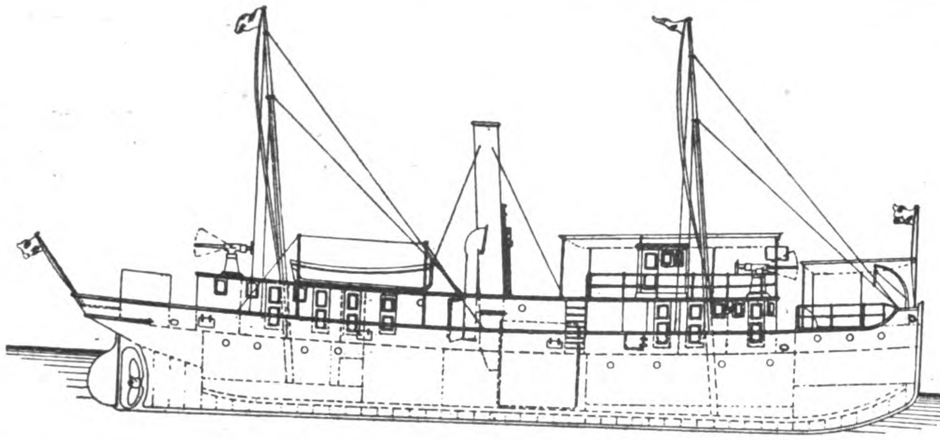

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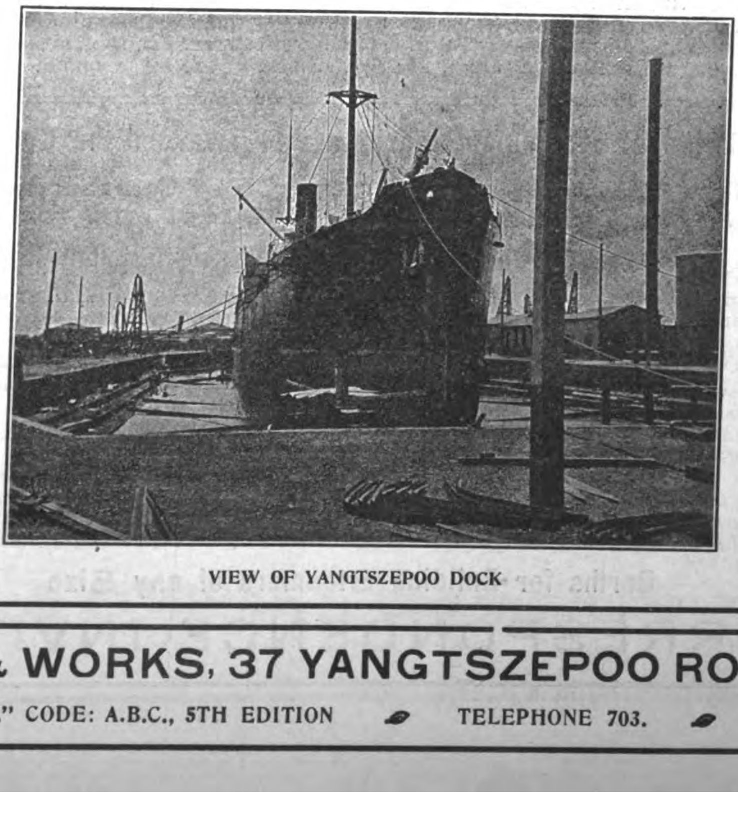

VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK
LENGTH ON BLOCKS 455'0"
" OVERALL - 469'0"
WIDTH, ENTRANCE 74'0"
" SILL - - 64'0"
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21'0"
DEPTH ON 3'0" BLOCKS (H. W. O. S. TIDES) 19'0"
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
WORKSHOPS LOCATED AT HEAD OF DOCK

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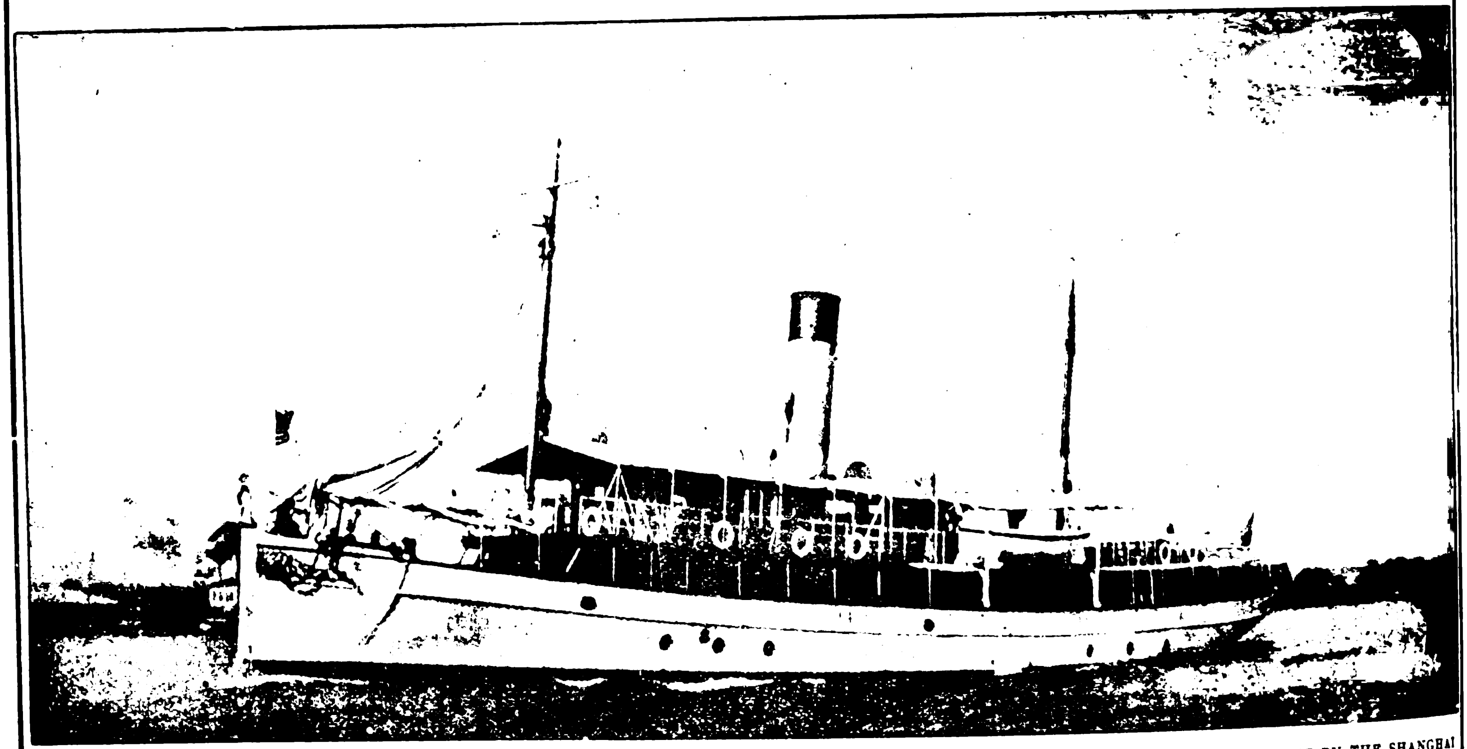

COMPOSITE COAST GUARD AND REVENUE CRUISERS FOR THE GOVERNMENT OF THE PHILIPPINE ISLANDS: BUILT AND ENGINED BY THE SHANGHAI DOCK AND ENGINEERING CO. LTD.; LENGTH OVERALL—148; LENGTH B. P.—140; BREADTH—25; DEPTH—11′9″; SIZE OF ENGINES: H. P. CYLINDER—18″; L. P. CYLINDER—86′; STROKE—24″; I. H. P. 600. S. S. BALALAC, BASILAN, BUSUANGA, CORREGIDOR, LEYTE, LUZON, MASBATE, MINDANAO, MINDORO, NEGROS, PALAWAN, PANAY, POLILLO, SAMAR, TABLAS.

The Model exhibited at St. Louis Exposition and awarded the Gold Medal in 1904

3-90 feet, and 3-60 feet Launches built for the Chief Quartermaster's Dept. Manila in 1910 and The Sea-going Tug "General Weeks" 140 feet long for the same Department

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The Dock charges are the most moderate in the Far East.

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The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as traveling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Light railway lines are laid throughout workshops and yards.

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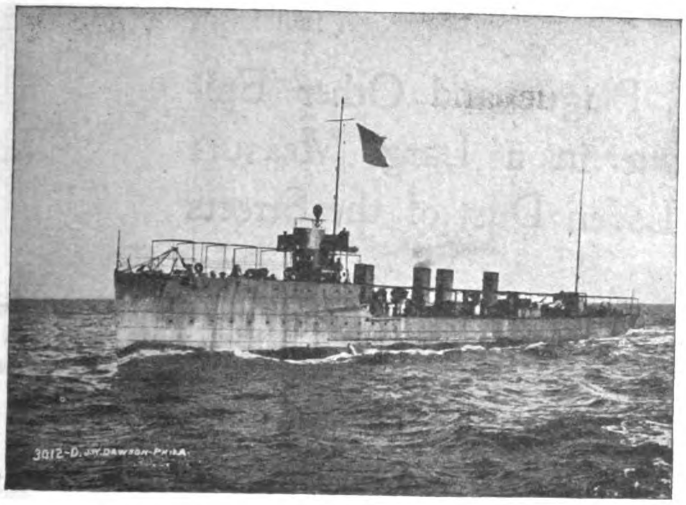

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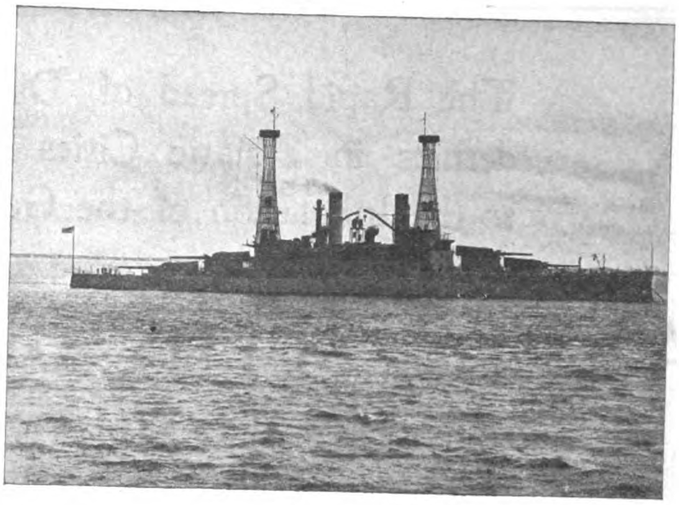

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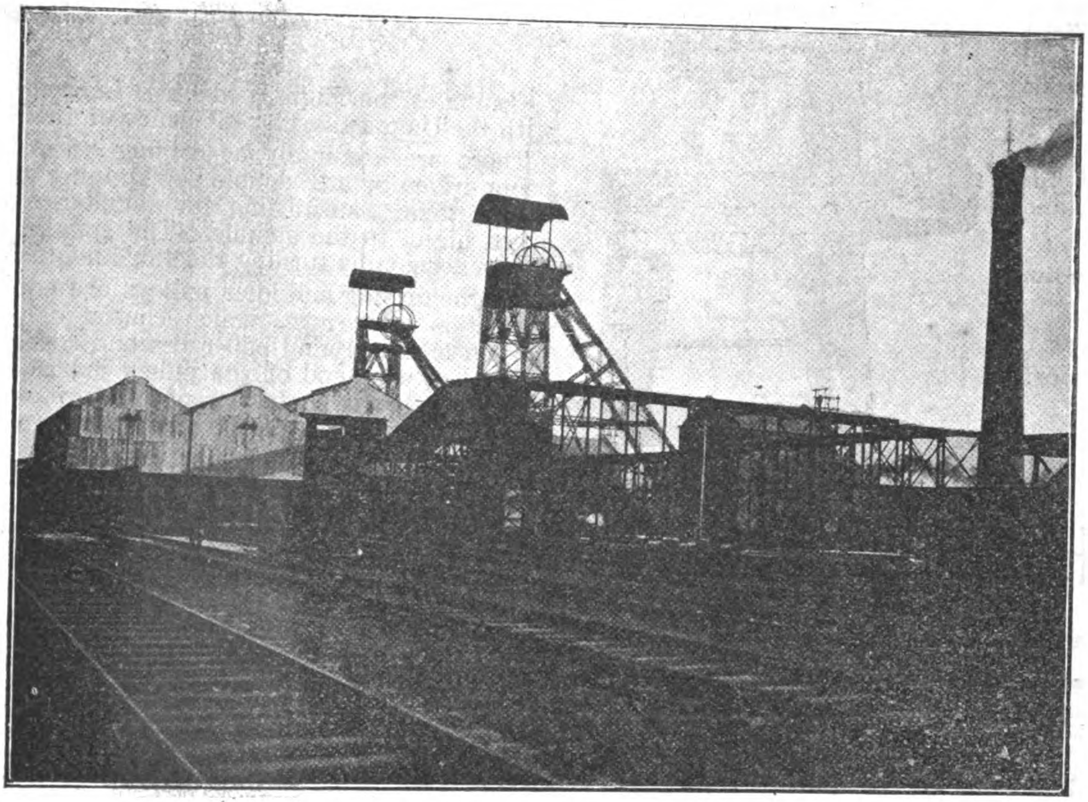

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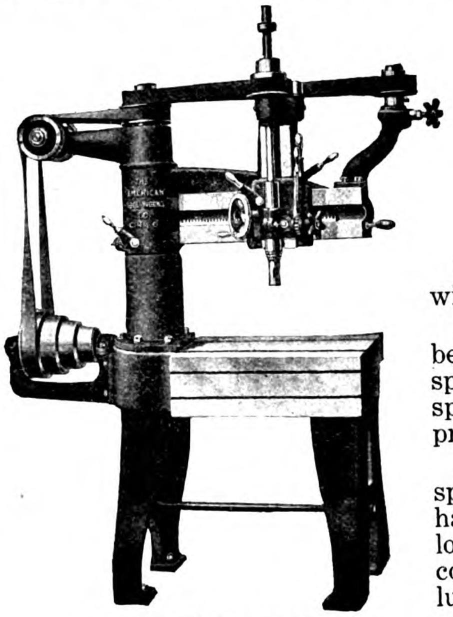

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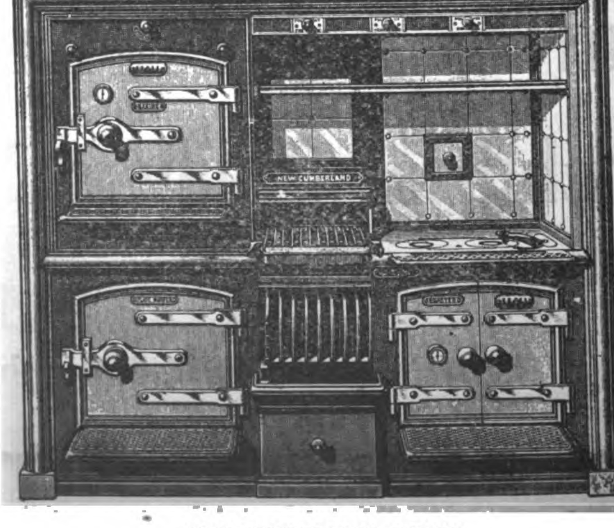

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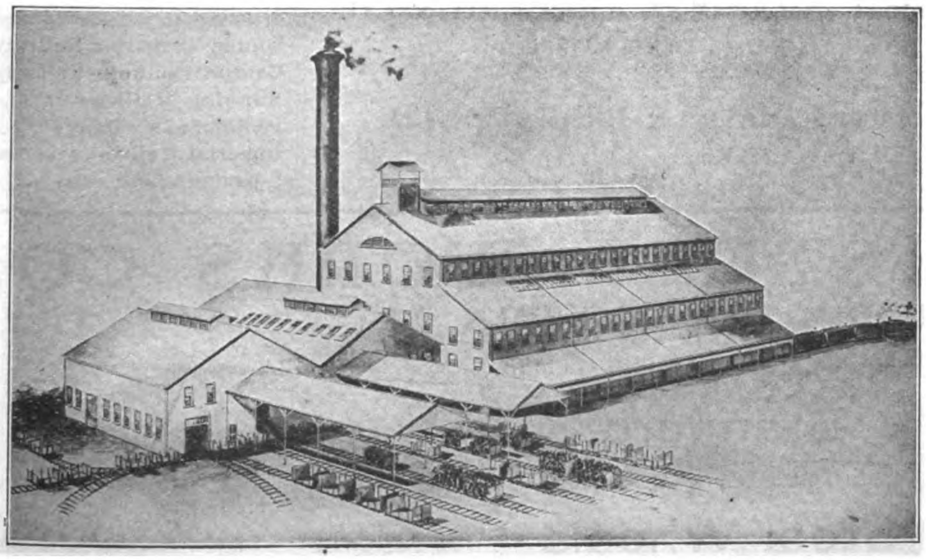

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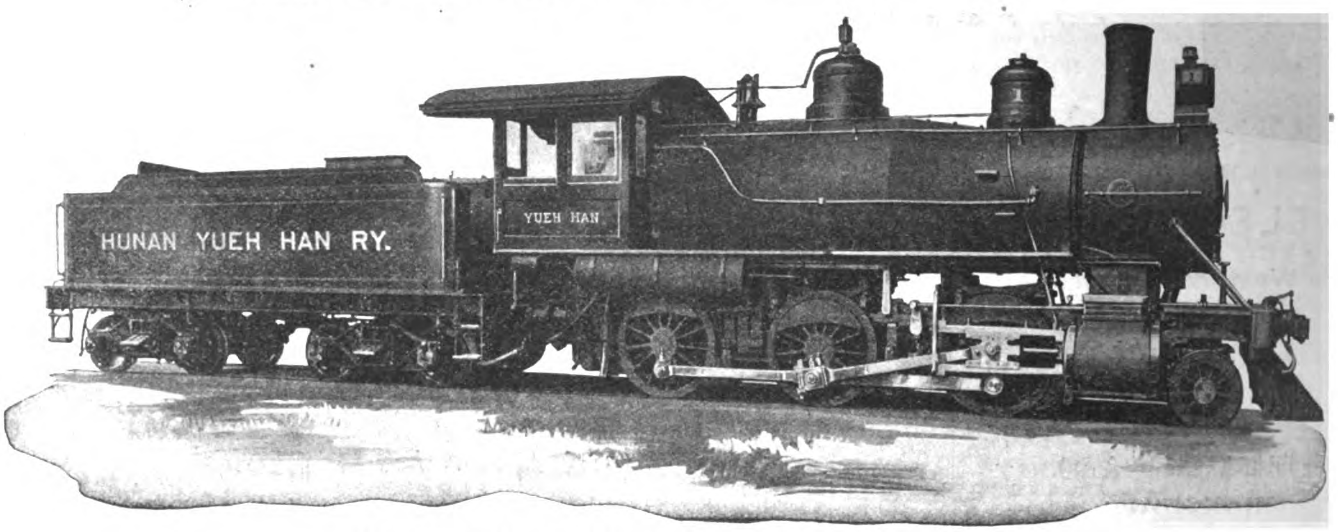

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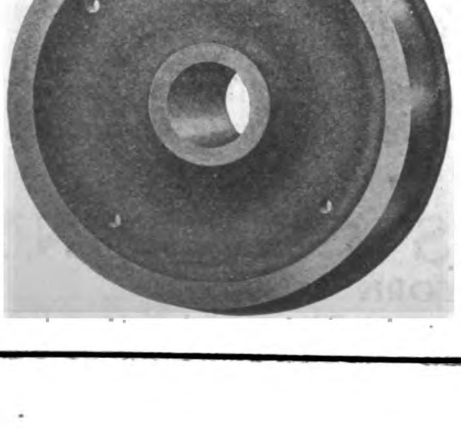

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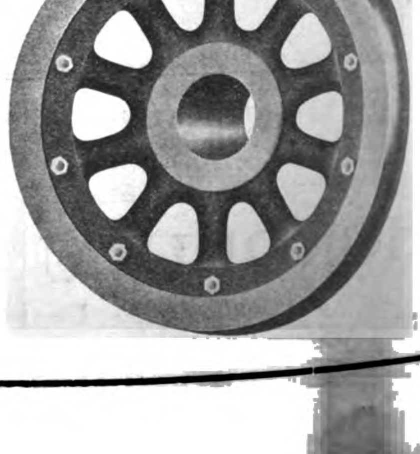

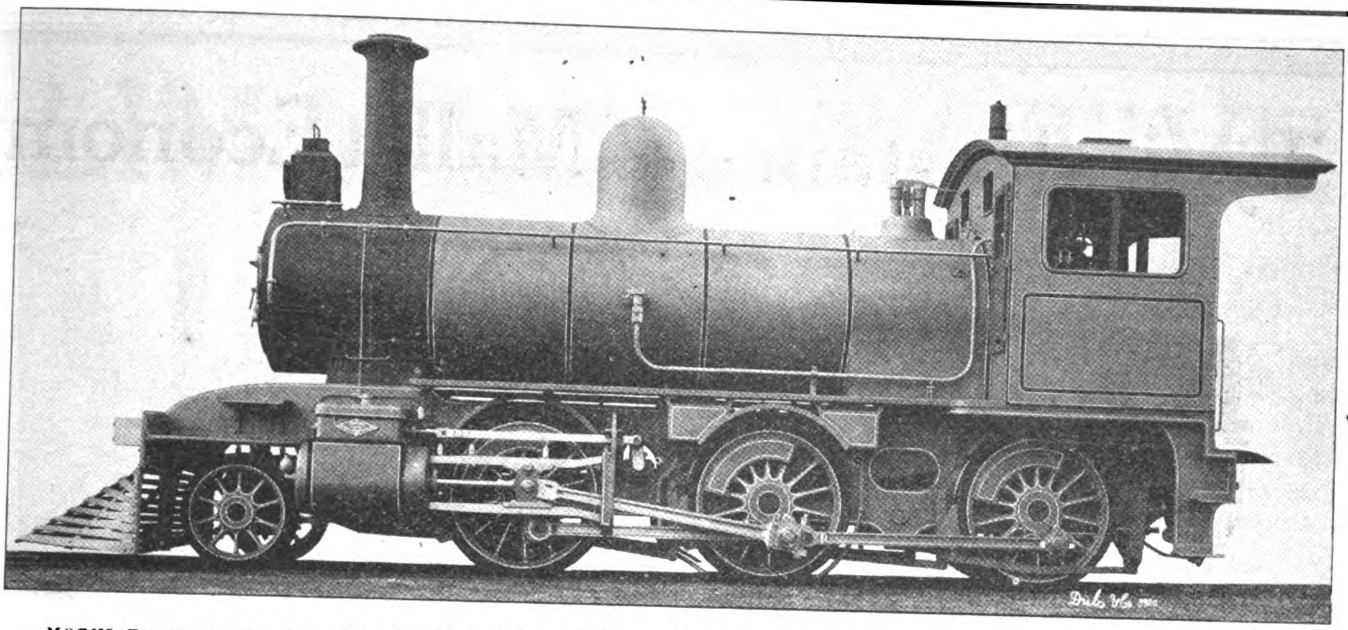

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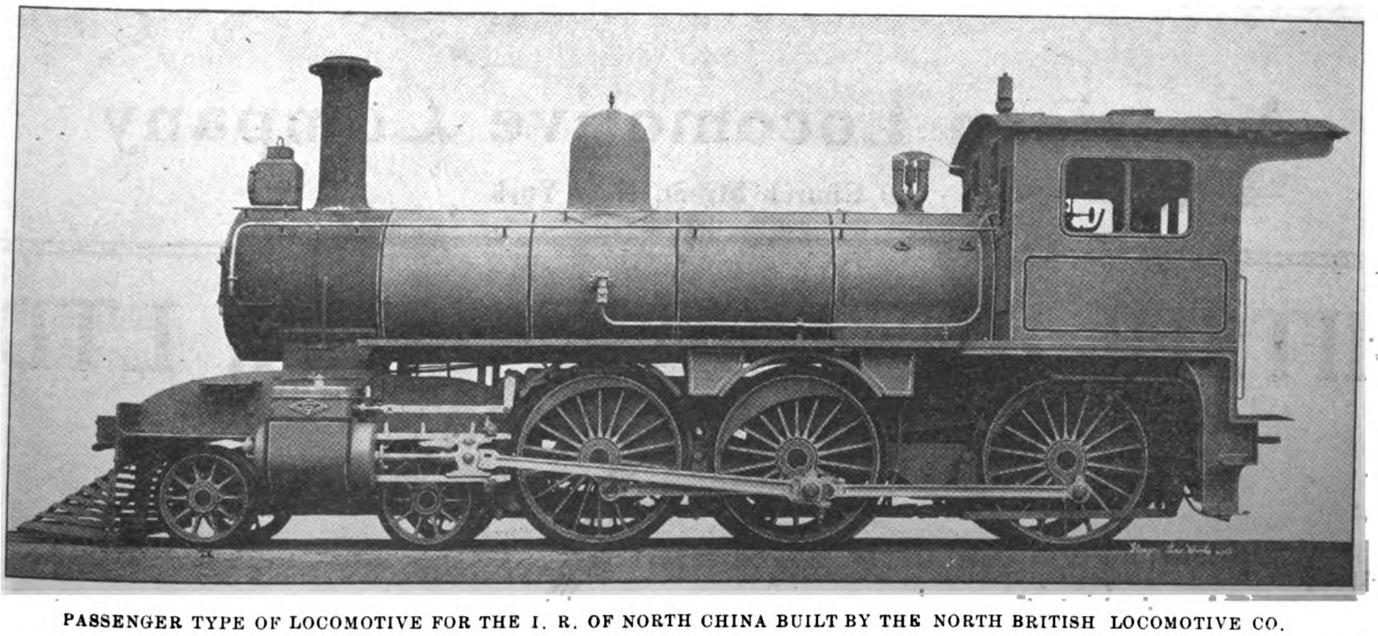

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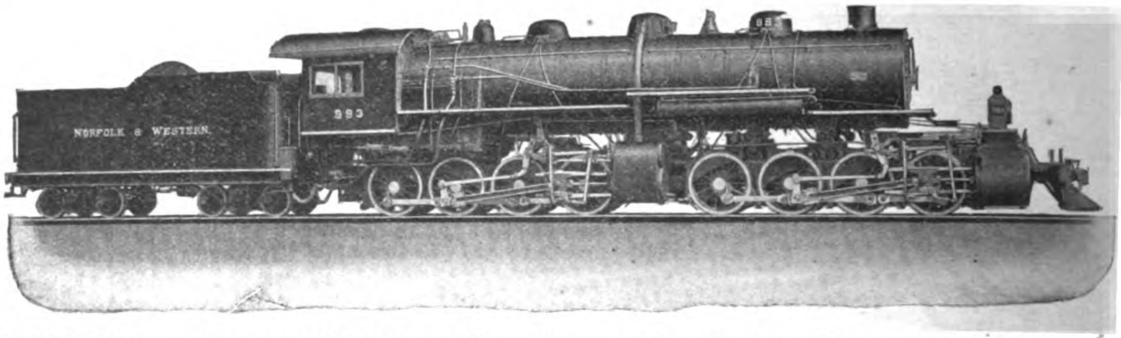
A Typical Instance of Mallet Economy



Total Weight in working order, 375,000 pounds; maximum tractive effort, working compound, 85,000 pounds; working simple, 102,000 pounds; gross weight of train on 1.32 per cent grade at 10 M. P. H., 2,160 tons.

A year ago the Norfolk & Western Railway, using twelve-wheel locomotives, double headed their freight trains over their maximum (2 per cent) grades on mountainous divisions.

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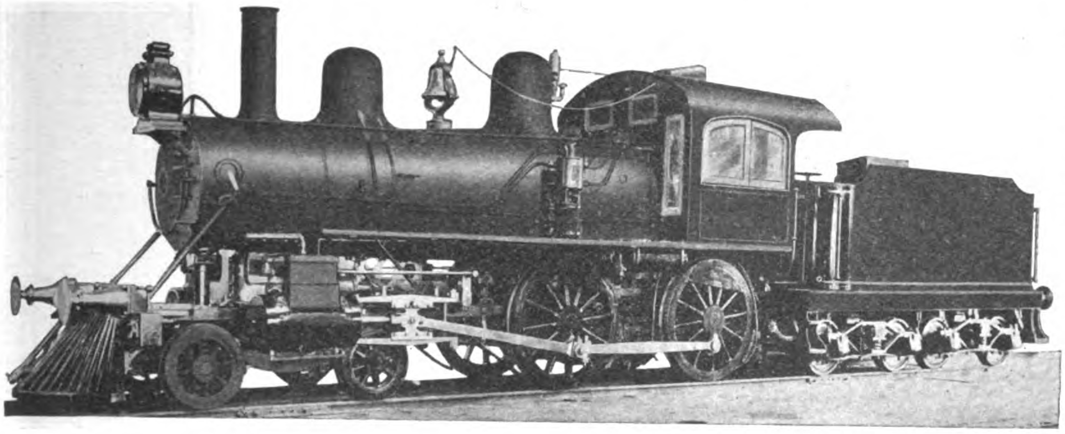

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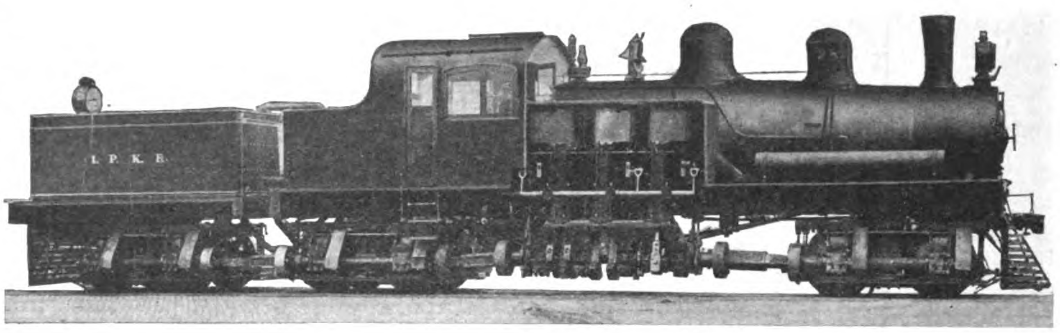

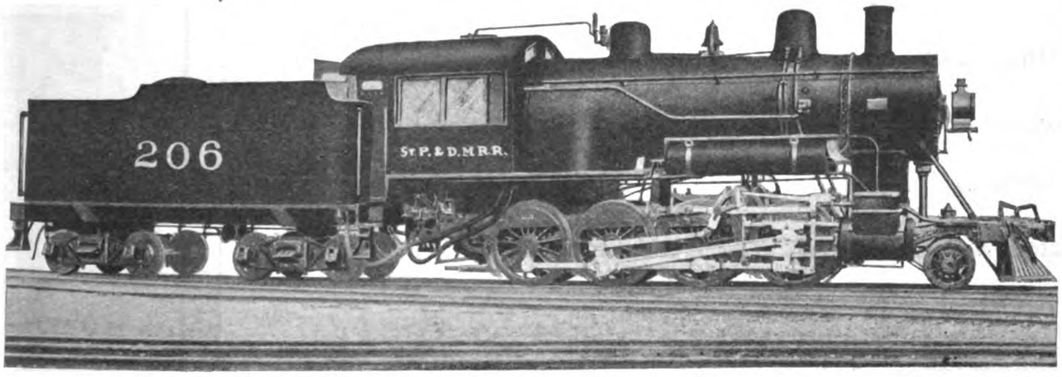

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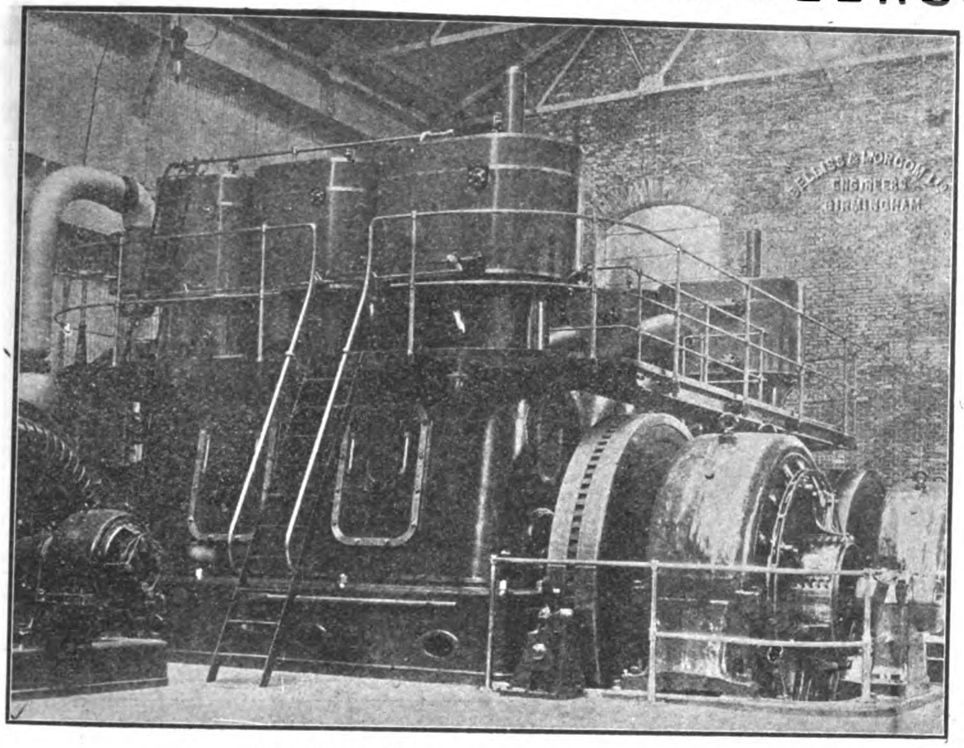

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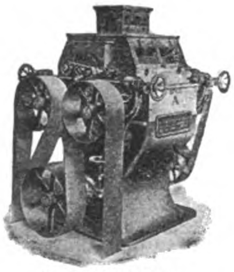

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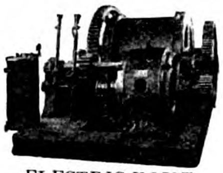

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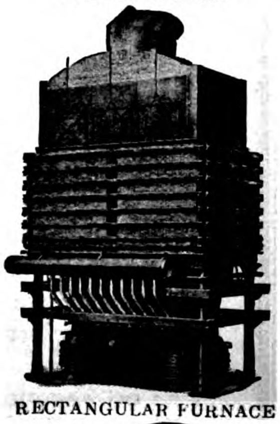

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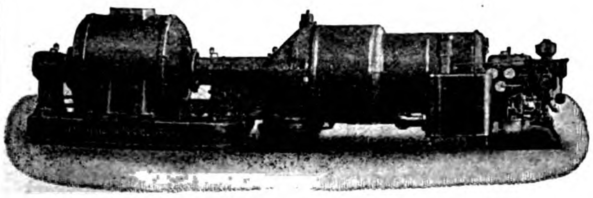

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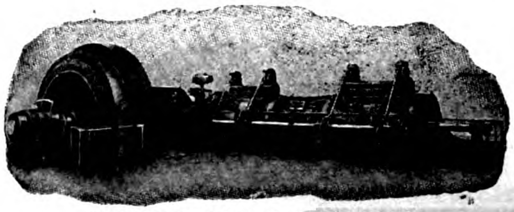

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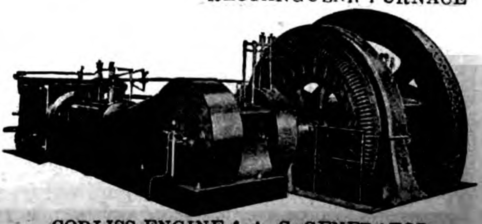

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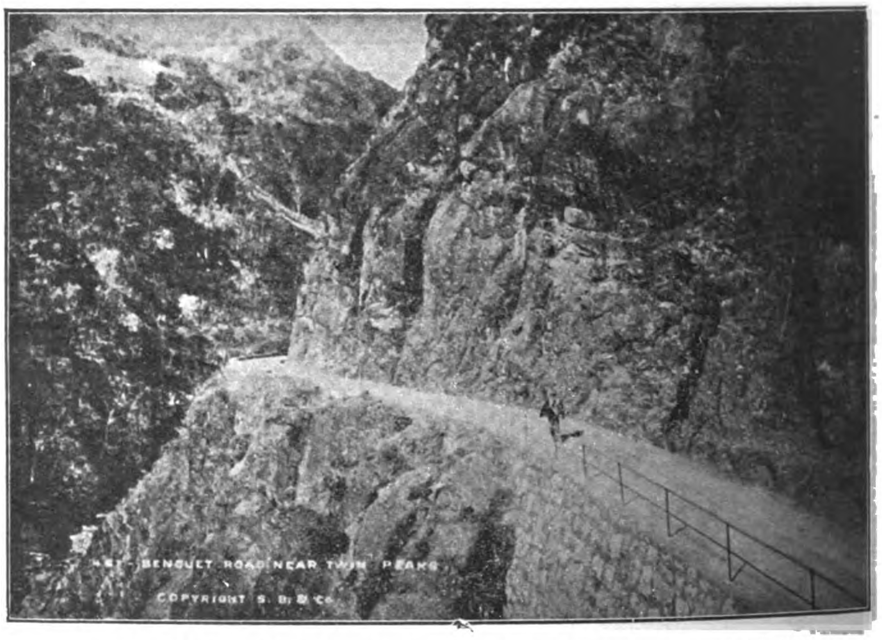

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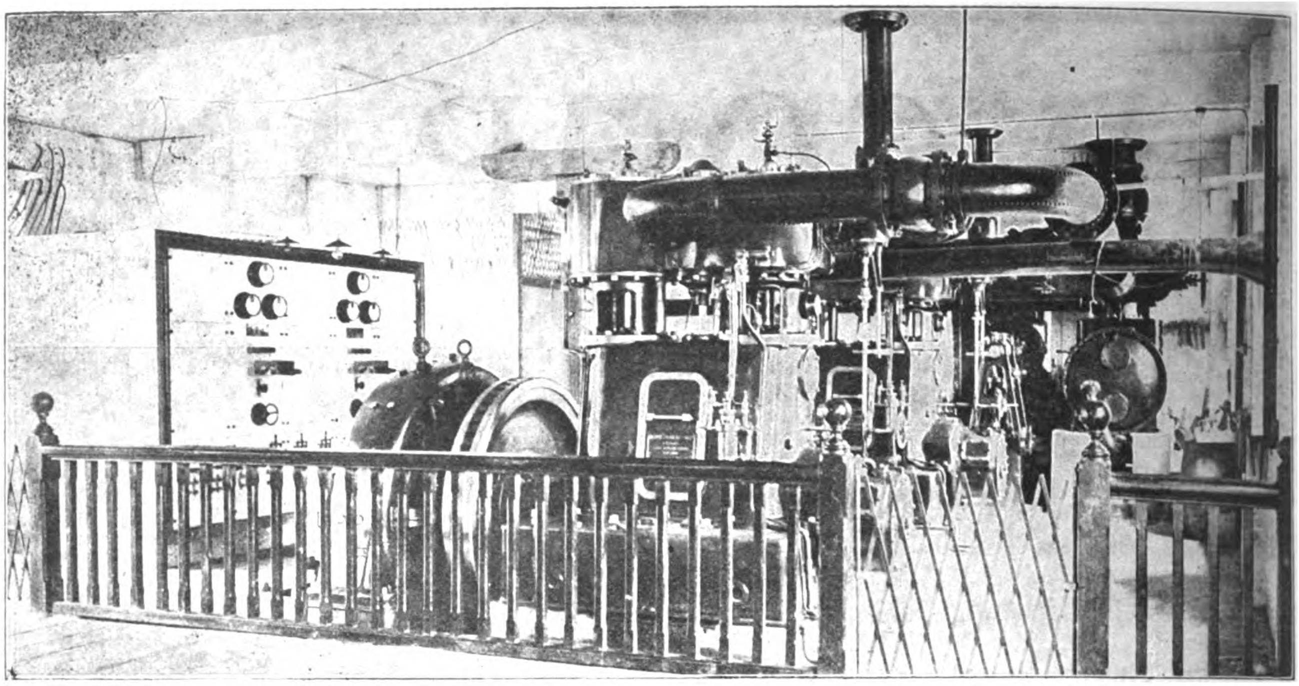

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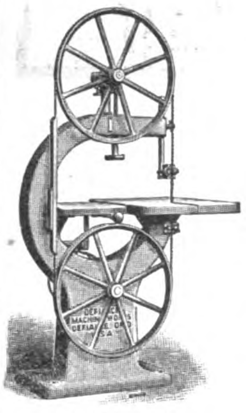

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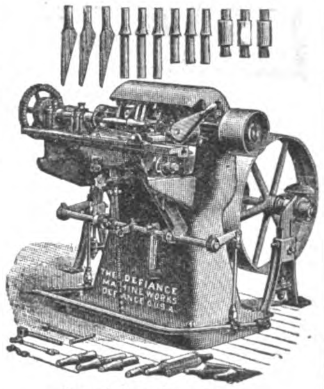

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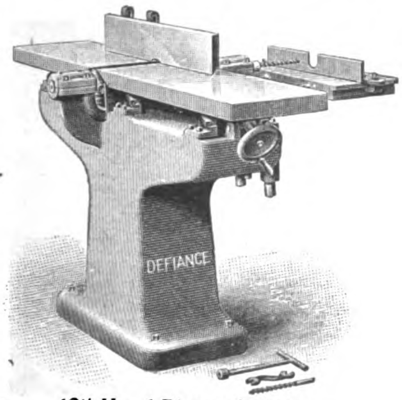

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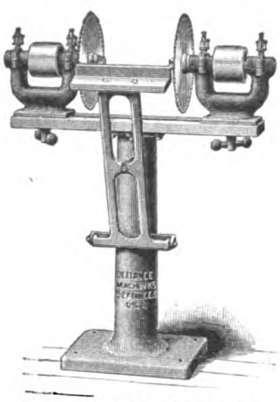

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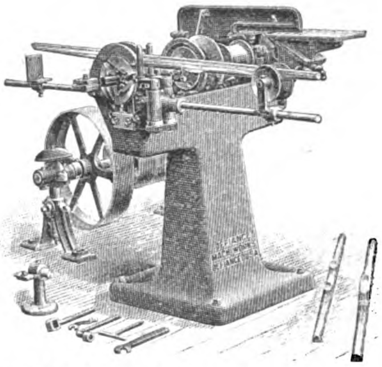

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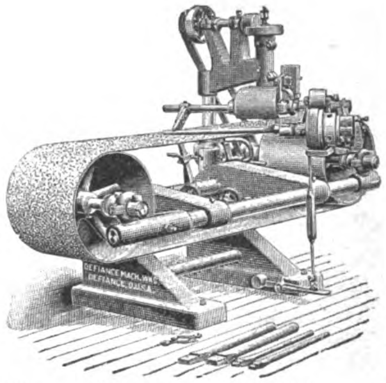

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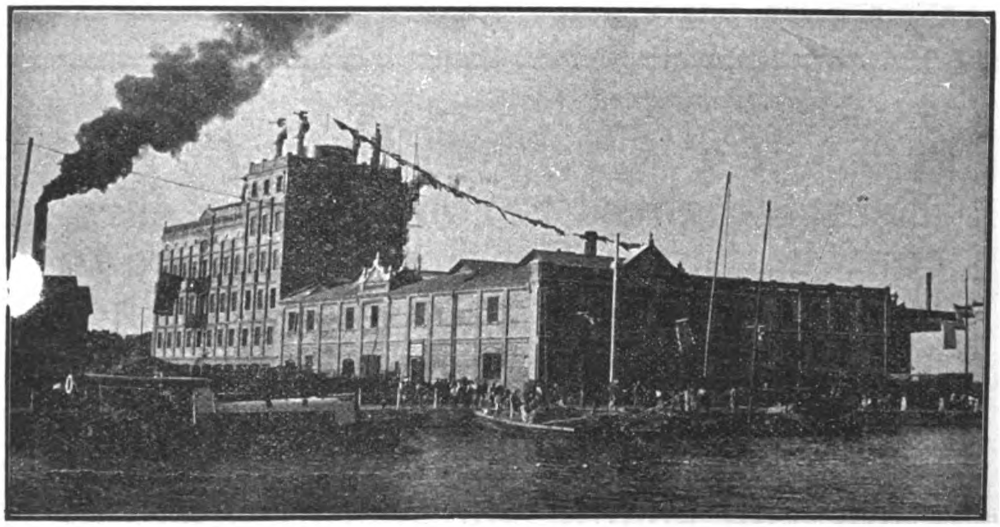

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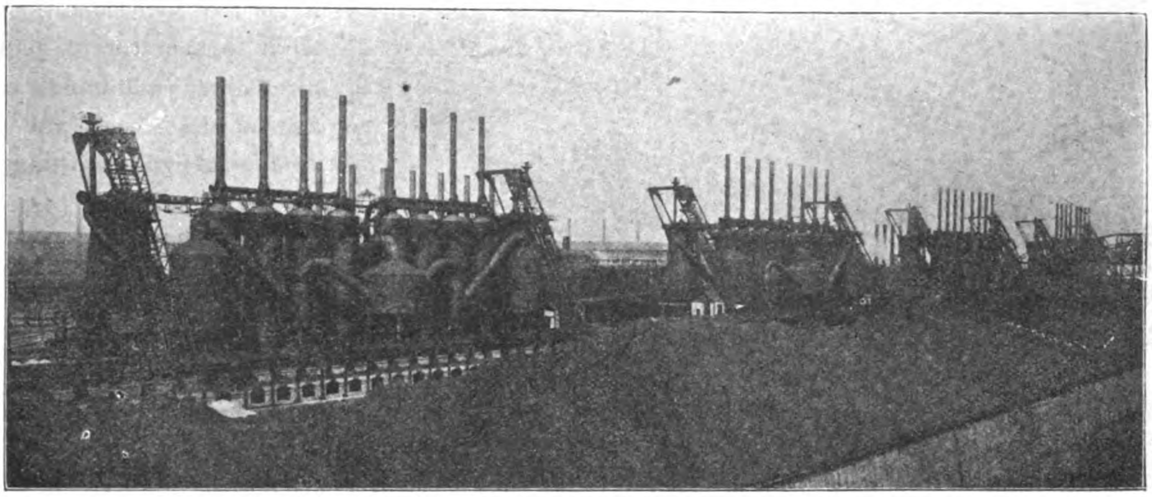

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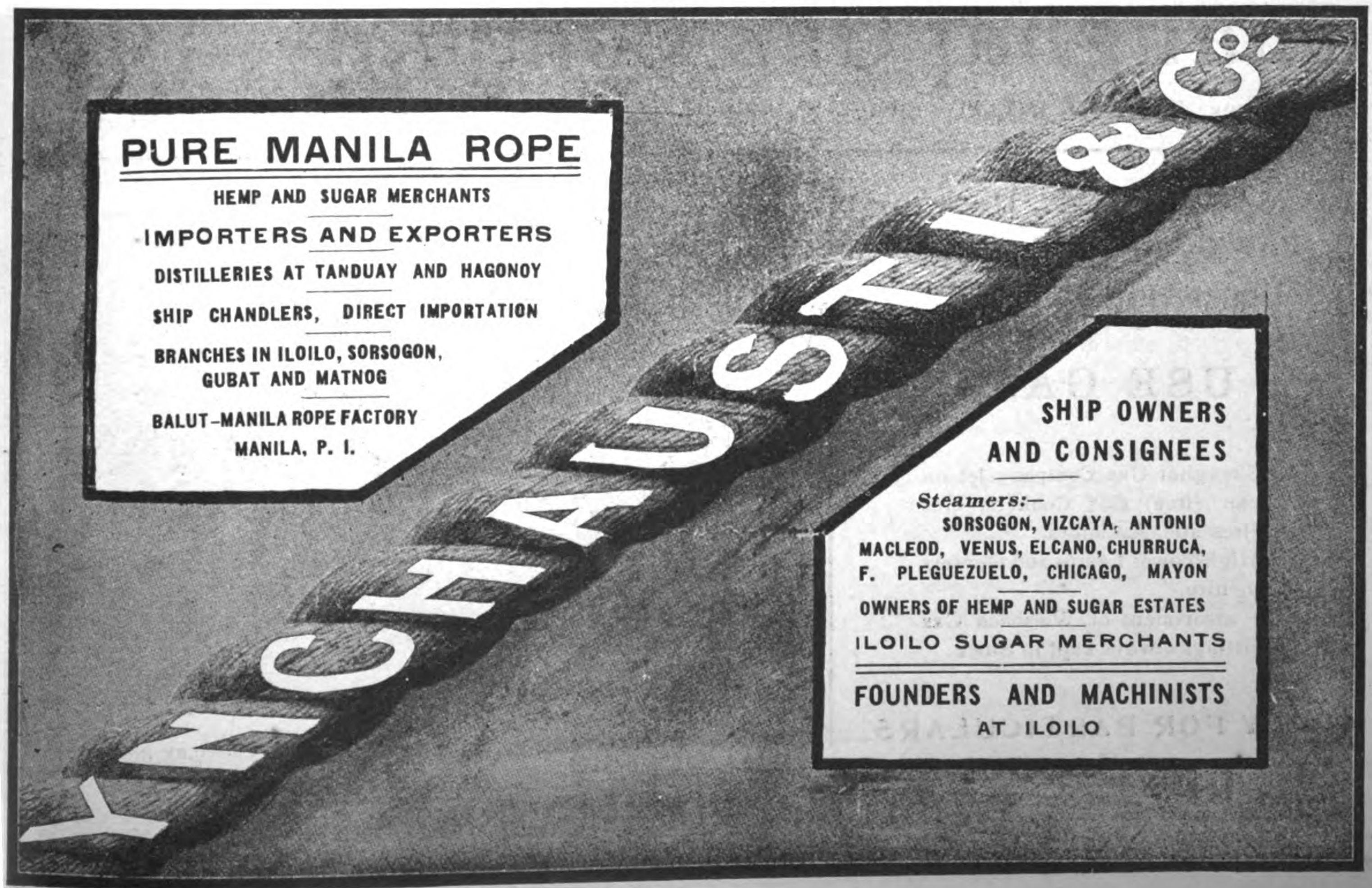

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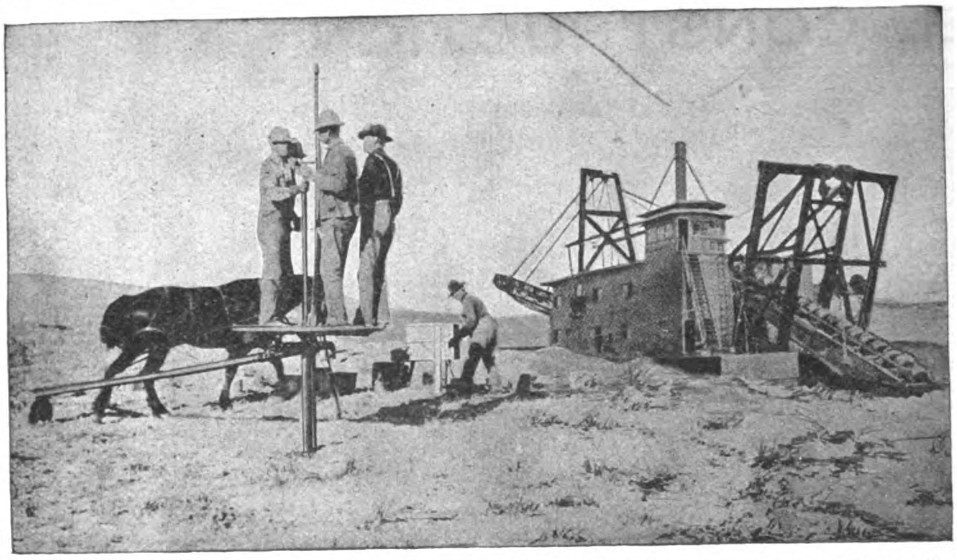

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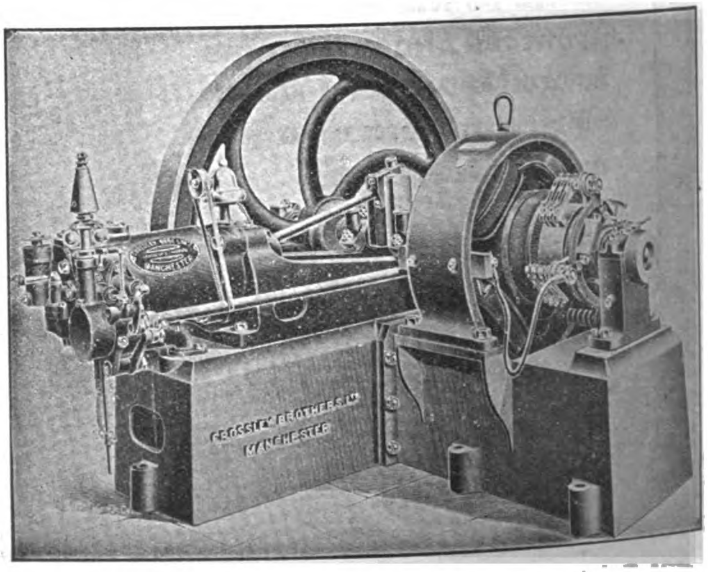

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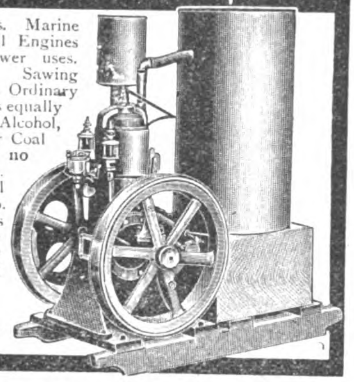

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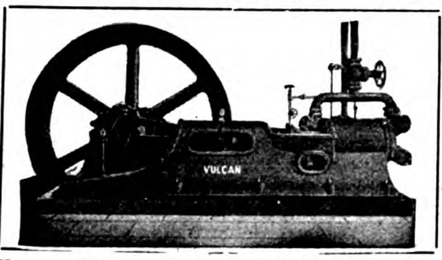
VUL  CAN

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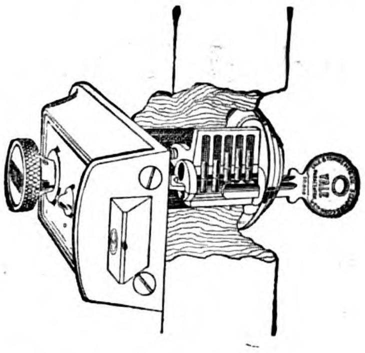

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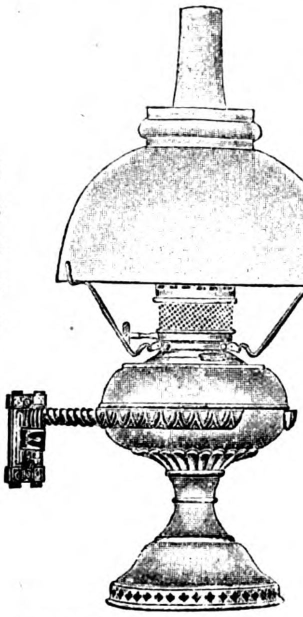

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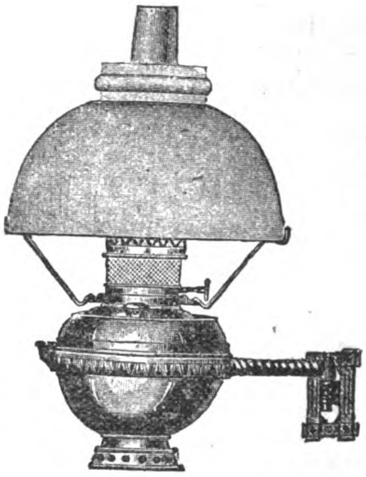

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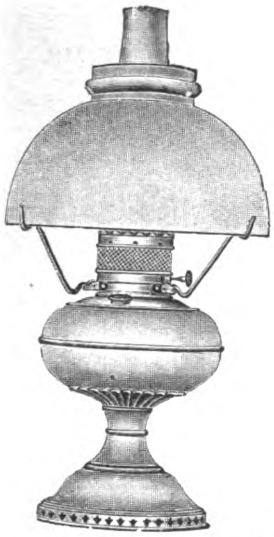

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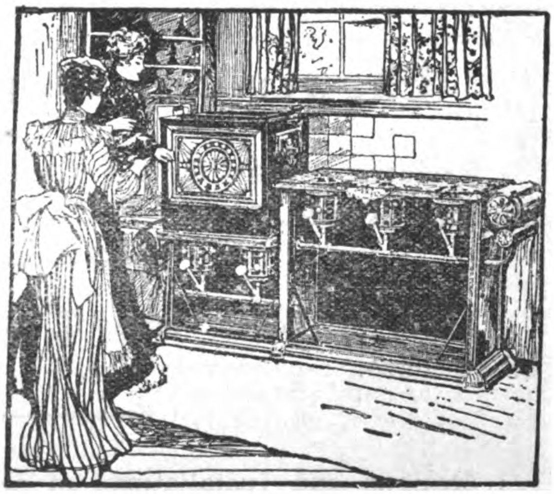

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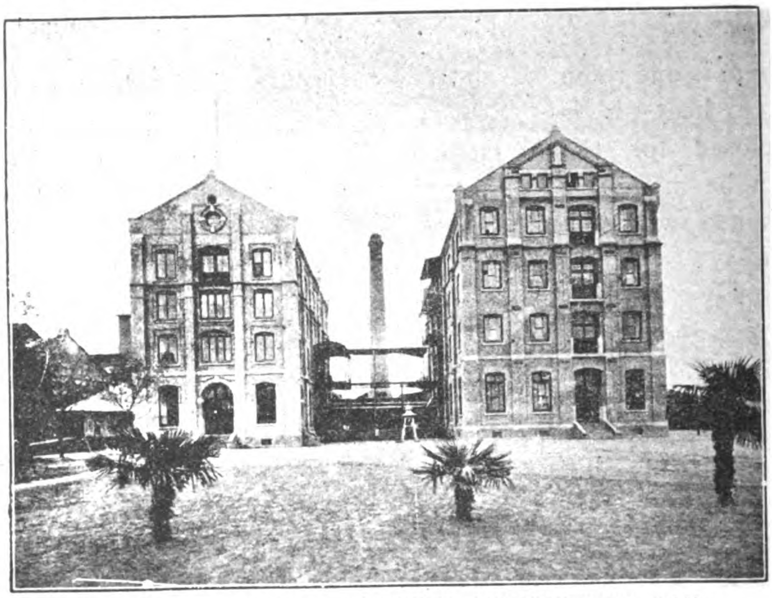

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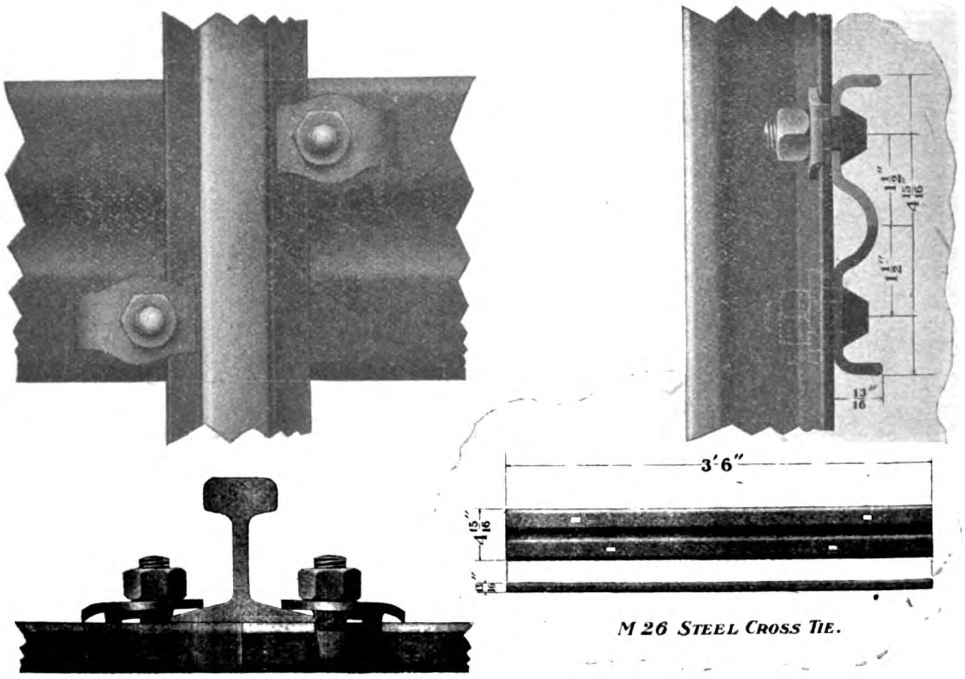

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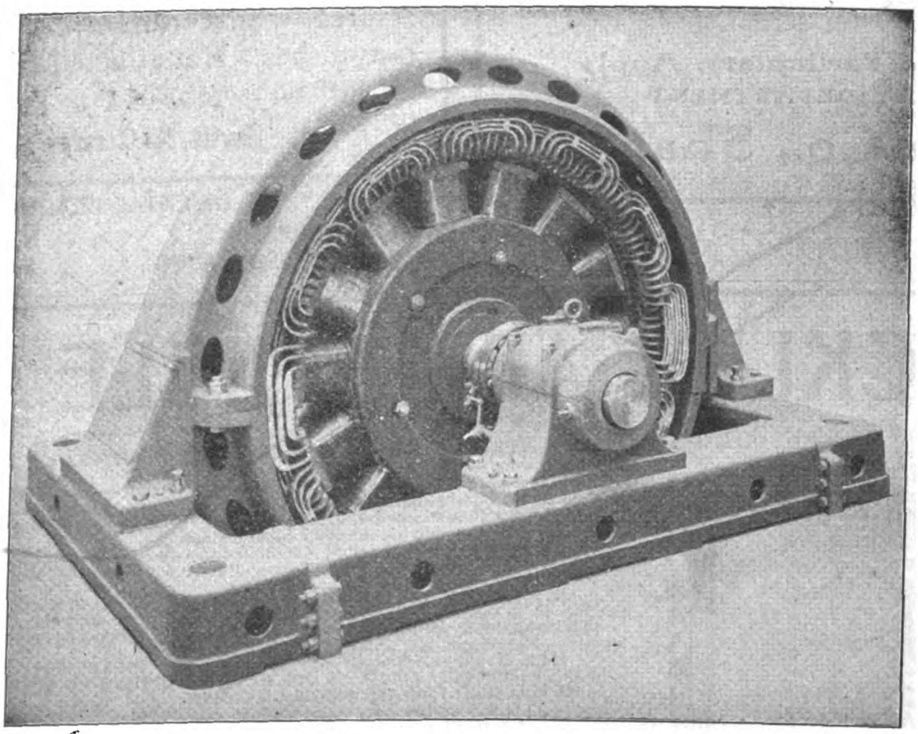

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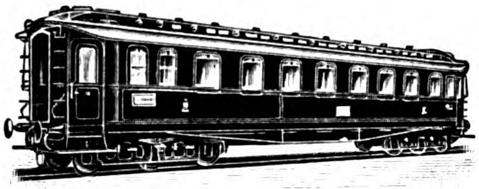

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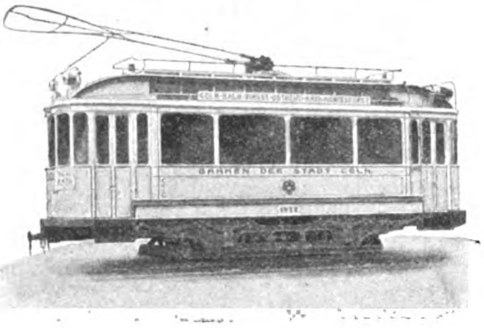

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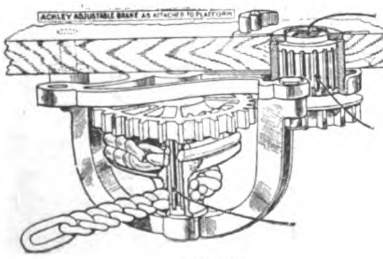

FIG. I

FIG. 3

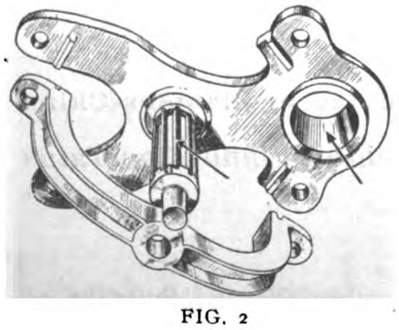

FIG. 2

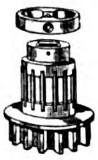

FIG. 4

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Here is the conclusion: It is EASY AND INEXPENSIVE TO INSTALL; POWERFUL, YET EASILY APPLIED; RELEASES QUICKLY; NO BINDING OF STAFF OR GEARS; ADAPTED TO ANY AND SUITABLE FOR ALL KINDS OF CARS.

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THE FAR EASTERN REVIEW

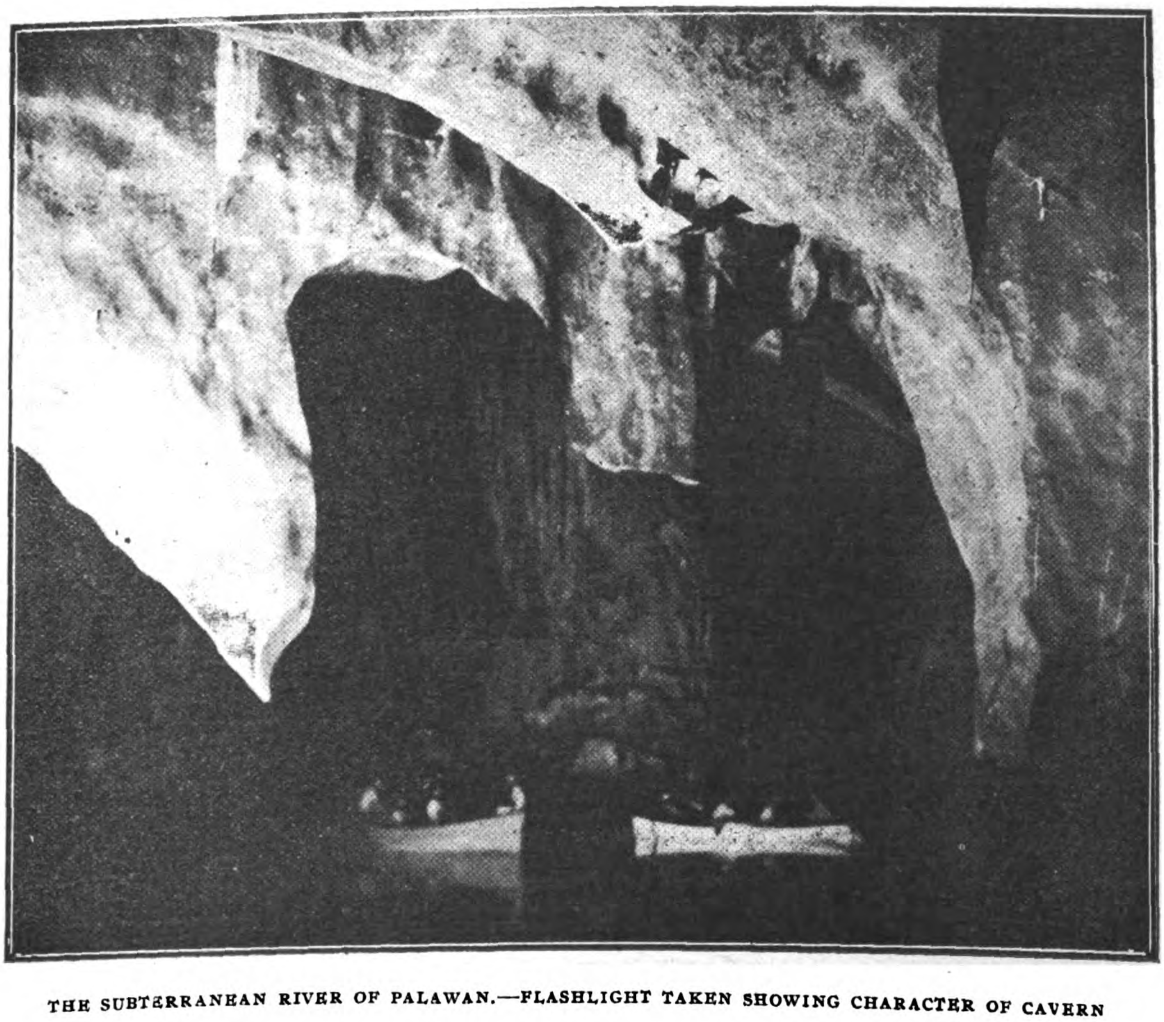
COMMERCE • ENGINEERING • FINANCE

VOL. VIII. MANILA, P. I., SHANGHAI, AND YOKOHAMA, DECEMBER, 1911 No. 7.

THE SUBTERRANEAN RIVER OF PALAWAN

We are indebted to the office of the Honorable the Secretary of Commerce and Police for the following notes regarding the subterranean river which has its source somewhere in the interior of the Island of Palawan and empties into St. Paul Bay, on the west coast of that island. Most of this information is taken from a report on the survey operations executed under the direction of Secretary Elliott by Mr. E. R. Frisbie chief computer in the Bureau of Coast and Geodetic Survey.

It is necessary that parties desiring to visit this interesting place should avoid making the trip in rough or unsettled weather, as, wheil portions of St. Paul Bay afford some measure of protection from southwest or northeast winds to a vessel at anchor, the entire shore line is exposed to surf during both monsoons, making landing in small boats difficult.



THE SUBTERRANEAN RIVER OF PALAWAN.—FLASHLIGHT TAKEN SHOWING CHARACTER OF CAVERN

The cove into which the subterranean river empties is near the center of St. Paul Bay, and about three miles northeast of a small barrio situated in the extreme southern part of the bay. The entrance to this cove on the southern side is strikingly marked by a point sloping down to an elevation of about 25 meters, and abruptly terminating in a massive flat topped tower of rock, with vertical sides, closely resembling a fortified castle tower when seen from the northeast or southwest, close in shore. The north side of the cove is a steep wooded slope, showing occasional glimpses of bare cliff. At the head of the cove are 200 or 300 meters of sandy beach, across the north end of which the river flows. Off the mouth of the river is a bar with a depth of from 2 to 4 feet, depending on the tide. After crossing the bar, deeper water is found in the short channel where the river crosses the beach, and immediately behind the beach is a lagoon about 120 meters long by 25 to 30 meters wide, and with depths of 6 to 8 feet. The river empties into the upper end of this lagoon through an irregular arched opening at the base of a vertical cliff. The arch is some 6 or 7 meters in height, and roughly three times this in width. Just inside the entrance the channel is broken by columns and longitudinal knife edges hanging from the roof, which divide it into numerous small openings just capable of passing a boat. Fifty meters upstream these obstructions disappear, leaving a single clear channel, but for the first 400 or 500 meters there are numerous small side openings or pockets. At a distance of 200 meters daylight is seen through one of these crevices, and at 500 meters the channel opens into the first prominent cham-

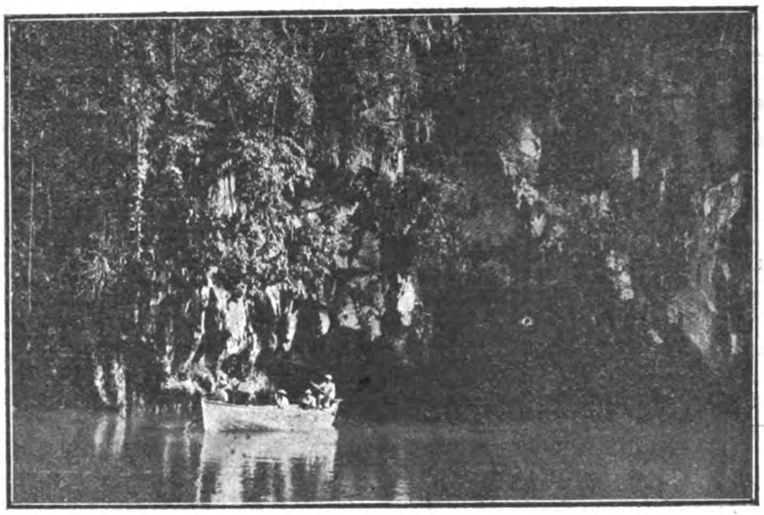
ber, containing columns, stalactites, and one very prominent stalagmite.

The next 1000 meters is characterized by a long straight channel, with an easy curve near its center. This channel, although rich in local detail, is strikingly regular in the main outlines, which consist of straight vertical banks curving upward into inclined roof sides which meet in a central ridge modified at its apex by small parallel hanging blades. Throughout this channel are numerous beautiful forms of stalactites, resembling chandeliers, bulbs, plates and hanging points and blades, but no stalagmites, as the entire width of the cavern is occupied by the river.

At 1500 meters this tunnel section continues in an elevated prolongation extending upward beyond the river, which at this point flows through an arch about 2 meters high on the west side of the channel. On the east side of the channel, opposite this arch, and just inside the beginning of the elevat d cavern, a small waterfall, which attracts attention through its volume of sound, is hidden in a narrow crevice. After passing under the arch the section becomes more broken, consisting of irregular shelves in side pockets. These banks are rare in the lower portions of the river, but after reaching this point they become increasingly apparent, both where they are piled in the recesses by flood water, and at short stretches, first on one bank, and then on the other.

Proceeding upstream from the prominent chamber above mentioned, the section contracts to one similar to the straight channel as described between the 500 and 1500 meter points, but on a somewhat larger scale. This continues for about 300 meters, or to about 3000 meters from the entrance, where, after a slight reverse chambers for about 200 meters, when another low arch is encountered, beyond which the chambers become larger.

Continuing upstream for the next 1000 meters, or to a point about 2700 meters from the entrance, a large chamber is found, where the stream abruptly turns, first to the right, and then to the left, around a prominent sharp shoulder reaching to the lofty roof. On the right is a large elevated cavern with two prominent pillars near the bank of the stream. This 1000 meters is characterized by the increasing size of the chambers, and by mud banks piled in



COVE SHOWING ENTRANCE TO SUBTERRANEAN RIVER

curve, the cavern opens into a series of chambers considerably larger than any previously encountered. This succession of chambers continues for about 1000 meters, or to the 4000 meter point, where the survey terminated. In this last section the side walls frequently recede from the stream, which is left to meander between mud banks on either side, while the roof rises in places to heights estimated at over 30 meters. The depth of the stream diminishes, so that it is frequently necessary to maneuver the boats to avoid grounding on shoals.

At about 4000 meters the stream is entirely blocked in a small pool, from which a noticeable current flows downstream, but into which no current could be found entering. The pool is bounded on the right by a solid rock wall, but its left side consists of a pile of boulders and loose debris perhaps 12 meters in height, and lying just beyond an immense column supporting two roof arches. So far as is known, progress in boats is impossible beyond this point, and the party making this investigation had not enough time at its disposal to attempt to continue the survey on foot. An ascent was, however, made to the top of the rock heap which, barred further progress, and it could be seen by means of an electric hand lamp that there was a continuation of the cave in the distance beyond. Whether this opening contained water was not ascertained. The last point reached lies about 1000 meters N. N. W. from the peak of St. Paul Mountain, which is given an elevation of 1027 meters on the charts.

The stream in general fills the entire cavern between usually straight walls, and there are no navigable side openings of any importance, so that there is no difficulty in following the channel. The water is fresh, and at the time of this survey was flowing in a gentle current hardly exeeding half a mile an hour. There are marks on the side walls indicating that the flood level may be 4 or 5 feet higher than when the survey was made. At places water drips from the roof in small quantities, but in general the cavern is dry. The air is pure and cool, and at a number of places a gentle downstream breeze is noted. At the upper end of the stream are small fish, doubtless blind, as the flash of an electric lamp within a distance of one foot caused no movement. Just inside the entrance are thousands of swallows and bats, but after a distance of 300 or 400 meters their number diminishes. They are quite rare in the upper sections.

SIGNALLING ON CHINESE RAILWAYS

Travellers are accustomed to look for certain necessary precaution and safeguards to insure that the trains on which we are travelling will arrive without accidents at the end of the journey. To those who have only travelled in countries which compel the Railway companies to ensure the safe working of their line, travelling in China would cause some surprise, owing to conditions under which some trains are run.

The Signal is the passenger's principal safeguard, and its prime duty is to prevent two trains, in motion, being on the same section of the line at the same time. It is much the same, so far as the passenger is concerned, whether he is the victim of a head on or a rear end collision.

Signals should be arranged so that it is impossible for any two or more trains to meet when in motion, or to overtake one another.

Engineers have different ideas as to how this can best be accomplished. The following particulars of one of the most approved practices for protecting the running road, might be adopted by the various railways in China with profit.

The system possesses the excellent quality of being simple and easily understood and could be efficiently worked by Chinese railway officials, without complicated machinery or extravagant use of materials, and is at the same time absolutely "fool-proof".

The duties of the different signals and the system on which they are worked should be explained: Suppose a train travelling in either direction on the running road, it will first of all come to the Distant Signal, which is distinguished by being fishtailed. This is controlled by the Home Signal, and so interlocked, that it cannot be lowered until the latter is lowered. It therefore shows the engine driver in advance the position of the Home Signal.

The Home Signals are fixed immediately outside the station, protecting all that lies within, such as points and their connections, etc.

Detectors.—These indicate that the Points are butt up to the Stock rail, further, guarantee that the points lie for the right direction, and until such conditions are fulfilled, no signal can be lowered. All detectors have a double rod with connections for each rod, and are placed so as to avoid trouble caused through expansion and contraction of the rails, as closely as possible to the switches they are to detect.

Economical facing point lock, and bar, can be fitted to prevent the points being moved during the passage of a train over them, and are operated by an ordinary point lever or a throw over lever.

A patent lock can also be provided for the siding points and so arranged that the key can be kept in the lock on the locking Frame, so that the siding points can be worked when the signals are at danger.

As to how the various signals between the adjacent stations are made to work in with each other can best be understood by describing the instruments used and the methods adopted to pass a train safely from one station to another by the Tyer system.

Tyer's Automatic Tablet Instrument.—Fig. 1 illustrates the working of the visual type which is as follows:—

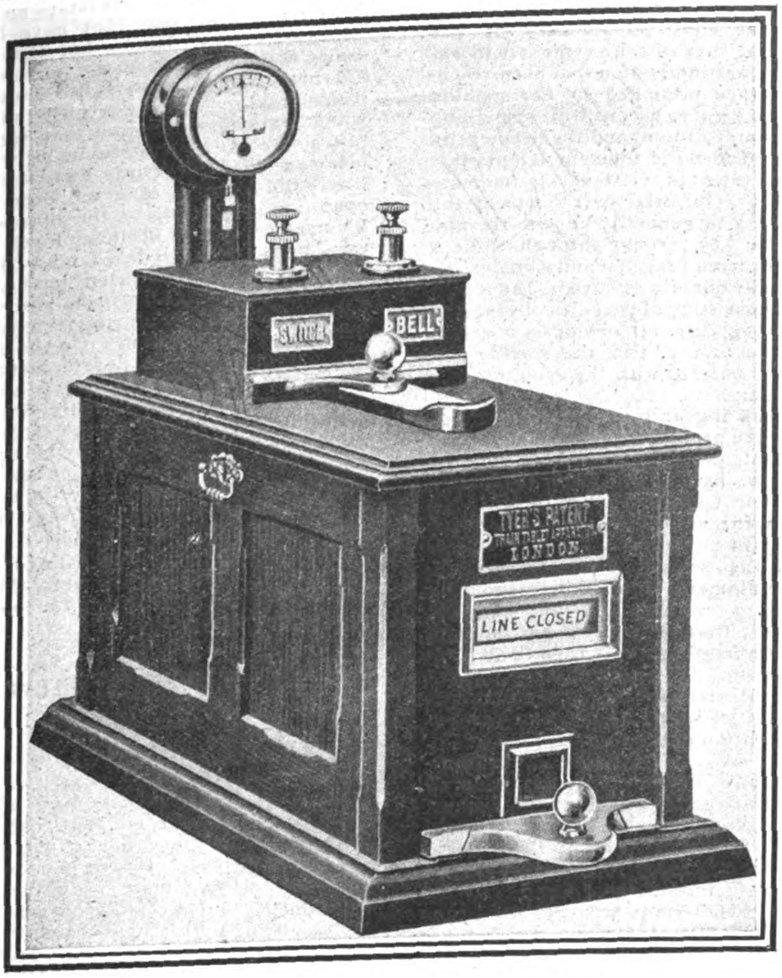
It consists of a galvanometer indicating the passage of "line passage," two plungers "Bell" and "Switch" and upper slide (for restoring tablets to the instruments), an indicator (showing 3 positions, "Line closed," "Up train approaching" and "Down train on line" or with other suitable lettering), a glass shutter at the foot through which can be seen the Tablet resting one above the other (thus affording an indication of the number available), and a main slide through which the Tablets are issued.

Outline of Working.—Take two stations, "A" and "B," and imagine "A" has a train ready to go to "B". After giving the usual code, "A" holds down his Bell plunger.

"B" depresses his switch plunger with his left hand, and at the same time withdraws his slide with his right hand: the withdrawal of this slide (which can only be half way) will reverse the commutator in the instrument, and will bring the signal "Up train approaching" in view. "B" will then depress his bell plunger, holding down on same for a few seconds. "A,"

upon receipt of this signal, will hold his switch plunger with his left hand, and with his right hand draw out his slide to its full extent, and will bring in view, the signal "Up train on Line."

"A" will remove the Tablet from the recess in the slide and will hand the same to the Engine driver. "A" then gives the departure signal. As soon as the Train arrives at "B" the man



TYER'S PATENT TRAIN TABLET APPARATUS

there withdraws the slide and inserts the Tablet, pushes the slide home. The passage of the Tablet into the cylinder unlocks his instrument and "B" then pushes in the slide which restores his Visual signal to "Line closed". He will then give "A" the "Arrival signal" holding down on the last beat.

"A," on the receipt of the "arrival signal," will depress his switch plunger, and push home his slide, which will at the same time restore his Visual signal to "Line closed".

For a Tablet that has been taken out for shunting, or for the purpose of entering some intermediate siding, and which is returned to the station from whence it was issued, the manipulation of the machine is practically the same. The man who issued the Tablet merely returns the same into his machine by means of the slide, which will restore the apparatus after the passing of the usual signals.

The stations at each of the sections have at all times an absolute record of what has been done on both instruments, which record can not be disturbed until the Tablet has been placed in the apparatus at either end or the other.

The screens with the visual signal indications are lettered in pairs, and the screen at "A" would be lettered "Up train on Line" on red ground, the screen at "B" "Down train on Line". The normal condition of both instruments at "A" and "B" is "Line closed".

The following are some of the advantages of the above apparatus:

Instruments are very strong, the case being of iron. All spindles and bearing are of German silver to prevent rust; and the commutator is so arranged that it is impossible for a failure to take place. The springs being fixtures, and the commutating plates fixed upon a slab of ebonite which is firmly screwed down to the Main Slide, a most perfect rubbing contact is obtained and both plates and springs are continually kept cleaned by the manipulation of the machine. This is a most distinct advantage, especially for foreign work.

Following are a few of the desirable features considering only one Line wire is required: Small amount of battery power, one battery being required for each instrument. No permanent current, battery only used during code, etc. Everything being locked up, so there is no possibility of tampering. The manipulation is very simple. The internal parts being few, the maintenance and supervision is therefore reduced to a minimum.

There are three unalterable signals, viz:

Line closed; up train approaching or on line; down train on line.

Outdoor signals, points, swing bridges, etc., can be electrically controlled, in connection with these machines at any time should the necessity arise, at only a small additional cost to the apparatus, and without the removal of the instruments for the parts to be fixed.

Intermediate sidings can also be controlled by a Patent Tablet Point Lock, no alteration being required to the Tablet. Trains running at high speed can exchange Tablets by means of a simple apparatus fixed on the side of the Line and on the Engine.

Tyer's Tablet Instruments are world famous, and used on the majority of Single Lines in Great Britain, in the Colonies and other countries. There are various types, but the main idea is the same throughout, particulars of which can be had from their Agents.

The Far Eastern representative for this firm (Mr. F. A. Punter, % Messrs. Samuel & Co., Limited, Shanghai) is prepared to furnish all particulars and quotations for every description of mechanical and electrical appliances for economical Railway Signalling suitable for Chinese Railways.

THE HISTORY OF THE McCALL INCINERATOR

In 1898 the United States Army was increased from 25,000 men to over 200,000 on account of the declaration of war with Spain. Large camps of mobilization were formed at Camp Meade, Pennsylvania; Camp Alger, Virginia; Jacksonville and Tampa, Florida, and Chickamauga Park, Georgia. Over 100,000 men were stationed at the latter camp.

As a result of the large assembly of troops in one place, the question of sanitation was one of the vital points to be considered as the soldiers would disregard the rules of camp sanitation, and became an easy prey to such preventable diseases as typhoid fever, dysentery, etc. In May 1898 Dr. McCall was appointed Acting Assistant Surgeon, United States Army, with station at the General Hospital, For McPherson, Atlanta, Ga. It was at this place that the Incinerator idea was brought very vividly to mind on account of the large number of soldiers being brought in with typhoid fever.

In the camps mentioned the old camp sink of Civil War times was used—a pit in the earth eight feet deep, ten feet long, and three feet wide. Flies would swarm to the sinks, walk over the excreta, then go to the kitchens and dining rooms, walk over the food, leaving in their tracks the germs of typhoid fever. Naturally an epidemic of typhoid fever was the result.

In rainy weather the sinks would frequently overflow, the contents being distributed over the camps, resulting in the most unsanitary conditions imaginable.

In many sections of the country it is practically impossible to dig sinks of any depth without considerable expense on account of stone formations and in some places at a depth of two feet frequently water is struck.

The water supply in the neighborhood of these camps was contaminated and this was another source of infection.

This unsanitary condition prevailed in all army camps in the United States and Cuba and later in the Philippine Islands. After some years' experience in camp in the United States and Philippine Islands as surgeon, Dr. McCall concluded that the only way to satisfactorily dispose of excreta, and thereby prevent typhoid fever, dysentery, cholera, etc., was incineration. With this idea in view, his first experiments were made at the Columbia Arsenal, Tennessee, in 1904 where he was stationed with his troops.

After numerous experiments at that post, the results were reported to the Surgeon General of the U. S. Army. As the problem of disposal of excreta in camp was considered a most serious one and still unsolved, the Surgeon General and other officials at Washington looked upon his experiments with favor and rendered all aid possible toward the development of the idea.

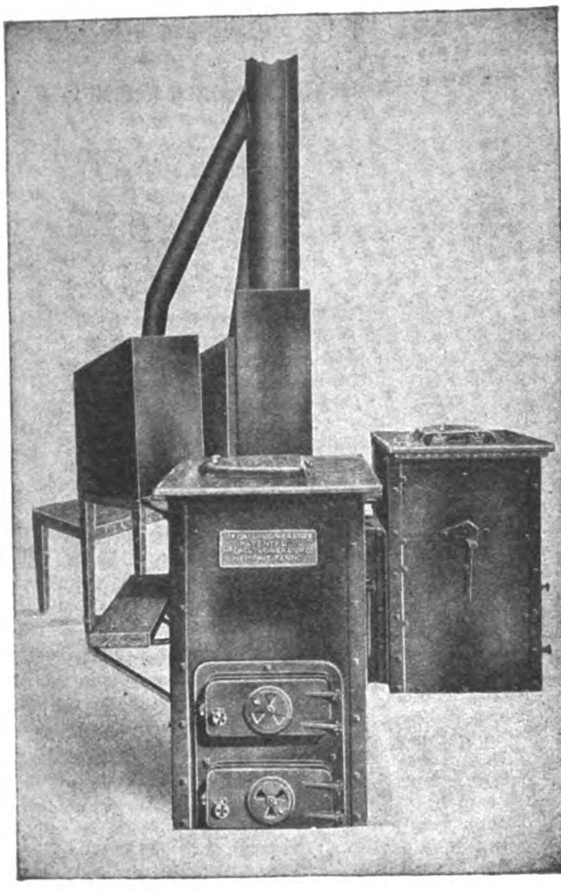
The next year May 1905 the incinerator was installed in the Maneuver Camp, Chickamauga Park, Ga. A board of Army Officials was appointed to inspect and observe the operation of the incinerators during the encampment. A sanitary expert from the Surgeon General's office, Washington, D. C., was also present to observe the tests.

A favourable report was made, and the board recommended the adoption of the McCall Incinerator for use by all troops in camp. This report was approved by the commanding General, *resulting in official adoption by the War Department.*

In 1907 at the Jamestown Exposition Camp, twenty five McCall Incinerators were installed for the use of the United States.

Excellent reports were made as to their merit and operation.

The banner year for army maneuver camps was 1908. At Pine Camp, New York, 15,000 troops were stationed, using 105 McCall Incinerators. About 9000 were stationed at Chickamauga Park, using 72 McCall Incinerators. At these encampments all excreta was incinerated, and not a single case of typhoid fever developed in either camp.



THE McCALL INCINERATOR

A small model of the incinerator was recently purchased by the War Department, and is now on exhibition at the Army Medical Museum, Washington, D. C. This model is also used by the Medical School for the instruction of the medical officers of the Regular Army and Organized Militia.

The excellent results obtained by the army from the use of McCall Incinerators caused the United States Marine Corps to adopt the machine for use in their camps at Guantanamo, Cuba, and Honolulu, H. T.

Col. William C. Gorgas, Medical Corps, United States Army, deserves the unstinted gratitude of the entire world for his work in Cuba, where, by cleaning up Havana and other cities and destroying breeding places of the Stegomyia Fasciata (yellow fever mosquito), he has driven yellow fever from the island and converted Havana into one of the cleanest and most attractive cities in the world.

Colonel Gorgas is now Chief Sanitary Officer of the Panama Canal Zone, and, upon recommendation, McCall Incinerators have been in use in Panama for the past three years.

Following the lead of the Government in the improvement of army sanitation, the general public is appreciating the improved conditions and is taking hold of the situation in earnest.

Not only in the United States but in all foreign countries, the McCall Incinerators are being considered a necessity in all contractors' camps, railroad shops, factories, establishments of various kinds, in cities out of reach of sewerage systems, small towns, schools, churches, jails, asylums, summer resorts, hospitals, fair grounds, parks, etc.

The device is a Steel Fire Box lined with asbestos, to prevent expansion and is made in the following sizes: eight, four, two, and one seat. The eight seat will accommodate 150 people and consumes one cord of wood per month for fuel, it will not be necessary to always burn wood as coal refuse, etc., can be used.

At the coming Philippine Carnival to be held in Manila, P. I., from Feb. 2nd to 12th, inclusive, several Incinerators will be on exhibition and a large stock is expected shortly.

Frank L. Strong, Consulting Engineer, contractor and importer of American machinery and supplies, Manila, is the exclusive agent for the Far East.

A NEW ELECTRIC LAMP

FILAMENT OF DRAWN TUNGSTEN WIRE.

When the metallic filament lamp made its appearance, just at that period when the aggressive competition set up by scientific gas-lighting rendered the improvement especially valuable to the electrical industry, it was thought that the apex of achievement in incandescent electrical illumination had been reached. The advance presented by the metallic filament was so great as to constitute something approaching a revolution, and the deficiencies characteristic of metallic filament lamps were cheerfully tolerated in view of the immense advantages they possessed over lamps of the carbon type. As is generally known, the filaments are formed by pressing through a die a mixture of powdered tungsten and a binder, the latter being subsequently removed. The resulting filaments consisting of particles of tungsten locally fused together, are obviously of an extremely brittle nature, and this quality has consequently interfered with the evolution of a really ideal lamp.

Extraordinary ingenuity has been expended in improving the pressed tungsten filament and various elaborate processes have been employed, but in none has it been found to obtain a filament in one continuous length with the desired strength, uniformity in cross-section and flexibility in mounting. It was only practicable with the threads of pressed metal to form the thin filaments required in this country of short lengths attached to rigid supports, with the result that it has been impossible to avoid a certain fragility in the filament. Consequently the tungsten filament lamp has not been able to withstand ordinarily rough usage.

These difficulties have for some time past engaged the attention of the General Electric Co. of New York, and the British Thomson Houston Co. who have now evolved and developed a method of constructing the filaments of drawn wire which is superior to the ordinary pressed or "squirted" filament in exactly those essentials which are necessary to the most perfect type of electric incandescent lamp. In the first place it is materially stronger and lamps made with such filaments are several times stronger than the pressed filament type at any point in their life.

The risk of breakage is substantially reduced by the elimination of the rigid connections which have hitherto been a feature of tungsten filament lamps. Instead of short lengths, welded to the supports at four or five different points, the filament is formed in one continuous length, wound upon spider supports with clamped flexible connections to the leading-in wires. The drawn filament is, besides, continuous, and is not subject to the variations noticeable in the ordinary metal filament lamps, where, as is often the case, one section of the filament will burn at higher temperature than the rest, thus reducing the life of the lamp. The enormous advance represented by the production of a drawn wire tungsten filament of accurate uniformity and continuous length is obvious. The advantages of this new development will be immediately available for the public in the "Mazda" lamps, which are manufactured at the British Thomson Houston Co.'s Works, and the various lamp factories of the General Electric Co. of New York.

Tungsten owes its efficiency as a material for incandescent lamp filaments chiefly to its high melting point—3,000 deg. C., which is higher than that of any other metal. Roscoe & Schorlemmer, in the latest edition of their "Treatise on Chemistry," state that "the purest forms of tungsten at present obtainable are hard and brittle and are not ductile, either at ordinary temperatures or when heated. "Even in ordinary commercial lamps, the filaments are of a degree of purity so high that no impurities can be discovered by the most searching methods of chemical analysis known. Nevertheless, these filaments show no traces whatever of ductility, or even pliability, but on the contrary, though strong enough for mounting in commercial lamps, they are exceedingly brittle and incapable of taking a permanent set. Ductile tungsten is a bright, tough, steel-coloured metal, which can be drawn into the finest wire much below one thousandth of an inch. The tensile strength of the wire increases as the drawing proceeds; or, in other words, the more the metal is mechanically worked, the tougher and stronger it gets.

There have been various lamps on the market during the past year that have been called "drawn filament" lamps, but they are not a drawn filament lamp in the same sense as the "Mazda". In these so called drawn wire filaments an alloy is made of nickel and tungsten which gives a combination that can be drawn into a wire of one continuous piece, the nickel being expelled afterwards by treatment, which leaves the filament in a more or less porous condition analogous to the ordinary pressed filament which has been employed in the various Tungsten and Osram lamps. This process therefore does not produce a pure ductile tungsten wire, but is an alloy or mixture, just as the pressed filament is during the squirting or drawing of the filament. On the other hand, the Mazda drawn wire development starts with absolutely pure tungsten which is worked into a billet and rod and gradually drawn into the necessary size of wire through successive manipulations, the whole material being pure tungsten from start to finish with no alloy or foreign ingredient which requires to be expelled at a later period by special treatment to the detriment of the filament strength.

This new filament of pure drawn tungsten on account of its ductility is several times stronger than drawn alloy of tungsten or older forms of squirting tungsten.

THE BROWN PORTABLE ELEVATORS AND CONVEYORS

The goods manufactured by the Brown Portable Elevator Company consist of labor-saving machinery designed for the economic piling and handling of materials in bags, bales, boxes or bundles of any kind. The expense of handling of commodities in this form adds very considerably to the ultimate cost of the goods to the consumer, and as this expense must always be eventually paid by the consumer, any device or method that will effectually reduce it by the saving of either time or labor tend to his benefit. It also enables the producer to meet competition in the most distant markets.

The ordinary method of piling goods in packages is by building up separate tiers or layers with two or more men standing on each layer to raise the material. Thus for a pile five tiers high, ten men are required, but with the portable elevator made by the Brown Portable Elevator Co., all the work of lifting is done by the machine, the only labor required being that of placing the package on the machine at the bottom of the elevator and placing it on the pile at the top.

The use of these machines presents many opportunities for economy and efficiency in the handling of materials in warehouses, stores, shops, railway freight houses, steamship piers, etc., and they have been adapted for loading and unloading cars, barges and wagons, for transferring goods from boats to cars and trucks, and for many other purposes which involve the non producing expense of moving goods by hand.

The Company has manufactured these portable elevators and conveyors in Portland, Ore., for the past nine years, and in Saginaw, Mich., for one year, but the constantly growing demand from all parts of the world has rendered the present factory facilities inadequate, and made necessary the building of the new factory in North Chicago, where they will have all modern facilities for meeting this demand, and for building machines to meet any special requirements. The company expects to commence the operating of its new factory in January, 1912, with a capacity of one machine a day. This will replace the present Saginaw factory, but the Portland plant will be continued and arrangements have also been made for the building of machines in Canada.

THE CHUNGKING ELECTRICITY WORKS

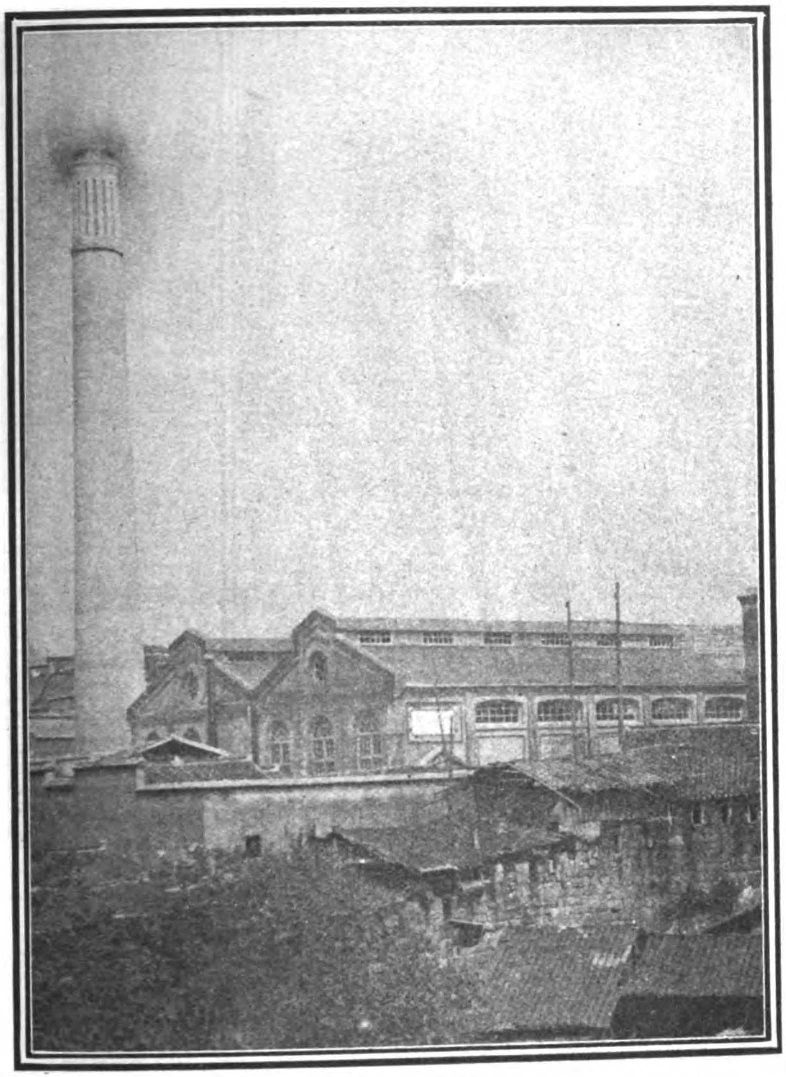
A year has passed since the Chungking Electric Light Company first supplied current to their consumers and a description of this company's plant may be of interest.

Chungking, the commercial capital of West China and a city of 650,000 inhabitants, is situated on a promontory formed by the junction of the Kia Ling or Little river and the Yangtze about 1500 miles from the mouth of the latter. The city is one of the most crowded in China, measuring only 5 li long by 3 li broad; the streets are narrow, crooked and uneven; and, being built on both sides of the rocky hilly peninsula, Chungking is a city of steps.

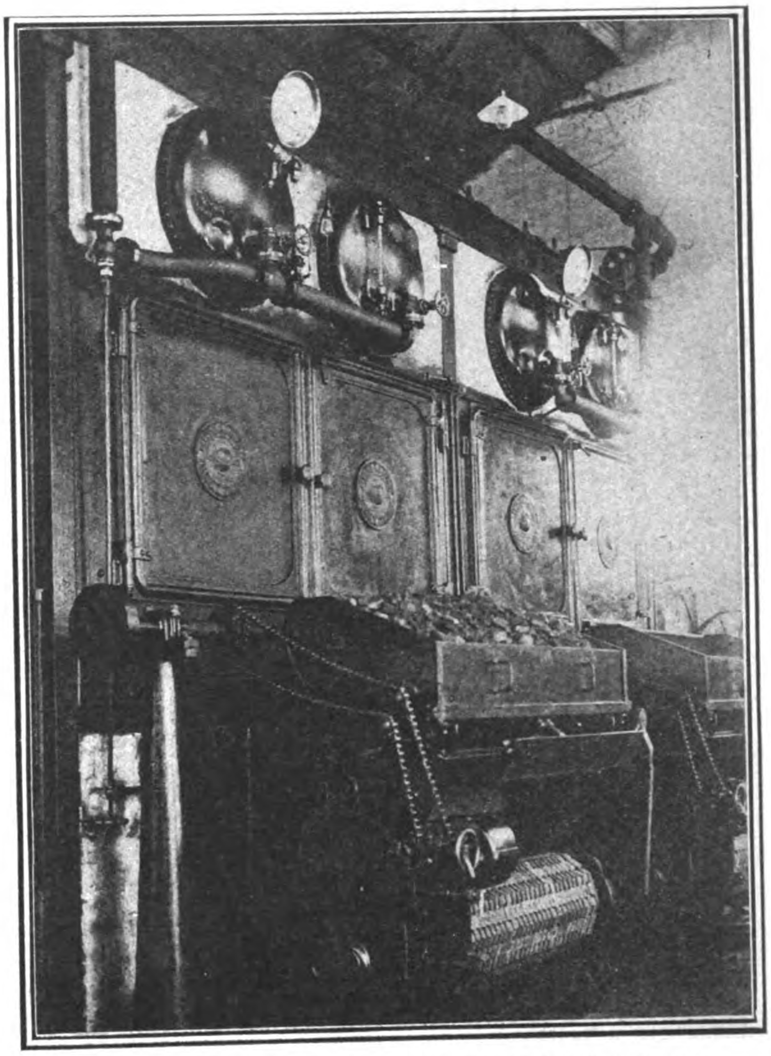
A successful experience with a small 10 KW, 110 volt, direct current installation, induced the Directors of the Electric Light Company to embark on a bigger venture and accordingly in May 1909 Mr. Liu Pieh Kah, the manager, proceeded to Shanghai to purchase the necessary machinery, and after some weeks of negotiation the contract for supply and erection of a 500 KW. direct current plant was secured by Messrs Arnhold, Karberg & Co., in the face of keen competition.

A brief description of the new plant is as follows:—

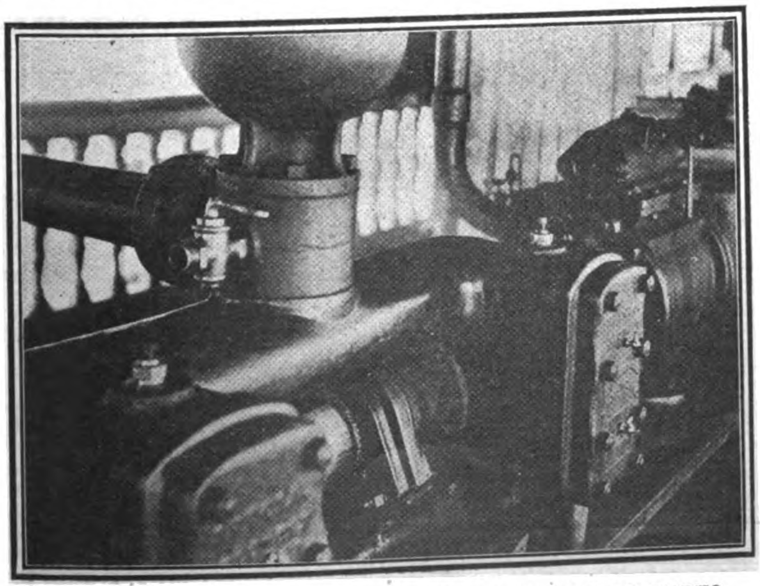
Steam is generated by two Babcock & Wilcox patent water tube boilers set in one battery. These boilers each have 2531 sq. feet of heating



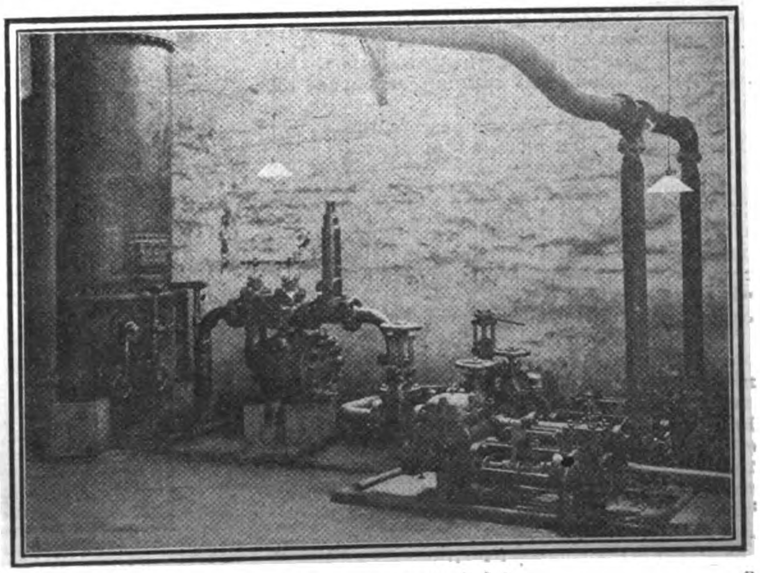
GENERAL VIEW OF THE CHUNGKING ELECTRICITY WORKS



BABCOCK & WILCOX BOILERS WITH CHAIN GRATE STOKERS

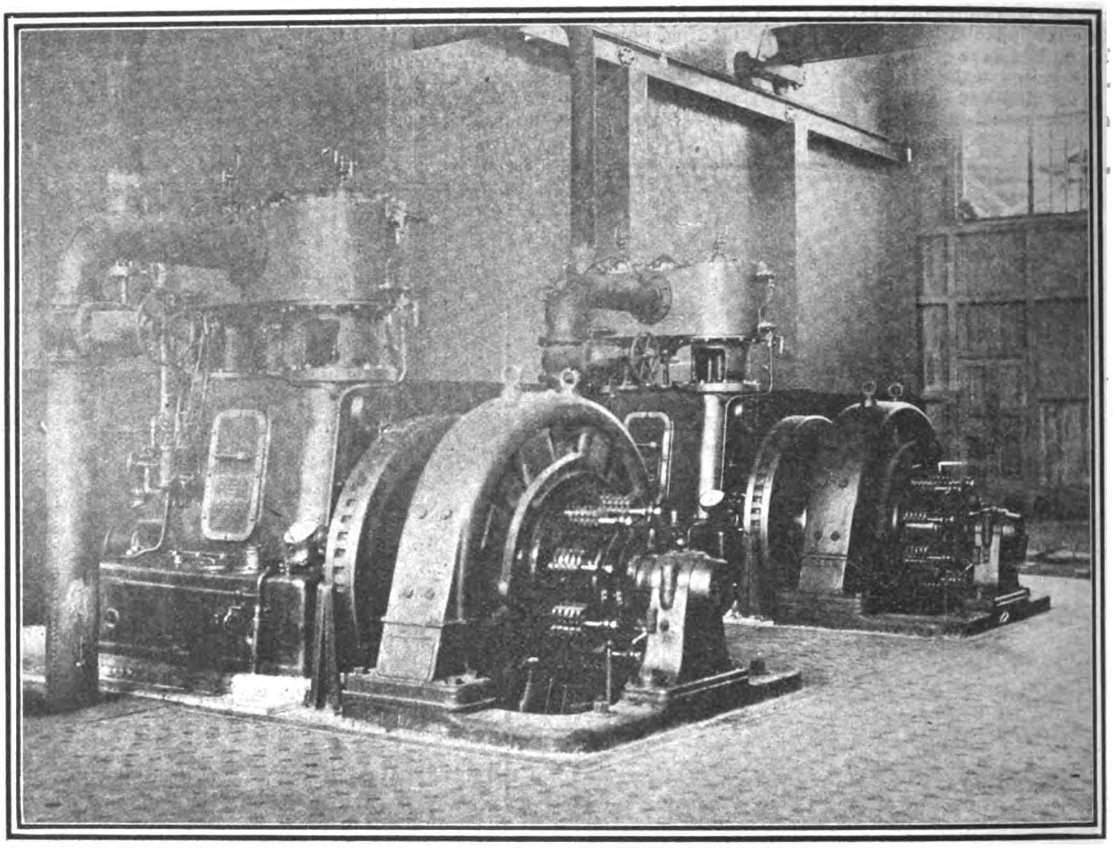


THE "CAMERON" PUMP WHICH SUPPLIES WATER TO THE WORKS



THE AUXILIARY PLANT

surface and both are fitted with integral superheaters and chain grate stokers by the same makers. The superheaters have each a heating surface of 428 sq. ft. and are of sufficient capacity to allow of the steam produced by the boilers receiving a superheat of 160 degrees Fhr.



GENERATING UNITS AND ENGINE ROOM

The stokers are engine driven and each have a grate area of 51 sq. ft. The installation of superheaters is desirable in a plant such as this, running under noncondensing conditions, but it is questionable whether the automatic stokers justify the outlay as the native engineers look upon them only as an additional complication and frequently revert to hand firing.

Two duplex feed pumps by Alex. Young & Co. are provided, each large enough to supply both boilers at one time. Before entering the boiler the feed is ·ltered and then passes through a B & W patent exhaust feed water heater which utilizes the exhaust steam from both main engines.

Two generating units are provided. The engines are by Belliss and Morcom, being their standard, compound self lubricating type, and each engine is capable of developing 370 BHP when supplied with superheated steam at 160 lbs. per sq. inch and running at a speed of 375 RPM.

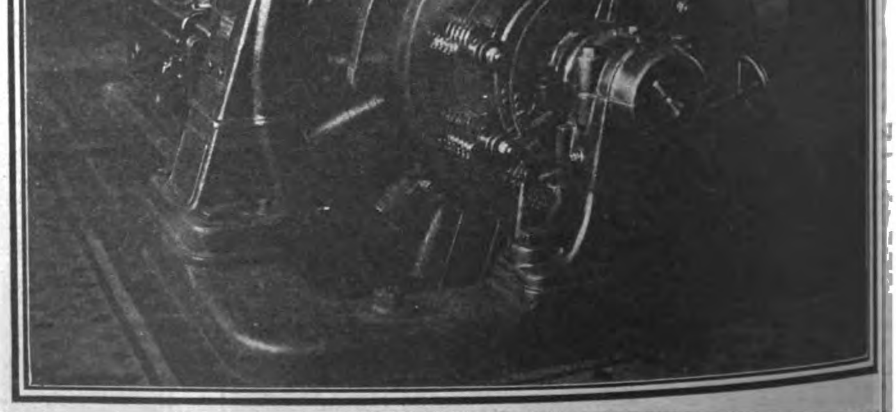
Direct coupled to the engines are the A. E. G. generato s, but mounted on separate sole plates. The dynamos are each 250 KW. direct current, 440/500 volts. 3 wire system. They are fitted with commutating poles and arranged with slip ring connexions to the armature for use with static balancers. The balancers, two in number, are capable of dealing with a 15% out-of-balance load. This type of balancer has proved quite a success.

A 4 Panel A. E. G standard type switchboard is provided on which are mounted the 2 main generator switches, 6 triple pole feeder switches and 2 double pole switches for station lighting. The dynamos are protected on either side by automatic circuit breakers, but these are mounted on special marble slabs fixed to the fuse rack behind the board. Pilot lights protrude through the main panels showing position of autos.

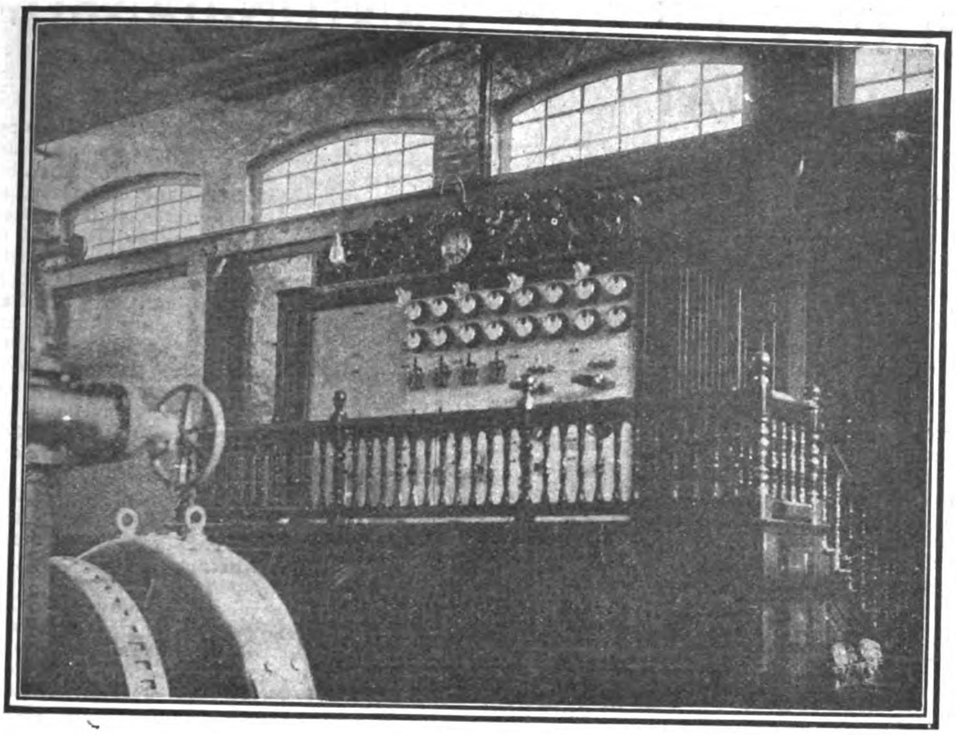
Current is distributed over the city on the 3 wire system, but invariably the feeders are too small and therefore the voltage drop towards the outskirts of the city is considerable. The overhead was supplied and erected by the natives themselves and the manner in which the street wiring is carried out leaves much to be desired.

The water supply system for the works had to be designed to rather unique conditions and in the absence of any public supply the company had to make their own arrangements regarding this most important branch of the undertaking. The Yangtze at Chungking is a swift running stream and during the low water season is comparatively free from suspended impurities, but during the summer it carries much mud and other matter. Further, between high and low water level, i. e. summer and winter level, the difference in level is from 60 to 100 feet and the width is from 400 to 1000 yards and has been known to exceed these limits, any fixed pumping station would therefore be impossible and the following arrangement was finally decided upon:

The main pumping station consists of a loco



250 K. W. A. E. G. DYNAMO, FITTED WITH COMMUTATING POLES AND ARRANGED FOR USE WITH STATIC BALANCERS



THE SWITCHBOARD

type boiler which supplies steam at 100 lbs. pressure to a "Cameron" pump which is large enough to deliver 400 gallons per minute against a head of 350 feet. This plant is mounted on a floating pontoon moored in the river just below the works. The delivery pipe line runs up the face of the cliff to the city street level and is provided at about every 20 feet of length with tee pieces to which can be connected the flexible hose couplings from the pontoon. In the station compound have been built the two water storage and settling basins; these are arranged side by side and each measures 52 × 20 × 15 feet deep and having a capacity of 100,000 gallons. Water is delivered to the reservoirs from the 6" pipeline through a two way valve which opens into either tank.

In the first instance both basins were filled and it was found that about 48 hours were required for the suspended matter to settle to the bottom of the tanks which are cement lined and the floors of which slope away from the partition wall towards a deep drain running along the outer walls. The mud and other impurities gradually find their way to this drain and when the tank is nearly empty a sluice gate at the end is opened and the whole tank is thoroughly scoured before being refilled. Whilst one basin is being filled and the water settling, the feed water is being drawn from the other and so on.

From the settling tanks the water, which is quite clear, is delivered by a centrifugal motor pump to the feed water tank elevated outside the station boiler house. The pump motor is controlled by an A. E. G. patent automatic controller the operating of which is governed by a float and switch attached to the feed water tank.

Before entering the boilers the feed water passes through a further process of purification by means of a B & W filter which as before stated is inserted in the delivery pipe between pumps and feed water heater, the water in the boilers therefore is as pure as possible and so far frequent cleaning of the tubes has not been found necessary.

The selection of the site for the Power Station also presented much difficulty and owing to the impossibility of carrying machinery through the narrow streets, the plant could not be installed at the centre of distribution. A site was eventually chosen near the Tai Ping Men and here were erected the massive buildings in which the installation is housed.

The engine room of the station is 82'-6" long and 41'-6" wide and the boiler house the same length but 45'-0" wide, the walls are all 25'-0" high. The structure is erected on foundation of blue stone and is built of black brick with red brick facings; the engine room floor is tiled, and that of the boiler house laid in stone flags. The stack is 150'-0" high from base to top of cap and 7' 6" internal diameter at top and the main shaft stands on a pedestal of blue stone 21'-0" high set in cement. From the pedestal the circular shaft runs up with a batter of 1 in 42 to the stone cap which crowns the structure. The outer brick courses of the stack are all headers. An underground flue connects the stack with the boilers. Of course the stack is far in excess of present requirements but both it and the buildings were designed for a total output of 2000 K.W. which output must sooner or later be reached.

Considering the remote region it is situated and the difficult means of transport to Chungking, the contractors for supply and the native Company for the assistance they gave in erection are to be congratulated. The contract for the supply of the plant was signed on the 28th July, 1909 and on the corresponding day in 1910 the engines and dynamos had passed the load tests in Chungking and public supply was available from September 15.

The arrangement of the plant, the buildings, stack, and water supply system were designed by Mr P. Edward Nettle who went to Chungking at the close of 1909 to superintend the erection of the buildings and later on the plant itself. Mr. Nettle is now the engineering representative for Messrs., Arnhold, Karberg & Co., in West China.

The plant was handed over to the care of native engineers on the 1st October, 1910, and up to the present everything has worked smoothly. During the past 12 months some 8000 lamps have been connected to the mains and the demand for electric lighting is constantly increasing. In fact the Directors of the Company are seriously considering the extension of the plant from which it may be gathered the undertaking is proving remunerative.

A charge of $1 per month is made for a 25 candle power metal filament lamp, other powers in proportion, and no meters are used. It is expected that in the near future the option of paying per flat rate or by meter will be left to consumer, and in the case of payment by meter a rate of .15 tael cents per unit is proposed.

COAL DEPOSITS IN SUMATRA

Coal mining has for many years been successfully carried on at Ombilien almost the whole output being consumed by the steamers of the Royal Dutch Packet Company. The mines are under Government control and are worked to a great extent as a convict settlement, prisoners undergoing long sentences being sent here to work out their term. No attempt is being made to build up an export trade although the coal is of excellent quality. The mines are connected with Padang by a line of railway 90 miles long including a stretch of rack railway.

Another coal field about to be opened up is situated towards the South of the West coast of Sumatra about 20 miles East North East from the port of Benkoelen which is about 400 miles by sea from Batavia. It is held under lease from the Government for a period of 75 years. The property has been bored to prove the continuity of the numerous outcrops and for the purpose of estimating the quantity of coal contained. Altogether there exist outcrops for considerable lengths along their strikes of 10 or 11 seams of an aggregate thickness of 36 feet which absolutely proves a substantial quantity of coal which can be mined with apparetly thin cover to a level of the beds of the rivers and with the most elementary appliances.

At the head of the Pegambier River lies a bed of coal 36 feet thick without any partings of importance. It is very probable that this seam is made up of the closing together of the other seams in that direction, a common occurrence in many coalfields. The following is the section of the more important seams.

No. 1 Seam.	Coal..........	3'	9"
	Parting........		4½
	Coal..........	4	2
		8'	3½"

No. 2 Seam: 4 feet thick without any parting, these seams dip 15 deg. South West.

No. 3 Seam. Still higher up the same river and about a mile from No. 1 seam a splendid and imposing seam of coal is in view for about 200 yards along its dip. A grander scene of river torrent, tropical vegetation and coal seam it is impossible to conceive. This seam, if continuous to the dip, and there seems no geological reason why it should not continue, is of immense value—indeed the regular occurrence of the other two seams about a mile below it would certainly imply its continuation for at any rate that distance The seam has the following section dipping 9 Deg. S. W.

Coal	2'	0"
Parting		2
Coal	6	0
	8'	2"

No. 4 Seam. On the bank of the river Simpoer a seam 2' 7" without any partings, dipping 24 Deg. S. W.

No. 5 Seam. Close to the river Gambier, 3' thick dipping 25 Deg. N. W.

No. 6. On the western boundary Dipping 42 Deg.

Coal	2'	3"
Parting		7½
Coal	3	3
	6'	1½"

The Nos. 1, 2 and 3 Seams give about 20 feet in thickness of coal and in themselves constitute a valuable coal field, as nearly two-thirds of the concession geologically contain these under good cover and from their proximity they could be worked simultaneously.

There is evidence that workable coal does not exist over the Northern third of the concession, but if for the total thickness as proved of 36 feet, coal existed over the remaining two-thirds of the concession, the total workable coal contents would exceed a total of one hundred and fifty million tons.

The coal from all the seams is black with very bright lustre and conchoidal fracture. The quality does not seem to vary and it would be classed as a good bituminous coal. Open fire tests on the spot gave very satisfactory results considering the coal was from outcrops and had been exposed to the elements for ages.

Analysis of the coal proves it to be superior to that of any other coal field working in the East.

*THE KWANGTUNG SECTION OF THE CANTON-HANKOW RAILWAY

"The construction of a trunk line, connecting Hankow, or rather Wuchang, immediately opposite Hankow, on the south bank of the Yangtze, with Canton, was first advocated by Sir MacDonald Stephenson. In every subsequent scheme for a comprehensive system of railways in China, such a line has occupied a prominent position. Yet though the necessity, or at least the desirableness, for its construction, is so great, as to be almost axiomatic, but very inconsiderable progress has as yet been made towards that end." Thus writes Mr. P. H. Kent in his able work, "Railway Enterprise in China" with reference to the Canton-Hankow Railway, and anyone, desirous of studying the history of railways in particular, can not do better than carefully peruse this book.

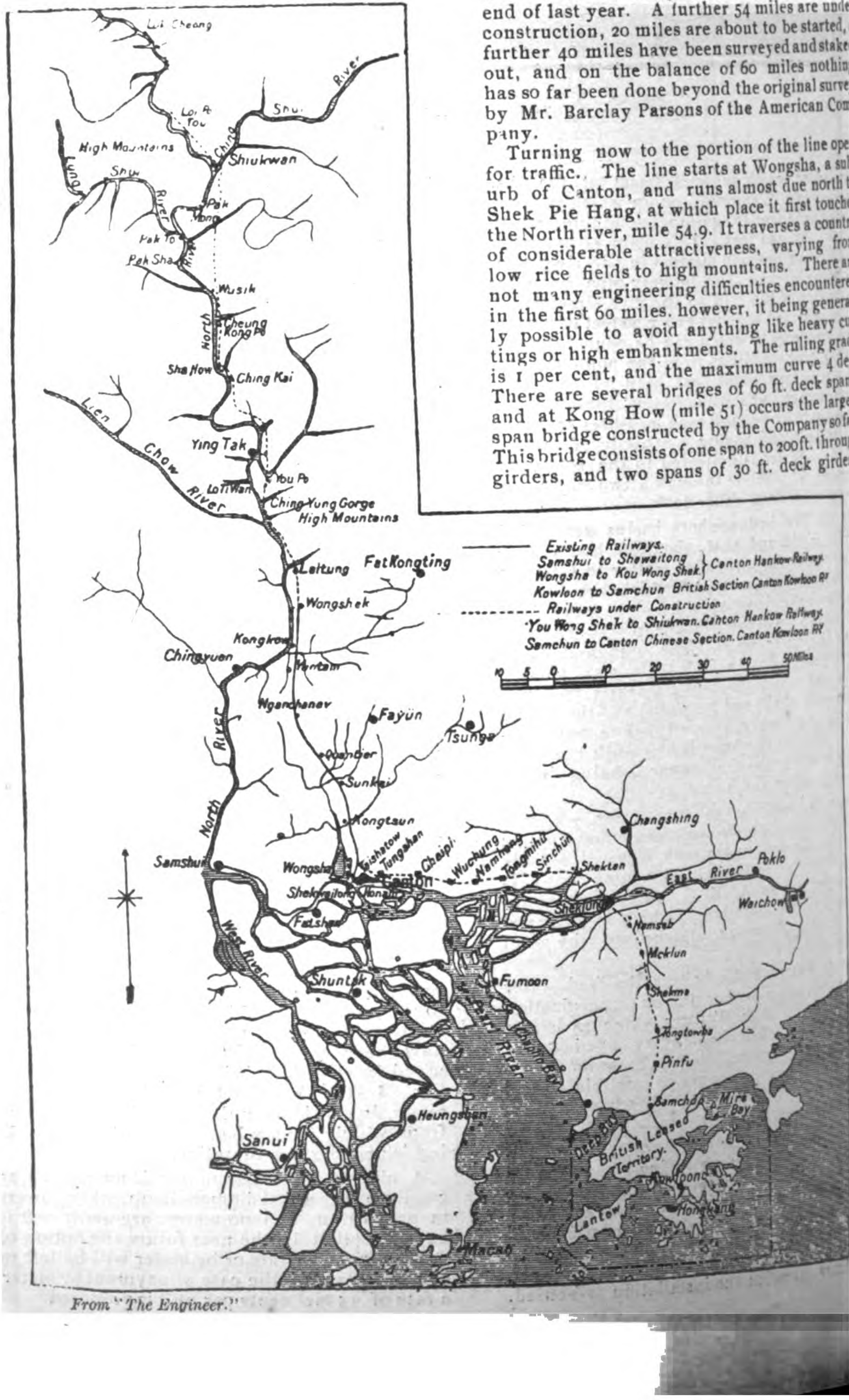
As regards the early history of this undertaking, we may say that the original concession for the construction of the whole line of over 700 miles was given to an American company—The American China Development Company. From it, it passed temporarily into the hands of the Belgians, then the Americans regained control, and, finally, it rests in the hands of the Chinese themselves. All the work that was done by the Americans was the construction to completion of the branch line from Shek Wai Tong (on the opposite or south side of the river to Canton) to Samshui on the West river, a distance of 32 miles, and the partial completion of 50 miles of earthwork on the main line northwards from Canton.

When the American Company was finally persuaded by the Chinese to retire from the field, which it eventually did upon receiving compensation to the extent of 6,750,000 dols., gold, for the work it had done and the two surveys of the main line, a Joint Stock Company was formed by Cantonese merchants, under the name of "The Kwangtung Mercantile Administration of the Yuet-Han Railway Company, Limited, to carry on the work. This Company, formed with a capital of 40,000,000 dols. Cantonese currency (about £3,636,000 sterling), intends to construct the line only through the province of Kwangtung, of which Canton is the capital, and it is with this portion only of the Canton-Hankow Railway that it is proposed to deal. Very little, if any, work has been started in the provinces north of Kwangtung and there is, in consequence, little to write about. Shares were issued of the value of 5 dols. (8s 9d.), price of the shares being so low nearly every coolie and person of the lowest classes who could muster a dollar became a shareholder, hoping thereby to obtain lucrative employment upon the line. Though there is, of course, not enough work on the line to employ all the shareholders, it is nevertheless a fact that only shareholders in the Company are employed, no others, except foreigners (who can not hold shares), being considered. In 1909, the call for the second payment on the shares of 1.50 dols. is about to be made. There will undoubtedly be trouble in collecting it. The total capital of 40,000,000 dols. is equivalent in a length of 240 miles to about £15,000 per mile, but it is proposed, when the main line is completed, to build numerous branches. The cost of the main line is estimated to be between £6,000 and £7,000 per mile.

By the rules of the Company, only a Cantonese is eligible for the appointment of Engineer-in-Chief, and also the President, Vice-Presidents, and members of the Board of Management must be Cantonese. Foreign engineers are employed under the Chinese Chief Engineer, the Company recognising that it can not do without foreign assistance in carrying out this big enterprise. At first, marked preference was given to Canadian engineers, trained on the Canadian Pacific Railway, but, latterly, all the Canadians have left and the line has become more cosmopolitan in character. At the time of writing there are nine foreign civil engineers employed, made up of different nationalities, as follows:—five Japanese, three Americans, and one Englishman, and the superintendent of motive power, who is an American, making ten foreigners in all. The Chief Storekeeper, Accountant and Secretary, are Cantonese. All drivers, guards, stationmasters, platelayers etc., are Cantonese. The head administrative offices of the Company are within the walls of the City of Canton, the workshops, engineer-in-chief's offices, etc., at Wongsha, a suburb of Canton, and the terminus of the line. The late President of the Company, Sir Liang Cheng Tung, having been appointed Ambassador at Berlin, has been succeeded, after a year's interval, by His Excellency Jeme Tien You, Consulting Engineer to the Board of Posts and Communications and a Director of the Imperial Pekin-Kalgan Railway.

Coming now to the line itself, the standard gauge of 4ft. 8½ in. has been adopted, and the length to be constructed in the Province of Kwangtung is, approximately, 240 miles, 58.5 miles are, at the time of writing, open to traffic, 7.5 miles have the permanent way laid. They were to have been opened for traffic before the end of last year. A further 54 miles are under construction, 20 miles are about to be started, a further 40 miles have been surveyed and staked out, and on the balance of 60 miles nothing has so far been done beyond the original survey by Mr. Barclay Parsons of the American Company.

Turning now to the portion of the line open for traffic. The line starts at Wongsha, a suburb of Canton, and runs almost due north to Shek Pie Hang, at which place it first touches the North river, mile 54.9. It traverses a country of considerable attractiveness, varying from low rice fields to high mountains. There are not many engineering difficulties encountered in the first 60 miles, however, it being generally possible to avoid anything like heavy cuttings or high embankments. The ruling grade is 1 per cent, and the maximum curve 4 deg. There are several bridges of 60 ft. deck spans, and at Kong How (mile 51) occurs the largest span bridge constructed by the Company so far. This bridge consists of one span to 200ft. through girders, and two spans of 30 ft. deck girders.



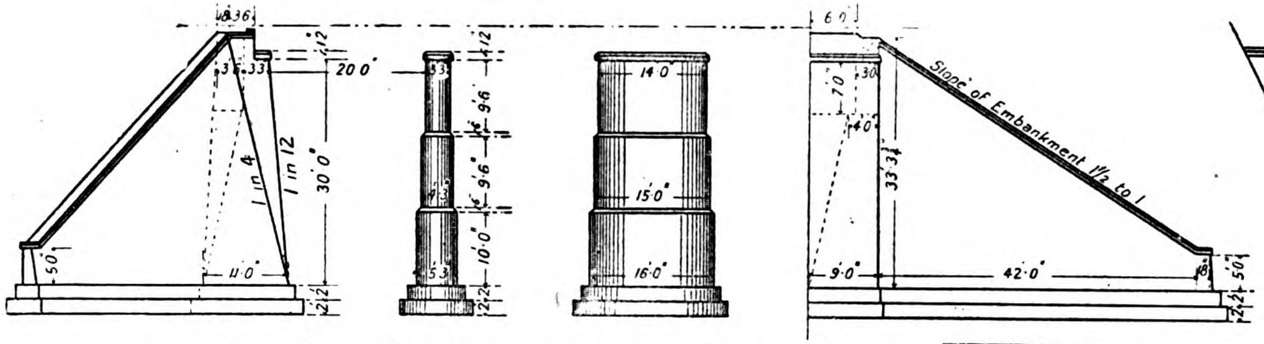
From "The Engineer."

The only drawback connected with the exploitation of this valuable coal field is the cost of building and equipping a railway to transport the coal to the coast, an approximate mileage, including sidings, of 20 miles. The cost of winning freight and general charges would be such that coal could be landed at the seaboard at a cost not exceeding 5s per ton. In comparison with the selling price of other coals, the Boeket Soenoer coal should have a clear margin of profit of not less than 5s per ton, and probably of 10s per ton which gives enormous value to the concession. It is certain that in the near future this will become one of the important centers for supplying the growing demands of the Eastern market.

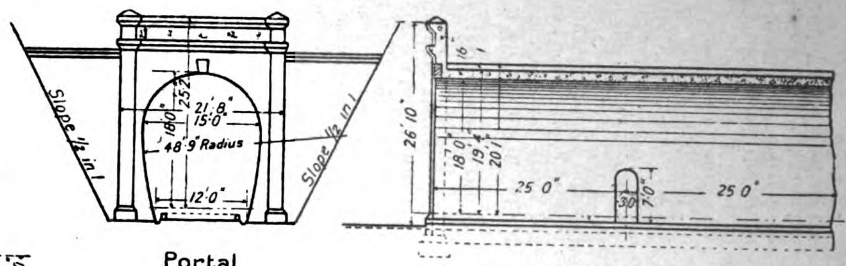
The above is a condensed extract from a report on the property by Mr. T. Parton, F. G. S., etc., of Sydney, Australia.

*From "The Engineer."

SOME TYPICAL CONSTRUCTION ON THE CANTON-HANKOW RAILWAY



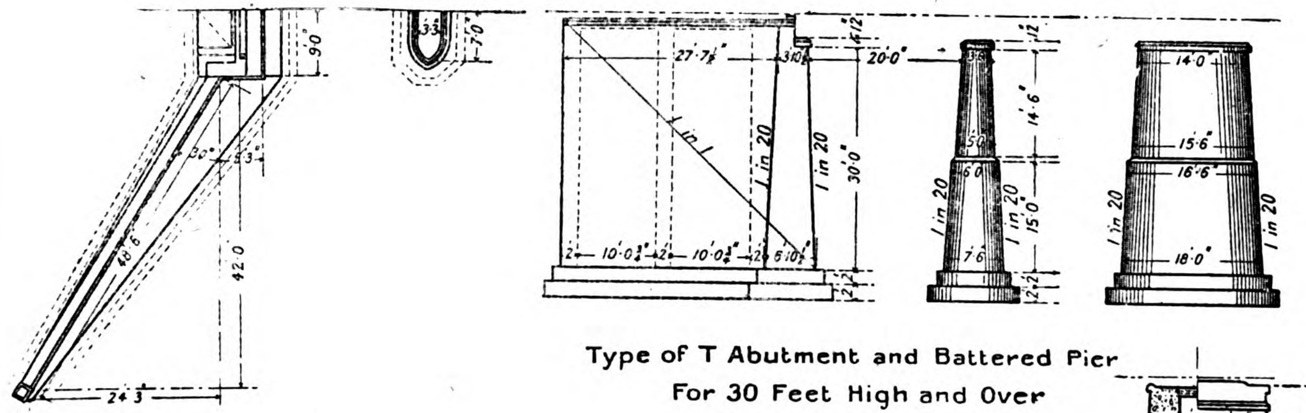
Type of Wing Wall Abutment and 30 Feet High Straight Pier.



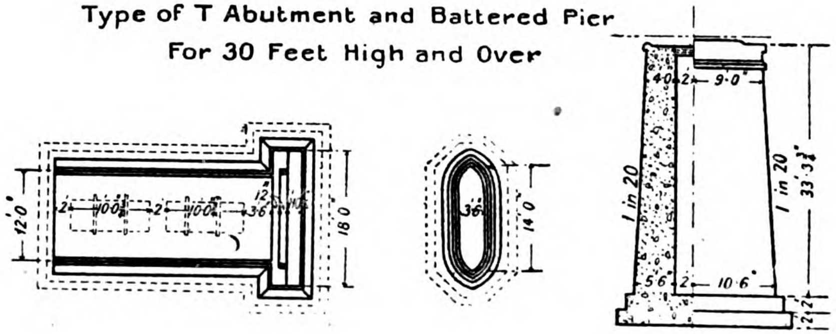
Portal

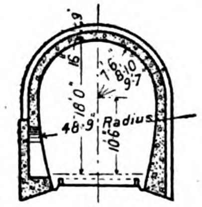
Longitudinal Section

Type of Tunnel in any Material.

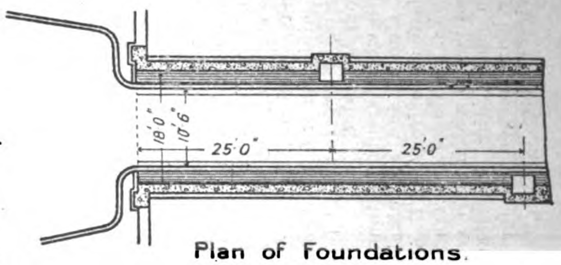


Type of T Abutment and Battered Pier
For 30 Feet High and Over

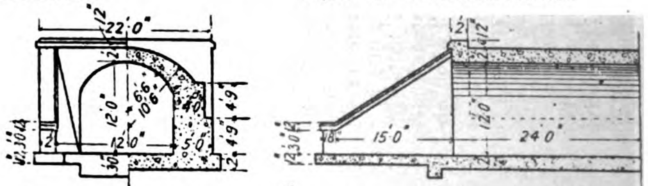




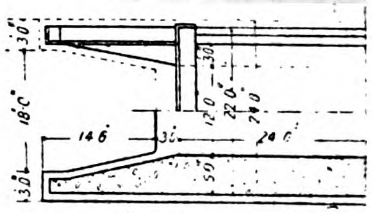
Cross Section.



Plan of Foundations.



Type of 12 Ft Arch in Concrete



Cross Section Permanent way
85 lb Rail.

From the Engineer

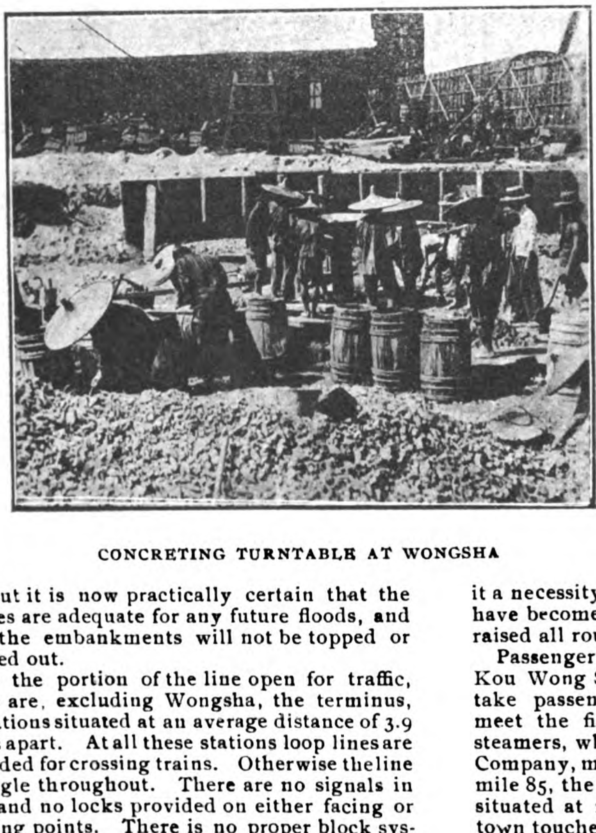
The 200 ft. span is of the whipple type, and was designed by Messrs. Baker and Hurtzig, of London. The girders rest upon cement concrete piers and abutments, these being supported upon piles.

There are on the open line four bridges of one or more spans of 60 ft. deck girders, the largest being at mile 12, where there is a bridge of 15 spans of 60 ft. There are also three bridges of one span each of 40 ft. and many of 30 ft. and 20 ft. spans. All bridge piers and abutments as well as arches and small culverts are constructed of Portland Cement concrete, proportions for all work, except arch rings, being one cement, three sand, and six stone. Arch rings are of the proportion of one cement, two sand, and four stone.

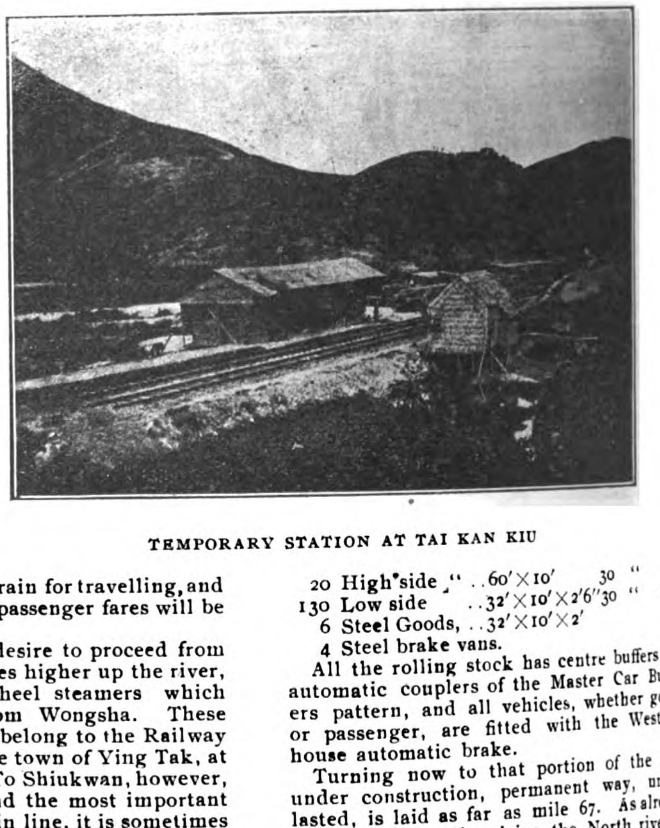
The Canton district and indeed the whole of the area traversed by the railway is liable to sudden heavy flooding. The largest flood occurred in June, 1908, when there was a rise of over 30 ft in the North river. Such a flood had not been previously experienced within knowledge, and as a consequence many bridges had to be raised, formation level throughout had to be raised and in some cases an entirely new alignment of parts of the line had to be undertaken. All this, of course, occasioned much delay, but it is now practically certain that the bridges are adequate for any future floods, and that the embankments will not be topped or washed out.

On the portion of the line open for traffic, there are, excluding Wongsha, the terminus, 15 stations situated at an average distance of 3.9 miles apart. At all these stations loop lines are provided for crossing trains. Otherwise the line is single throughout. There are no signals in use, and no locks provided on either facing or trailing points. There is no proper block system. Permission to proceed from station to station is given by the stationmaster to the driver and guard, after the former has first ascertained, from the station in advance that the line is clear, and has received permission to despatch the train. On the train leaving the station, the station ahead is advised by telephone, and the driver of the train is given a tablet which he delivers on arrival at the next station. Without a tablet no train can leave a station. All points over which the trains are to run are manned by pointsmen.

At Wongsha, which is on the north side of the Canton river, the Company owns about 500 lineal feet of wharfage, and ocean-going ships of light draft can come alongside at high tide and discharge direct on to the Company's land. As it is intended to connect the line with the Canton-Kowloon Railway, now also under construction considerations of the final designs for the Wongsha terminus are as yet deferred, and the station can only be considered as a temporary one at present. On the open line there is at present no goods traffic whatever, the short length of line open to traffic not warranting consignors from transferring their merchandise from the river to the train, and incurring the expense of double handling, when they can get boats to take their goods right to their wharves in Canton. Time being of little object to the Chinese, the three days taken by boat to Canton do not weigh with them so much as the expense of double handling, and until the line has got to a distance of 150 or so miles from Canton, it is not thought that the amount of goods traffic will be worth considering. On the other hand there is a heavy passenger traffic, principally third class, to cope with which there are at present five trains running daily each way, Sundays included.



CONCRETING TURNTABLE AT WONGSHA



TEMPORARY STATION AT TAI KAN KIU

The Chinese are inordinately fond of travelling and do not object to paying for the privilege. With regard to passenger fares the rates from Wongsha to Kou Wong Shek, the present end of the open portion, are as follows: third-class single, .85 dols.; second-class, single 1.55 dols.; for first class, single 2.55 dols. For a distance of 58 5 miles this is equivalent to—for third-class .3 pence per mile; for second-class, .55 pence per mile, and for first-class, .93 pence per mile. These prices for travelling compare favourably with any other railway from the passengers' point of view. There is no doubt, however, that as soon as the public have found it a necessity to use the train for travelling, and have become used to it, passenger fares will be raised all round.

Passengers, who now desire to proceed from Kou Wong Shek to places higher up the river, take passenger stern-wheel steamers which meet the first train from Wongsha. These steamers, which do not belong to the Railway Company, make the large town of Ying Tak, at mile 85, the same day. To Shiukwan, however, situated at mile 140, and the most important town touched by the main line, it is sometimes possible to obtain a steamer, in which case passengers arrive in two or three days from Canton, but more generally, on account of low water in the river, native flat-bottomed boats have to be taken from Ying Tak, in which case four to six days can easily be taken on the journey from Ying Tak, or five to seven days in all from Canton.

All stations are constructed of red brick set in lime, and besides providing the usual offices and waiting rooms, have an ample overhanging verandah on the platform, and quarters for the station master, telegraph operator and pointsmen. Platform walls are of concrete 14 in. above the rail level, and have a ramp of 1 in 5 at the ends. The road bed is well ballasted, having a minimum of 6 in. of good stone under the sleepers. Sleepers are of Jarrah wood obtained from Australia.

The rails which are flat bottomed are of 85 lb. per yard section, and are obtained, together with all fastenings, from the Hanyang Iron and Steel Works, a Chinese concern at Hankow.

Locomotives, of which there are 25, are all of American make, the American Locomotive Company being responsible for most of them. The heaviest engines, type E, weigh with tender, 238,000 lb., or 106 tons English, and are of the 2-6-0 type with a double four-wheeled bogie tender. The diameter of the driving wheels is 56 in., that of the leading wheel, 33 in., and of the bogie wheels on the tender, 33 in. The weight on each pair of the coupled driving wheels is 35,000 lb., or 15.6 tons English. The rigid wheel base of the engine is 14 ft. The cylinders are 19 in. diameter by 26 in. stroke, the boiler pressure being 180 lb. The heating surface is 2,020 sq. ft., and grate area, 30.3 sq. ft. The water capacity of the tender is 5,000 gallons, and the coal capacity nine tons. The tractive power on the draw-bar is 24,100 lb. The fuel used is Japanese coal of rather poor quality.

The rolling stock at present on the line consists of the following:

No.	*Nature*	*Dimensions.*	*Capacity.*
2	Directors' cars	60'×9'×10'6"	
2	1st & 2nd Compos	60'×9'×10'6"	34, 1st; 22, 2nd.
10	2nd class "	60'×9'×10'6"	60
20	3rd class "	60'×9'×10'6"	96
	Coaches are 26 tons tare.		
2	Baggage cars	40'×9'×10'6"	30 tons net.

GOODS STOCK.

2	Goods cars	. . 32'×9' 8"	30 tons net
18	Flat wood cars	. 36'×10'	30 " "
20	High side "	. . 60'×10'	30 " "
130	Low side	. . 32'×10'×2'6"	30 " "
6	Steel Goods,	. . 32'×10'×2'	
4	Steel brake vans.		

All the rolling stock has centre buffers and automatic couplers of the Master Car Builders pattern, and all vehicles, whether goods or passenger, are fitted with the Westinghouse automatic brake.

Turning now to that portion of the line under construction, permanent way, unballasted, is laid as far as mile 67. As already mentioned the line joins the North river at mile 54.9. From this point onwards the work becomes of a much more interesting character from an engineering, as well as from a scenic, point of view. High hills come right down to the water's edge, and the work is a succession of cuttings through the ridges of these hills and filling up the valleys between the ridges. The gradients are very easy, generally, the line rising from 15ft. above mean sea level at Wongsha to 310ft. above the same datum at Shiukwan bridge, mile 140.

At mile 66 occurs the first tunnel which is completed and about to be opened. It is only some 270 ft. long, and is through hard sandstone, which had to be blasted. It is nevertheless lined with concrete 18 in. thick down to 2 ft. below formation level. Two engravings of this tunnel, one during construction and the other after completion, are given on this page. The cost of this tunnel is given as 148 dols. per lineal foot, equivalent to £12 19s. sterling. We cannot, however, vouch for the accuracy of this figure.

As already mentioned, the formation level of all cuttings and embankments had to be raised after the experience gained during the

terrible floods of June, 1908. This was a source of great delay in carrying on construction, but there are other and worse delays, caused by the Chinese landowners on the right of way. On account of some peculiar god or devil which a certain hill or piece of ground is supposed to harbour, no inducement will make the owner sell that land, and many and grave troubles have been encountered, some of which are still going on and have been for two or three years. For instance, at mile 68, there is a stretch of land of very short length upon which is situated the grave of the head villager's mother. As a general rule graves on the right of way afford very little obstruction, it being the practice of the Railway Company to pay 6 dols. to the nearest relative of the deceased, who then exhumes the remains, puts them in a large earthenware jar, and either reburies it or stands it on the hill side clear of the line of works. In this case, however, strong opposition has been offered, the head man, who is very wealthy even going to Peking to lay the matter before the Throne. In the end, force will undoubtedly have to be used, though the Company recognises that this is only a last resource.

At mile 83 also, even graver obstruction is offered. In this case three villages have combined to prevent the Railway Company buying any of their land, and it is quite possible that very serious bloodshed will occur here before the villagers are forced to give way. These villagers prevent all work proceeding, even work of quite a preliminary nature, threatening the engineer and his staff, and obliging them to withdraw. In this case there are no graves in question, the villagers object to the line passing so near their villages (about 30 ft.) and have indicated the one and only line they will accept. As their line is over 1,000 ft. away from the present centre line and quite impracticable from an engineering point of view, matters are at a deadlock.

From mile 55 the line runs parallel with the North river, leaving it between miles 78 and 107, running parallel to mile 120, and from there striking well inland until it again joins the river at Shiukwan, mile 140. Between miles 75 and 78, the line runs through a precipitous, rocky gorge of the river, and on this length which is so far the heaviest portion undertaken, there are three short tunnels of 300 ft., 150 ft. and 200 ft. length respectively. All these tunnels are through rock, and all will be lined to below formation level with concrete.

The bridge at mile 85 is 750 ft. long, and it was originally proposed to build 13 spans of 60 ft. deck girder. Considerable difficulty, however, was experienced in driving the foundation piles in some of the piers, and the original design has been abandoned in favour of three spans of 200 ft. through girders, two spans of 60 ft. and one span of 50ft. deck girders. This peculiar arrangement is accounted for by the fact that the first pier together with the two abutments, has been partially completed, and it is desired to utilize these structures in the new design. The 200 ft. span piers will be founded upon steel wells, these latter now being made by the Company at Wongsha. The 50 ft. piers will be founded upon piles driven in cofferdams.

It is not in contemplation to use compressed air for the well sinking, but there is little doubt that eventually it will have to be used. The nature of the substrata is a matter of considerable uncertainty in the case of this bridge; the Company never having made adequate borings to ascertain this most vital point. It is conjectured that underlying the surface sand and small stones, good stiff clay will be met with at a depth of 30 ft. or so below low-water level, and upon this conjecture the foundations of the bridge have been designed. It is extremely probable from one or two indications that have become manifest that large boulders are likely to be encountered during the well sinking, and these may be so large and so numerous that compressed air will have to be resorted to. Tenders for the entire construction of this bridge have been called for, but have so far met with a poor response, Chinese contractors probably not feeling competent enough, or willing to take the undoubtedly big risks attending such a work. No foreigner can submit a tender for any work upon the line, though it is true that there are one or two foreigners—Italian and French—who are employed by the Chinese as sub-contractors.

To mile 106 there is very little of any engineering importance to recount. Earthwork is proceeding steadily, but very little bridge work is in hand, in fact, between miles 70 and 120 no bridge work whatever is going on. There are several reasons for this peculiar state of affairs. Originally, all bridges of whatever size, were constructed by the Company itself, contractors only furnishing the necessary sand and stone for the concrete. This method of departmental working proved exceedingly expensive, as on many occasions the supply of cement gave out at a critical period during the construction of the bridge; but labour gangs and foremen had to be retained ready for the arrival of a fresh supply of cement. In March last year, however, the practice of using departmental labour was stopped by order from Peking and work by contract ordered instead.

Owing to the very small number of contractors in South China familiar with and experienced in the correct methods of mixing concrete, putting up shuttering, etc., it has been, and still is, a matter of great difficulty to get good men. A small body of these contractors, and the same small body invariably, submit tenders for bridges when they are advertised, and as nothing is known of these men or their capabilities it has been wisely decided to give each contractor a small culvert first, to discover his capabilities, before letting him have any other work, and, consequently, while the capabilities are being proved on these small culverts, there are many large culverts and bridges still untouched.

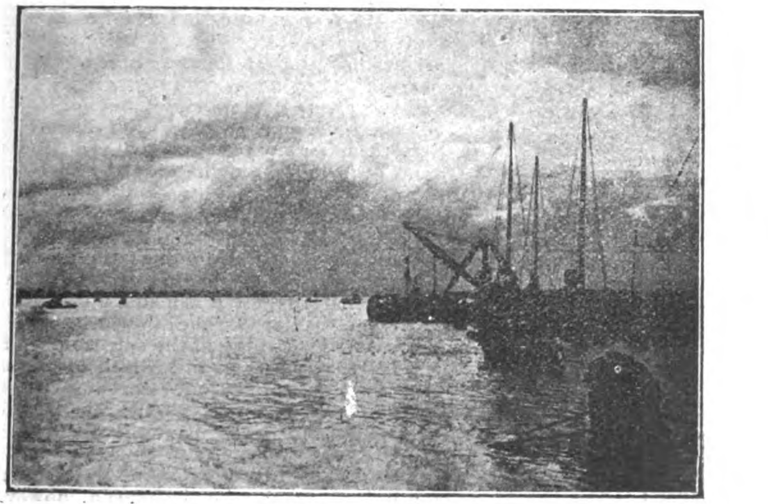
Bridge work contractors are required to be responsible for the bridges they build for a period of 12 months from date of completion. This is a sound clause in the contract where concrete work is concerned, as it undoubtedly has deterred many inferior and inexperienced contractors from coming forward, but it, of course, does not relieve the engineer of the very arduous work of personal supervision of every bridge constructed.

Up to the time of company work on bridges, cement manufactured near Hong-Kong by a foreign company, and known as "Green Island" cement, was almost invariably used. A little German cement (Alsen brand) had been used for foundations under water, and for arch rings, but its use has been abandoned. A Chinese company has built a cement works in Canton, and the Railway Company intends to utilize this cement exclusively in future structures on the principle of supporting home industries. As to the quality of the Chinese cement it is a little early to form any opinion. Stone supplied for concrete is an excellent quality of limestone, of which the hills bordering the line provided unlimited quantities. The size for concrete is 1 in. to 1½ in. Sand is obtained from the river, in many cases within 20 ft. of the work for which it is required. The sand generally is of an uniform excellent quality. Foundations for bridges are generally piled, even the smallest culverts having as many piles as can be conveniently driven. Probably no works of a similar nature anywhere have gone in so strongly for piled foundations.

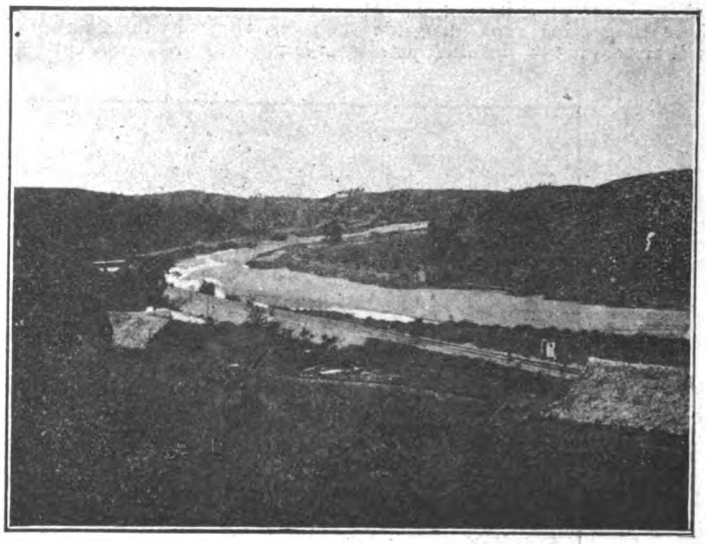
At mile 140 the east fork of the North river is crossed by the line of railway. The width of crossing here is 800 ft., and it is proposed to carry the line over by means of four spans of 200 ft. through girders. No difficulty in the construction of this bridge is anticipated. At an average depth of 25 ft. below the surface of the bed, limestone rock in a level stratum is found, and it is proposed to sink steel cylinders on to this rock in the case of two of the piers. The remaining pier and two abutments will have open foundations. No tenders for this bridge have so far been called for, as the Company intends to complete the line open for traffic to Shiukwan (mile 139½) before proceeding further with construction of any sort.

Shiukwan is a city of 60,000 inhabitants and is the principal place in Kwangtung touched by the main line. A large passenger traffic is anticipated from here and from the surrounding small towns and villages.

For the purposes of construction the line is divided up into sections of ten miles each, in



THE NEW RAILWAY WHARF AT WONGSHA



SOUTH FROM TAI KAN KIU

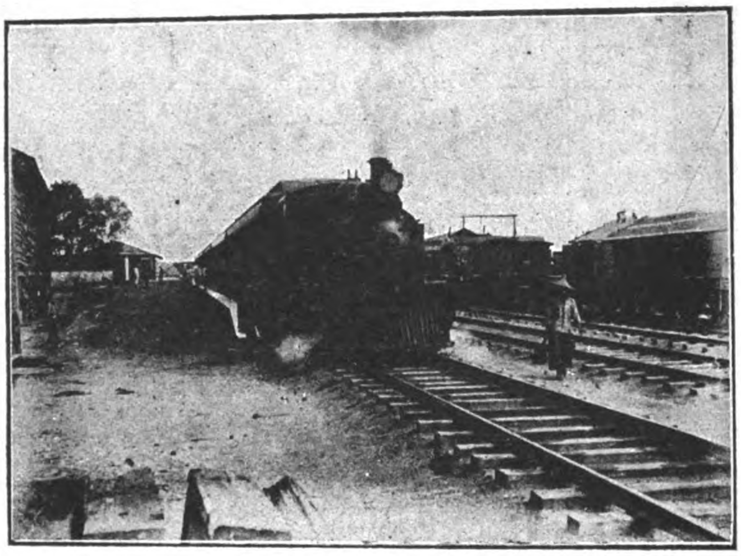
charge of which is a resident engineer, whose quarters are placed as nearly as possible in the middle of his section. He is provided with a paymaster who is responsible for the financial matters, a clerk, storekeeper, and interpreter. This latter individual is very necessary, as it is next to impossible for any foreigner to learn the Chinese language without giving two years exclusively to the study of it, which, in the case of an engineer, is impossible. The resident engineer is also provided with a guard of from 12 to 20 soldiers, who are under a captain, and who are armed with old pattern, but serviceable, Mauser rifles. This guard is at times a necessity in cases of trouble with villagers, and though the soldiers are not soldiers in anything but in name, being recruited from villagers themselves, they are as a rule loyal to the engineer, and can be trusted to protect him in cases of trouble, since failure to do so means decapitation.

The engineer, in order to get about his section, is, in cases where there is a road, provided with a pony, his interpreter and Chinese assistant engineer also having ponies. In cases where the section runs alongside the river, a small motor launch burning petroleum is provided for him to get from one end of his section to the other. His quarters are constructed of wood and consist of one or two bedrooms, dining room and office. Fireplaces are a necessity, as from December until the end of March bitterly cold winds blow from the north across the great Gobi desert. The sun is seldom seen during these months, the sky being heavily overcast, though there is little or no rain. In March last year here was slight frost at Shiukwan for several nights.

The months of July, August, and September are hot, but on the whole the climate is very good, and sickness amongst foreigners rare. There are mosquitoes, and consequently malaria, but not of a serious kind. Living is exceptionally cheap—chickens, eggs, ducks, pheasants and partridges being abundant. Vegetables of all sorts are plentiful, but are seldom eaten by foreigners owing to the peculiar methods of cultivation adopted by the Chinese.

Coming now to the cost of construction: for earthwork, the company advertises in the Chinese newspapers that such and such a section containing so many cubic yards in embankments and cuttings is to let, the tenderers being asked to name a lump sum for which they will do the whole section. Generally, into the lowest of such lump sums received in reply the number of cubic yards of earthwork is divided, and the successful contractor is told he can proceed with the work at the resulting price per cubic yard.

For all soils except rock he is paid this amount per cubic yard, but for rock he is paid 1 dol. per cubic yard, the Company supplying him with explosives if blasting is necessary.



TRAIN AT WONGSHA

As the contractor is paid for all earthwork in both cuttings and banks it is obvious that the longer the distance he can get his coolies to lead excavated soil from cutting without payment, the greater profit to himself on the contract. If the work is sufficiently big to warrant him buying or hiring temporary small gauge track with tip wagons, his profits increase at a great rate. In some cases earth from cuttings has been led a distance of three quarters of a mile, the contractor paying his coolies only the cutting rate. In cases where opening for bridges have to be lef in an embankment temporary bamboo bridges are put up and the small gauge track carried across it.

The quantity of earthwork in a section of 10 miles varies between 700,000 to 1,250,000 cubic yards of cutting and embankment. Of these amounts about 10 to 30 per cent. are rock. The prices for earthwork obtained by the method mentioned above have varied between 10 cents to 15 cents per cubic yard, the higher price being for through cuttings (2.1 to 3.15 pence per cubic yard). Prices for bridge work are as follows: cement delivered by the Company into its section storehouses varies from 4.80 dols. to 5.50 dols. per barrel of 375 lb., depending, of course, on the distance it has to be carried from Canton. Sand for concrete ranges between 6 dols. to 14 dols. per ching of 7 cubic yards. The latter price is for cases where the sand has to be carried in baskets by coolies over perhaps two or three miles of rice fields to the bridge site. Broken limestone varies from 11 dols. to 23 dols. per ching for the same reason. The prices paid to contractors for labour only in bridge work, that is, labour in mixing, depositing and ramming concrete, as well as putting up and taking down shuttering, have varied from 1.25 dols. to 1.65 dols per cubic yard, and for specially large and high piers up to 2 dols. per cubic yard. Very careful supervision by the resident engineer in person has been necessary when this method of bridge construction has been in force.

Now, according to the new system adopted since March last year, contractors take over the whole work of construction, and provide all materials including cement, but not the shuttering. In addition, as already mentioned, the contractor takes all responsibility for the bridge he has constructed for a period of twelve months from the date of completion. The average price submitted by contractors to date for minor bridges up to 20 ft. span and small culverts has been 52 cents per cubic foot, equivalent to 14.04 dols. per cubic yard, or 24s. 6d. English. For larger bridges the price has been 17 dols. per cubic yard and for the Ying Tak and Shiukwan bridges it will, of course, be much higher, probably 24 dols. to 30 dols. per cubic yard.

The exclusive use of cement concrete for bridge construction is open to some criticism. Excellent limestone in unlimited quantities exists practically all along the railway, and never more than one or one-and-a-half miles away.

In former times the Chinese built all their bridges—of which there are numbers along the river banks—solely of this limestone, and the excellent workmanship in the arch rings proves that they possessed considerable skill in dressing the stone. Single spans of 16 ft. in one slab of limestone exist in many places.

On the other hand, it is said that any coolie can be easily and quickly trained to mix concrete, and this being so, the Company would not be in the hands of the stonemasons, as it would be if masonry for bridges was adopted. It is also contended that concrete is cheaper than masonry. This may be true for places close to Canton, but is not so at places further away, the cost of cement transportation being very high after the first 30 miles from rail head. A good quality of lime is, however, made by nearly every village for its own uses, and there seems no reason why the Company should not use this lime for stonemasonry work, if necessary using cement for the face joints.

Nearly all native houses in this part of China are built of brick in lime. These bricks are of nearly the English size 9 in. × 4½ in. × 3 in., and make very neat work. They are of a blue colour, and are generally under-burnt. This defect could easily be remedied, and there appears to be no reason whatever why these bricks should not be used for small arch culverts and minor bridges. The price of these local bricks is 7 dols. per thousand.

The excessive width of formation in cuttings seems also open to criticism. The width of 24 ft. for a single line is made up as follows: 18 ft., the standard formation width, plus twice 3 ft., the width at top of the side trains. Even in solid rock cuttings this width of formation is maintained. The one and only apparent reason for this width is that the railway will be, and indeed now is, used extensively by footpassengers as a highway, and this extra width is given to give them clear room away from moving trains. If this be the reason, however, it would seem necessary to widen the embankment to 24 ft. also, instead of the standard of eighteen.

With regard to wages given for day labour by the railway, these vary from 35 cents to 40 cents per day for ordinary labourers, depending upon locality. For interpreters, clerks, foremen, and storekeepers, the pay averages 40 dols. to 50 dols. a month; and for survey coolies from 18 dols. to 12 dols. a month.

With regard to Chinese foremen, very few are competent to supervise alone the construction in concrete of any but the smallest bridges, and a fewer number still can be classed as trustworthy and honest. As illustrating the untrustworthiness of foremen and Chinese contractors, it is related of a certain foreign engineer, who left the work of piling the foundations of a large bridge to the supervision of a Chinese foreman that on being advised by this foreman that the work had been completed, he noticed the, in what seemed to him, remarkably short time the work had been done Going down to inspect the work, preparatory to ordering the concreting to begin, he noticed when walking over the pile heads that many of them seemed loose. As these piles were supposed to be 30 ft. to 40 ft. in the ground, he ordered the foreman to draw one for inspection. He then discovered that every pile had been cut off to a length of 4 ft. to 5 ft., and the remainder of the length carefully hidden away Needless to say the foreman lost his appointment that instant.

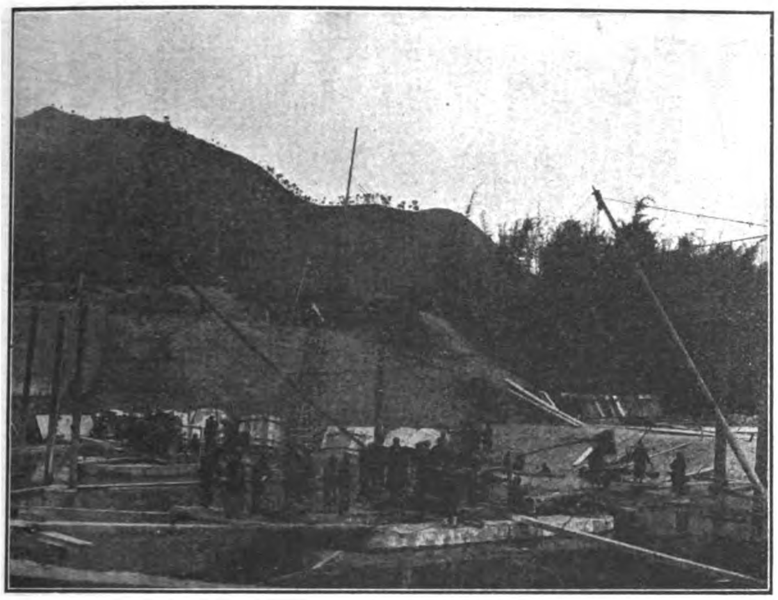
With regard to Chinese engineers there are undoubtedly men of great ability amongst them. The present Chief Engineer of this line, Mr Kwong King Yang, is a man of high professional attainments. Unfortunately, few men of his calibre are available in South China. The Northern Country Chinese do not like working in the climate of South China, and the South Country Chinese do not go to the engineering university in the North for a similar reason. The Company has several young men employed as assistants to foreign resident engineers, and some of them are turning out well, but it will

be a long time, at any rate in South China, before the help of foreign engineers can be entirely dispensed with. These young Chinese assistants are generally excellently well trained from a theoretical point of view, but lack any practical experience or training. They show exceptional keenness in learning, however, and keep note-books constantly with them when on practical work. Most of them study American methods of construction and read American books. With regard to the treatment of foreign engineers by their Chinese employers, nothing but praise can be given. They are well looked after and protected, and are consulted freely as regards the various problems that arise in the work.

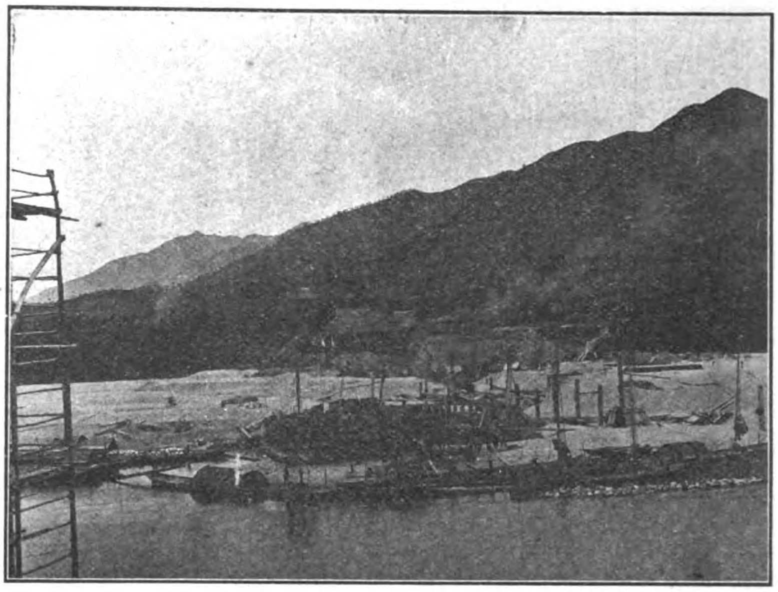
Looking now at the prospects of this railway from an earning point of view, so far there are no indications of any revenue to the Company. Not much in the way of goods traffic can be expected until the line is open to Shiukwan, when there may be considerable coal traffic developed. It is, however, not until through connection between Peking and Hongkong is established that any considerable goods traffic will accrue. As this is not likely to occur for quite ten years yet, not much more on this subject need be said.

This Company cannot complete its portion of the Canton Hankow railway for quite seven more years, and even this period can be looked upon as optimistic. Ten or twelve years is quite a probability. Beyond mile 180 very heavy rockwork is known to exist, and means of transporting materials are very bad.

That the railway when completed will prove an inestimable boon to the inhabitants of South China, can not be doubted, and as a means of opening up the interior of Kwangtung to mining and other enterprises, ist final and sucsces-ful completion is a consummation devoutly to be wished for.



SINKING CURB IS IN PROGRESS BY DREDGING SAND AND GRAVEL EMPLOYING CHINESE METHODS ON THE KWANG-TUNG YUET-HAN RAILWAY.



THE YING TAK BRIDGE ON THE KWANG-TUNG YUET-HAN RY.—ONE OF THE CURBS READY TO BE SUNK.

LATER INFORMATION

The following data under date of November 22 on the progress of the w rk to date has been made available through the courtesy of the President and Engineer-in-chief of the Company, H. E. Jeme Tien Yew:

"Of the total length of 209 miles in this part of the Canton-Hankow Railway, 58.5 miles were completed and opened to traffic up to the end of the last year and another 7.25 miles have lately been added to the open line, making up a total of 65.75 miles. The line has thus far passed through the low-lying country, crossing a large number of minor bridges and culverts, except towards the railhead where there is heavy rock-cutting and a tunnel about 230 ft. lorg. Permanent station buildings, track houses and water tanks have been built along the open line with the exception of the Canton terminus station building which is in course of construction. In Canton, a 70-foot turntable of Sellers' pattern is provided, as also workshops and electric plant adequate to the requirements of the railway.

"Work has been started as far as the 160th mile. Three tunnels aggregating to nearly one thousand feet, just a few miles ahead of the railhead, have already been completed. A big bridge at Yingtak, some 90 miles from Canton, consisting of 3-200 ft. spans, 1-60 ft., 1-50 ft. and 1-45 ft. span, is very near its completion. Some of the minor bridges have been finished while others are well under construction. Another big bridge spanning 760 ft. in the 150th mile and a tunnel about 1,000 ft. long in the 160th mile have just been made a start of.

"The northern end of the line has been surveyed and located up to the boundary of Hunan province, but work has not yet been started. The line towards that end runs chiefly through mountainous regions where there will be more than sixty tunnels aggregating to over ten thousand feet. It is estimated that this portion alone will require no less than 9,000,000 Mex. dollars to finish, while this, together with the work now in hand, will cost the Ry. Co. something like 16,000,000 Mex. dollars for completion which will take about four years provided facilities are afforded to the working system."

ACTIVITY OF THE HONOLULU IRON WORKS IN THE FAR EAST

Formosa.—During the past five years Honolulu Iron Works Co. have constructed and reconstructed seven cane sugar factories in Formosa, varying in capacity from 650 tons of cane per diem to 2,800 to 3000 tons of cane. Six of these factories are for the Taiwan Seito Kabushiki Kaisha (Formosan Sugar Manufacturing Co. Ltd.) and one for the Meiji Seito Kabushiki Kaisha. The factory for Meiji was shipped in Oct. of this year and has a daily capacity of 1,000 tons of cane.

All of the Taiwan Seito Co.'s factories are equipped with twelve roller mills of the very latest construction and design, having quadruple effect evaporators, central condensers and crystalizers. The buildings are all of steel and built for 150 mills solid pressure per hour. All the factories are operated on the gravity system, the boiling houses being four floors in height so that the liquor is pumped once only to the upper or vacuum pan floor and then drops by gravity from pans to crystalizers, thence to centrifugals without subsequent handling. This is standard type of factory as installed in recent years in the Hawaiian Islands and elsewhere. It eliminates elevators and pumps for handling the products to the greatest extent possible, saving labor and attention.

The bagasse from the mills is delivered direct to furnaces automatically so that the fresh cane and bagasse is not touched by hand.

The largest factory installed in Formosa by Honolulu Iron Works Co. is Ako, with capacity of from 2800 to 3000 tons of cane per diem. A description of this factory will serve for all the others. Ako is equipped with the following machinery:

Two 34"×78" 12-roller mills with Krajewski crushers, fourteen boilers 7×20 feet, all with automatic bagasse feed, requiring no extra fuel if worked uninterruptedly, six vacuum pans, two quadruple effect Lillie evaporators with an aggregate capacity of 2800 tons of juice, thirty-two crystalizers, thirty-two 40" centrifugals. This, with the exception of the Guanica central in P. R. and Chaparra—factory in Cuba is probably the largest cane sugar factory in the world.

Philippine Mindoro Development Co.'s Factory.—Perhaps the most interesting development in the Philippine sugar industry is the plant now in course of erection on Island of Mindoro for the Mindoro Company on what is known as the San José estate. This factory will be fitted most complete in every particular with the latest type of machinery. The buildings are all of heavy steel construction and of sufficient size to accommodate machinery to subsequently handle 1600 tons of cane in 24 hours with one crushing plant.

The plant as at present equipped will have machinery for 1000 tons of cane in 24 hours and will be enlarged as requirements demand. The crushing plant is a 9-roller mill arranged for one additional unit with Krajewski crusher. The rolls of the mill are 36 inches in diameter by 84 inches in length. Vacuum pans are of "express" type, each having capacity of twenty tons of dry sugar per strike. Crystalizers are of a capacity to suit the vacuum pans. Centrifugals are 40" in diameter and are electrically driven. Evaporator, of which there is one in-

stalled at present and space for duplicating same, is of "standard" quadruple type.

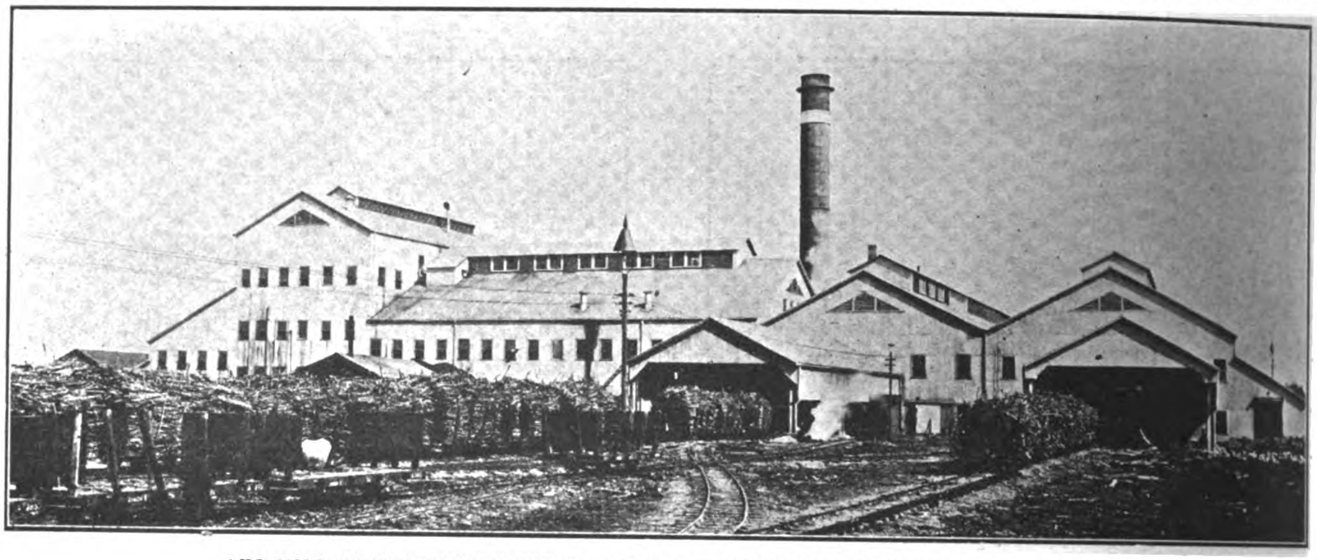
Boilers are seven by twenty feet in diameter of multitubular type.

Condensation system is what is known as the "central" type with the usual equipment and with dry vacuum and water supply pumps.

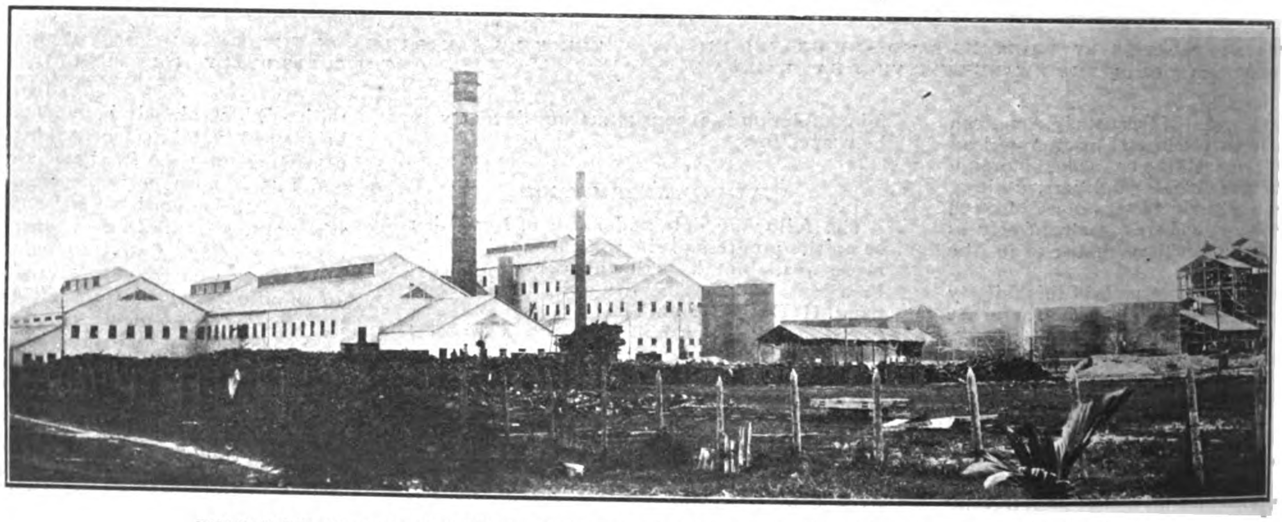
tools for carrying on repair work in their different lines.

The whole of the machinery is now being placed on concrete foundations and piers. Self-supporting stack b ing 9 feet 9" in diameter and 125 feet in height above foundation, about total 150 ft.

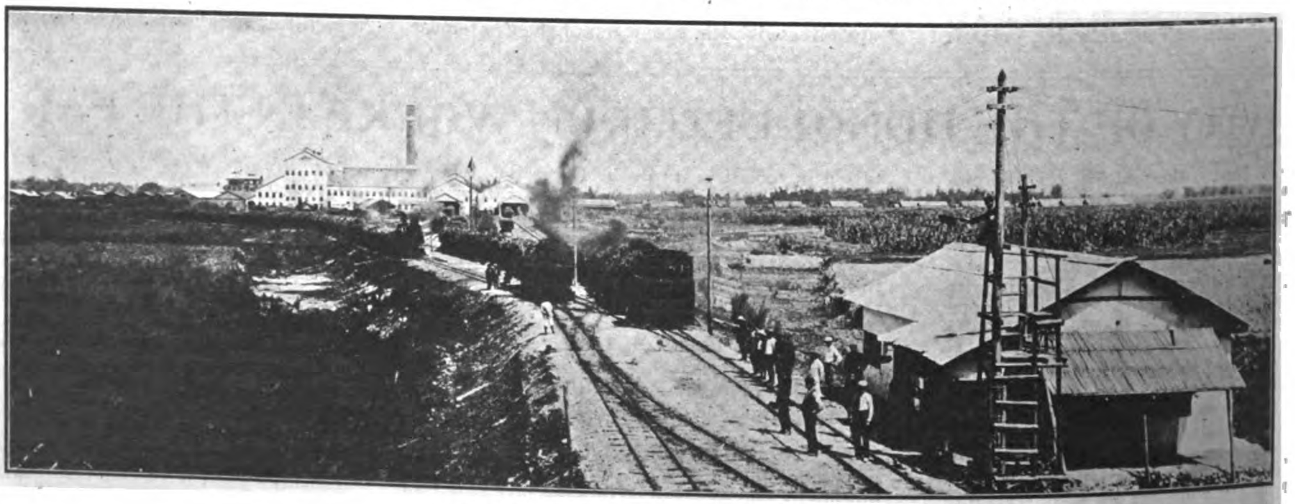
periments conducted by one of the near-by plantations on the island of Oahu, Hawaii, of a new system of clarification. At the present time in all Hawaiian factories, the juice is heated and lime and delivered to settling tanks where it stands a sufficient time so that impurities settle to the bottom. The



AKO MILL OF THE TAIWAN SUGAR COMPANY.—CAPACITY: 3000 TONS OF CANE PER DAY
Erected by the Honolulu Iron Works at Ako, Formosa, which is standard type of factory installed by this Company.



REAR VIEW OF THE AKO MILL, SHOWING MOLASSES STORAGE TANKS AND DISTILLERY



ANOTHER VIEW OF THE AKO FACTORY

All auxiliary machinery throughout the factory is electrically driven. Separate buildings housing the power plant, machine shop, carpenter and smith shops. These shops being equipped with all necessary machine

The factory is also filled with necessary machinery for manufacturing white granulated sugar for direct sale to market.

During the past year there have been ex-

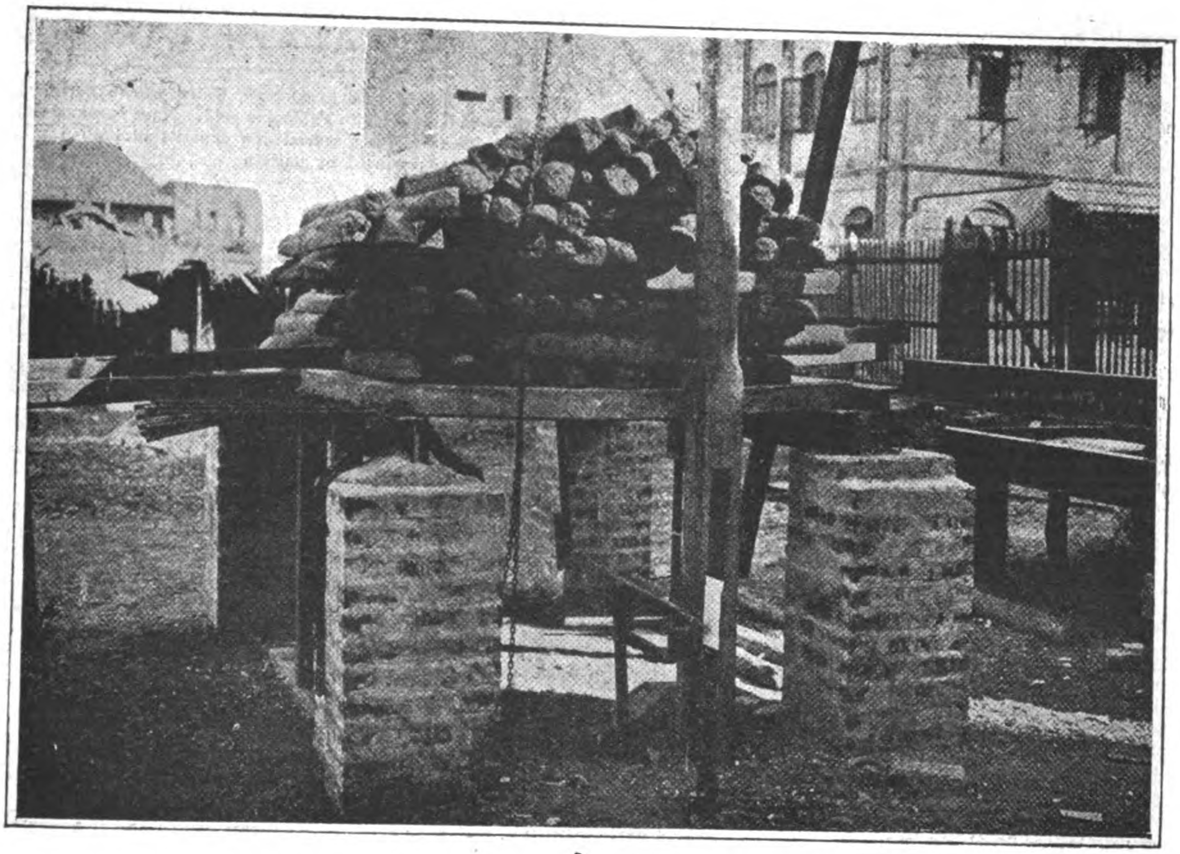
clear juice is then drawn off and what is known as the mud is delivered to the filter presses where the clear juice is separated from the mud and scums.

The new process, known as the "Kopke

KAHN SYSTEM OF REINFORCED CONCRETE IN INDIA

There has recently been introduced into India a new system of reinforced concrete construction which promises to be widely adopted through the increased economy and simplicity which it is possible to obtain with it, says *Indian Resources and Power*. This is the Hy-rib, a new departure of the well-known Kahn system, with which absolutely no centering or wood construction is necessary. With the methods usually adopted in reinforced concrete construction, woodwork has to be built under the steelwork and kept in that position until the concrete has set. The reason for this is that the steel foundations generally used will not hold the liquid concrete; if it were poured on this base without any woodwork underneath, it would simple drop through. A new method has, therefore, been adopted in the construction of the steel framework, so that it will hold the liquid concrete when it is poured straight on it, while a gripping surface is at the same time made underneath to which the plaster for the protection of the steel will adhere.

To architects and contractors the importance of the possibility of abolishing centering will be obvious. India is a country in which timber is usually dear, and though the centering work for reinforced concrete construction is generally put down at Rs. 6 per 100 sq. ft., it would probably be found to cost considerably more than double that figure, if the costs were more accurately worked out. But even at the price of Rs. 6 per 100 sq. ft., an invention which obviates entirely the necessity for woodwork must effect an enormous saving in large undertakings. The new steelwork is exactly the same in price as the older pattern, and, therefore, the cost of centering is entirely saved to the contractor by the use of the Hy-rib. Moreover, it renders the expediting of construction possible. At present either large sums of money have to be spent on the woodwork or intervals of several days must elapse for the drying of the concrete before the centering for one section can be removed and used in another part of the work.



DEMONSTRATION TEST OF KAHN SYSTEM OF REINFORCED CONCRETE BEFORE LEADING ARCHITECTS AND ENGINEERS IN BOMBAY.

From "Indian Industries and Power."

Another special feature of this material is that the ribs lap over one another and clinch, thus making a continuous reinforcement in both directions. The material can be curved to any desired radius and has been used in large quantities in heavy warehouse work. It has been widely adopted in the Argentine Republic, in Brazil, and to smaller extent in Chile; while it has already been generally adopted in the United States and in Great Britain. It is interesting to note, too, that on the occasion of the recent visit of the Duke of Connaught to South Africa, the new material was used in the building of the residence in which His Royal Highness lived.

In order to show the capacity of the new material, a demonstration was given in Bombay recently, a number of the leading engineers and architects of the city attending.

For the purpose of the test two slabs of concrete reinforced only with No. 26 Hy-rib had been made, one 2 inches thick, such as is used in roof construction, and the other 3½ inches thick, as would be used for flooring. Each of these had a span of 5 ft. 3 ins., although the usual builder's centre is only 4 ft. in span, and both were rigorously tested as weight carriers. On the flooring slab, it was calculated that for the area the maximum weight which builders would require it to carry would be 22 cwts., but over 70 cwts. was piled on with practically no deflection and on the roof slab 18 cwts. was finally put on with a similar result.

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clarification system," will consist of a number of revolving centrifugals in which the principle of the cream separator is utilized and the clear juice is drawn continuously from the revolving cylinders while the mud remains in same. About once in every hour these are emptied of the mud, after having the sugar washed out of it. This system dispenses with the settling tanks, *mud-presses, filters*, etc., and will undoubtedly be generally adopted in all Hawaiian factories, as well as all factories erected in the future by Honolulu Iron Works Co. Another process which is now in course of development is what is known as the "Battelle" system for recovering sugar from waste molasses. In the present process of manufacturing cane sugar the waste molasses consists of about ½ sugar and ½ glucose. This sugar in the molasses could not heretofore be exhausted to any greater extent than mentioned above, but with the Battelle process it is estimated that 85 to 90% of the sugar which goes to waste and which amounts to about 6% of all sugar that is made will be recovered. Furthermore, this process will make it possible to manufacture a refined sugar without the bone char process.

Another new system of manufacturing refined sugar has lately come to our notice, the so-called Weise process. The Company formed for the introduction of this process has sent to Hawaii from the mainland some samples of white granulated sugar of the most extraordinary clearness and color of grain, equal to the very best refined sugar. This company claims to be able to manufacture this sugar from 96 polarisation raw sugar at an extremely low cost, producing about 94 of such white refined sugar from 100 raw sugar at 96°.

The Honolulu Iron Works Company are now manufacturing three new mills with a different type of housing; they are made of steel castings, considerably lighter and stronger than the ordinary C. I. housing so far used. The King bolts only come part of the way into the cheeks, where they are firmly secured, thereby allowing the lower rolls to be placed as close together as the strength of the returner bar will allow, reducing the friction, and consequently the power, for driving the mill to the greatest possible extent. The hydraulics are placed under the top caps in such a manner that they allow free motion of the top roll and can be very readily removed for the renewal of packings.

THE MINERAL RESOURCES OF THE PHILIPPINES

The Division of Geology and Mines of the Philippine Bureau of Science has issued an interesting bulletin comprising a review of the progress of the mining industry for the year ended June 30, 1911. The brochure is highly illustrated and contains exhaustive papers from Warren D. Smith, Ph. D., geologist and Chief of the Division, Frank T. Eddingfield, E. M., mining engineer, Wallace E. Platt, A. M., geologist, Paul R. Fanning, S. B., Metallurgist, and Frank A. Dalburg, B. S., Coal Engineer, all of the Division of Mines, as well as a paper by R. Y. Hanlon.

Comparative tables of the mineral production for the last four years and prepared by Mr. Eddingfield, show a falling off particularly in the production of gold, although in a measure this was true of all mineral products. The tables follow:

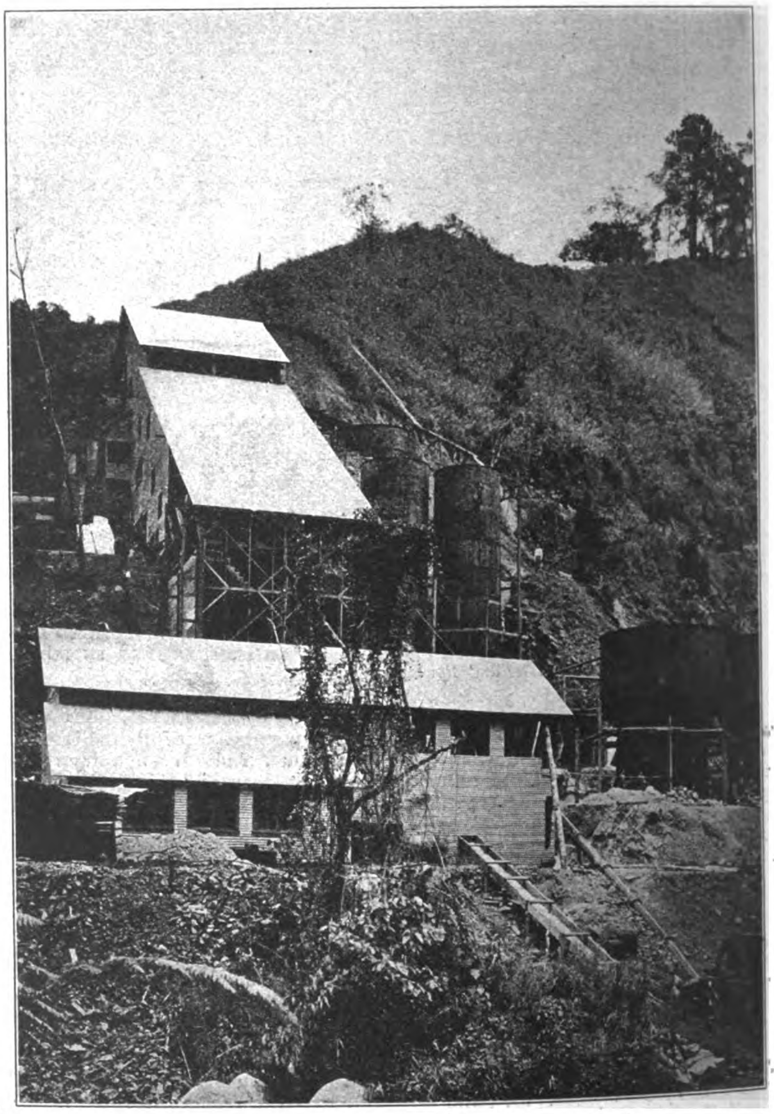
TABLE I.—*Mineral Production in 1910.*
[In pesos *a* Philippine currency.]

Province	*Gold*	*Iron*	*Coal.*
Albay			172,955
Ambos Camarines	144,900		
Bulacan		20,023	
Cebu			3,300
Ilocos Sur	(*d*)1,000		
Masbate	(*e*)		
Mindanao	*d*40,000		
Mountain Province	*d*95,960		
Nueva Ecija	*d*25,000		
Pangasinan	*d*2,000		
Total	308,860	20,023	*g*176,255
Total metallic with coal			505,138
Total nonmetallic			1,541,031
General total			2,046,169

TABLE II.—*Comparative Statement of Mineral Production in* 1907, 1908, 1909, *and* 1910
[In pesos *a* Philippine currency.]

Year.	Gold.	Silver.	Copper.	Iron.	Manganese.	Coal.	Non-metallic.
1907	141,194.00	95.53				26,799.00	
1908	434,500.00	2,750.00	52.00	17,500.00		77,166.00	815,918.00
1909	495,194.00			31,078.00	12,500.00	197,184 00	1,504,091.00
1910	308,860.00			20,023.00		176,255.00	1,541,031.00

a One peso Philippine currency is equal to 50 cents United States currency.
b Some silver generally found alloyed with Philippine gold. None is mined separately.
c No manganese reported for 1909, but several new deposits were found.
d Includes estimated amounts produced by natives
e No mills running.
f Small amounts smelted by Igorots.



THE HEADWATERS MILL IN BAGUIO DISTRICT

In a short introduction Mr. Eddingfield gives a short review of conditions during the year. He says:

"The year 1910 has been characterized by the greatest activity in the history of mining in the Philippines, yet the production of gold fell to but little more than 60 per cent of the previous year, and all the other mine products suffered a reduction. The reasons are given below:

"The year 1909 closed with a damaging flood in Benguet which tore away the entire cyanide plant of the Consolidated Mine and greatly delayed the Bua, since when the mines have been worked but very little. Later, severe storms swept through the south, causing considerable damage to the San Mauricio and hindering the work of construction in Masbate. Still later the Philippines and Stanley dredges stopped work and the old Paracale dredge sank. Then the San Mauricio, the Mine most anxiously watched by everyone, suspended operations and discouraging reports came from the Tumbaga.

"Such an array of calamities would have been enough to dishearten a much more advanced country than this, but they affected the con-

(Continued to page 225)

Additional tests took place on January 27th, before the same gathering of engineers and architects. The 3½″ slab of 5′-3″, reinforced by No. 26 Hy-Rib, was loaded to 2 cwts. per square foot and then a cotton bale weighing 4 cwts. was hoisted to a height of 6′-0″ and dropped, this tremendous impact resulting in the cracking of the underside of the slab, and producing a slight deflection, but it did not impair the integrity of the slab as was clearly shown by subsequently loading the slab with 132 cwts., or a uniform load of 7.¾ cwts. per square foot.

The slab showing no sign of collapse under this excessive load and only a small additional deflection, which was very gradual and uniform, and the supply of pig-iron being exhausted, it was decided to again hoist the cotton bale and drop it. This time it was hoisted to a height of 8′-0″ above the pig-iron and dropped, but with no noticeable effect on the slab whatever.

The other slab, 2″ thick 5′-3″ span, which is the construction recommended for construction, was loaded with 30 cwts. or equivalent to 4½ cwts. per square foot, and this induced a deflection of approximately ⅜, but there was no sign of failure as the increase in deflection was gradual and uniform, case when approaching failure.

The success of these tests would point to a large adoption of this material throughout India. We believe that it will specially commend itself to engineers in country districts on account of the large saving in labor and centering, and on account of its adaptability for walls, partitions, tanks, etc. We understand the material comes in sheets of 4, 9, 8, 10, 12 feet, and the Company also manufacture a small hand-cutter for cutting the material for the job as required.

Another advantage is that the material can be curved to any radius and will commend itself for use in pipes, tanks, arched floors, etc.

The accompanying photograph shows the slab at completion of the test. The material is manufactured by the Trussed Concrete Steel Company of Detroit, Michigan, who manufacture the well-known Kahn Bar and other products. Messrs. McKenzie's Saw Mill, Limited, have been appointed Sole Agents for Western and North-West India.

THE FAR EASTERN REVIEW

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THE VIOLATION OF THE OPEN DOOR BY CHINA

(Communicated)

Dear Mr. Editor:

I have read with great interest your article on "The Violation of the Open Door by China." Being a Chinaman, I, of course, look at the situation from a standpoint of absolute neutrality as to British, German, American or other interests.

Before entering upon my argument I would just like to point out that your reasons why American manufacturers have been unsuccessful in this country are not the correct ones. The little business they have lost owing to unfair decisions is negligible.

Some little time ago I listened to an argument between an American and an English friend regarding the relative sportsmanship of their respective countries. After a heated argument in which the American stated that the English, instead of taking their defeats like men, were always trying to find excuses, such as losing the polo international because they had not enough ponies, the yacht race because the Americans made such impossible rules, the intervarsity sports because the Americans trained their men specially, whereas the English were all amateurs and went in to the thing for sport, and ended by stating that, after all, the organization that won was the best, and if the English were true sports, instead of spending their time explaining how they lost, they should change their methods and make sure of winning next time. I think the position of the English in sport—according to my American friend—is the position of the American in business out here, and the advice of my American friend to English sportsmen might well be taken to heart by American manufacturers. In the following argument I will agree with you that the present methods are unfair, but would point out that American manufacturers are not the sole sufferers.

The unfair discrimination is against every manufacturer not of the nationality of the financing body, and even against manufacturers of the same nationality who are not on the approved lists. I believe this was also true in the case of the American Development Co. at Canton, and it certainly may be expected while conditions exist unchanged.

Every engineer believes that the machinery he is familiar with, is the best, so, within certain limits, it pays to buy what your staff wants rather than material they are prejudiced against. It is natural for a British engineer to prefer British machinery and a German engineer, German engines. A British engineer in buying a British engine gets something he knows the virtues and limitations, but if forced to take an American engine, he secures something he knows of only through the pages of his technical papers, and will always be expecting the boiler to leak because many years ago some railway had one that did. Faults that happen in an English locomotive are taken as a matter of course, but if they happen in the American locomotive are made the subject matter of a long report to the director, with a strong strain of "I told you so" running through it.

This feeling can easily be seen in the letter quoted by you.

"The lowest tenders are from American and Continental makers for their specifications and patterns. There is, however, very little difference between the lowest tenders and those of really first class makers".

The really first class makers, as pointed out by the letter, are British. Evidently the impression meant to be conveyed by the letter was that American and Continental makers are second class. This is, of course, absurd, and is like the statement of the old Chinese historiographer who described China as the centre of the earth, and all other countries as tributaries and barbarians, and I believe has as much reason.

To this day American locomotives are hauling the most important trains on the I. C. R. The engineers of that railway have never been able to say anything against American locomotives excepting that their tubes leaked at first, but agree that after overhauling they were as good locomotives as they had on the line.

All locos. have their faults, and if the American boilers give more initial trouble than others, the American valves are as good today as when they came out, while the European ones have to be continually overhauled. The American boiler faults are blazoned far and wide, while other defects are quietly accepted as necessary and usual.

All this, however, is merely beating the air, for as long as the engineers of the various railways are allowed to run things according to their own particular likes and dislikes, the Chinese will never get fair play. We can not get it from the engineers out here because it is quite evident that their experience has been limited to a very restricted circle of manufacturers and districts.

The only person who can insist upon fair play is, as you say, the managing director. You have blamed these gentlemen very much, but what can they do? Many of them do not know a tank engine from a Mogul, and they must rely on their engineers. Supposing one of them, director of an English loan built line, put his foot down and insisted upon the cheapest loco being bought—which, let us say, was of German make, the English engineer would immediately send in a list of dire prophecies of accidents, breakdowns, etc., till the poor director would think he had ruined the whole line. Supposing, however, he was firm, and did buy the German loco. From the day of its arrival it would be reported. The brakes would be stiff necessitating an extra man merely to work them, the valves would leak or something else would happen. All these things, which might happen in any loco, in the case of an English loco would be taken as a matter of course, but, in the German loco, would serve to so worry the director that next time he would follow the engineer's advice. The director can not do anything else. He might insist upon the German engine being run as well as the English engine, or else ask the locomotive super to resign, but this would probably be disapproved of by his Peking superiors under protest from the legation of the country furnishing the loan.

The only man who ever attempted to put his foot down was Mr. Loh, the former director of the Tsinpu railway, and we all know what happened. Instead of upholding him in his fight for a square deal, the railway board discharged him. That the board did not think him in the wrong but merely discharged him as the easiest thing to do, is shown by his immediate appointment as engineer-in-chief of the Yunnan railway. Do you think, however, that this dismissal will stiffen the backbones of other directors? As soon as friction arises between a director and his engineer, the engineer is sure of his government's support in having the director dismissed. The engineers know this and so do the directors. The Yuchuanpu (Railway Board) don't want to be bothered, as it distracts the attention of its officials from other profitable business and find it easier to dismiss an honest director rather than have the worry of backing him up.

Under present conditions it is absolutely certain that the great preponderance of orders from any railway will go to the country—or should I say company—financing it.

Even if the Yuchuanpu insist upon indents being put to public tender, it can easily be worked to benefit favored interests. After a great deal of trumpet blowing the directors of our Pehan railway announced that all material would be put to public tender, and semi-public tenders are being regularly called, but I defy any one, excepting those in the know, to quote to them. The specification is made up in French somewhat as follows.

Injecteurs	137	F. 35	2 pieces
Unions	21	J. 8	1

The marks and letters probably refer to some number on their stock book, which no one can see, and the marks of the last invoice. There is only one way to find out and that is by a visit to the stores some three hours ride from Peking, and securing permission (which is more than likely to be refused) to go over the store and hunt for the articles required. You can imagine the amount of work needed to quote on one union worth say 50 cents. The

only people who can quote are the original suppliers. Such public tenders are all rot. I consider a man much more honest who, like the Germans on the North Tsinpu railway, openly tell everybody they might as well save themselves the trouble of tendering, as they have already settled who is to get the business.

As long as each railway is allowed to settle its own standards according to the limited experience and partiality of the men in charge, so long will China find it impossible to secure a square deal. Every country in the world has suffered from lack of standardization, and China might have been expected to profit by others' errors, but instead she seems to have those multiplied by the number of countries financing her. One despairs of our government ever doing anything in a sensible manner, as the Peking officials only care about feathering their own nests.

It is certain that a radical alteration in the methods of railway administration is needed. Many foreigners with whom I have discussed the matter, however, say that the rock on which all Chinese efforts will be wrecked is that of "Squeeze." Without doubt that has been the great blot on all former administrations.

Although bribery and corruption has been sanctioned by usage, the great mass of opinion has been strong against th system, and now that the revolution has opened up a new era and made certain a constitutional government, I should not wonder but that squeeze and bribery will be made as great an offence in China as in England under the Illicit Commissions Act. Where adequate salaries have been paid as on the Kalgan and Szechuan railways, I defy anyone to say that they have ever paid a cent in bribes to the engineers or directors. This proves that our great fault does not arise from inherent dishonesty, but because inadequate salaries make it imperative.

If fair salaries are paid, squeezing can be made as rare as in foreign countries. A great fight will be necessary to eradicate this evil, but our nation has the moral stamina to do it, as is shown by the way in which we have stopped the growth of opium, and if you will only try to imagine the impossibility you would have in trying to abolish the drink curse in your own countries, you will admit that China has still hope.

As I said before a radical alteration in the methods of railway administration is needed. Even the old administration saw this, and as far as I can find out did call a conference of railroad men in order to decide upon some sort of standardization. So far so good. Any one who knows the medley of designs existing at present will agree that some sort of standardization is necessary. But as usual the Peking board went the wrong way about it What officials were they calling to Peking? The great preponderance would be British; there would be no American, one German, and perhaps a couple of Frenchmen. What were these people to do? To make standards for the Empire? If so then, of course, the standard would be an English one. That is not the way to establish a set of standards. To be any good they must be drawn up impartially so that manufacturers in any part of the world could quote on them with a fighting chance of success. The Engineers at present in China are not likely to decide fairly. Few of them seem to have had any experience outside their own country, and they all seem to think that only their own country's manufacturers can produce anything good. This denotes limited experience. Furthermore, may I say it without in any way aspersing these gentlemen, all have their future to protect. Although servants of China, they always keep one eye on the loan syndicates. Personal advancement and future positions must influence their decisions. They are not unprejudiced as is shown by your article.

Now the railways of China are important enough to obtain men whose experi nce and reputations are big enough to place them above the pettiness of seeing nothing good excepting in their own country's machinery, and of seeking to pull the chestnuts out of the fire for friendly manufacturers.

Our government should therefore appoint a commission composed of a well known engineer or engineers, from each one of the loan countries. The commission could be presided over by H. E. Jeme Tien Yew, as you suggest, and should also include one or two other Chinese engineers of standing and carry out its duties in the manner of a Royal Co mission in England, or a Senatorial Committee in the States. It should have power to call as witnesses any railway man in the Empire.

Such a Commission would cost a great deal of money, but when its duties were completed China would have definite lines laid down which it could work along towards standardization with the probability that immense sums would be saved yearly.

Such a commission, actuated solely by a desire to devise the best and most suitable standards, might be trusted to act fairly as its interest in China would be finished with its work.

The duties of the commission would be to produce a set of limiting standards or specifications, within which every railway in China could call tenders with the certainty of getting good results, and within which they should be compelled to work. It is impossible for standards to be devised to the satisfaction of everybody, but they should be the best for China without thought as to whom they would favor. Some such set of specifications is absolutely necessary if China wants to buy cheaply. At present, when every official is allowed to act upon his own ideas, it is impossible to get cheap prices. As long as one locomotive is bought on one specification, and another on a totally different one, it would not pay any manufacturer to make pr parations for the business. But if every railway in China had to purchase material on a standard specification, and honestly award the order to the lowest tenderer, manufacturers would prepare for the business and China would benefit by cheaper prices.

It is difficult for me to say within what limits the commission could work, but without doubt they could formulate a set of limiting specifications which, while they gave a fair chance to all manufacturers, would make it certain that only good results would be obtained.

For instance, in the case of bridges, they might specify the unit stresses to be used in designing, loading, type and general features, materials and workmanship and inspection and testing, in the same way as outlined in the specification as drawn up by the American Railway Engineering & Maintenance of Way Association. Such a specification, while making certain a first class article, does not favor any one manufacturer over another.

The remainder of the details could be safely left to the builders. English engineers have a habit of asking people to quote to drawings which minutely specify the dimensions of all T's and channels in English standard sections, and as the Continental and American sections are slightly different, the latter are debarred from competing. Another point which could be waived is the difference in the shop practices of the various countries. In England the rivet holes are drilled, in America punched and reamed. The English state that punching distorts and consequently damages the surrounding material. The Americans, while admitting that drilling is slightly better rivet for rivet, contend that when a punched hole is reamed out, it is as good as the drilled hole, and owing to the lower unit stresses they use on rivets they state that their joints are superior to the English. The real reason why Americans punch their holes instead of drilling is because of the less amount of labor needed. In any case, whatever the difference, it must be admitted that it is so small as to be negligible, and certainly not important enough to make drilled holes insisted upon, considering that they handicap the Americans by about 5%, and other things being equal, this 5% would pay for the purchasing commission which has to be paid to the loan syndicate.

Without doubt a fair set of specifications could be devised, but even they would be evaded if left to the engineers of the various railways to adjudicate upon.

The only way to fair play is to take the buying out of the hands of all who can influence the giving of the order, and make it automatically sure that everybody has a fair chance, so that the lowest tenderer, provided he is a first class manufacturer, will secure the business.

Instead of allowing the engineers or other interested parties to specify whatever they thought fit, a buying department, independent of either the railway staff or the loan syndicates, etc , should be formed.

All requisitions for material should be sent in to this office, and tenders invited following the official standards produced by the commission, and the lowest tender accepted irrespective of nationality. To see that the material was up to standard our government should retain inspecting engineers of good standing (say the gentlemen who had sat on the standardizing commission) to inspect the materials at the factories in countries likely to submit tenders. It is not fair to appoint only one in London who has to inspect all material whether manufactured on the continent or America, for his additional charges often seriously militate against materials from those countries being accepted, and from the advice of one of them at least they do not seem to be able to judge material of other countries impartially.

Many engineers order from an approved list of manufacturers. The necessity of such a list would indicate that engineers are not sure of what they want. For instance, if I wanted to buy springs, and knew just what I wanted, I could safely buy as per the cheapest offer. But if I did not know what kind of spring I wanted, and couldn't tell if a spring delivered was what I wanted or not, I must go to one of the best known manufacturers in order to safeguard myself against my own ignorance. This is one good reason for the approved list system.

As soon as China has a set of definite standard specifications, an approved list will be unnecessary, as China will then know what she wants and it will be up to her Inspecting Engineers to see that she gets it.

The arrangement with their London agents has been always defended by the L. C. R. officials, because these agents were supplied with a complete set of blue prints and code words for everything used by the railway, making it so easy to order from them, and too much trouble to explain to other people. These officials ignore the fact that all the blue prints, code words and specifications could be produced for 50 other firms at a very slight cost. For a few hundred taels they could place everybody in a position to quote, saving the government tens of thousands of taels.

It would seem that residence in China has a bad effect on everybody. A foreigner in his own home country would consider he was negligent or dishonest in his duty unless he secured the best material at the cheapest price for his employers. In his home country the engineer will give, as on the Brighton railway, the contract for its conversion to Germany, Soudan bridges to America, equip German arsenals with American machinery, and buy Panama dredgers from the Clyde, but in China he seems to see nothing good but in his own country. Is this due to the bad effect China has on foreigners, or to the fact that the experience of the engineers we get has been very limited and confined to the little centers in which they were trained? In any case I suppose they reason. "Oh, well, the Chinese don't know any better and have to pay for what we decide." Is this honest? I think not, just because we trust them they should be more honest with us than they would be at home, where they deal with people who know more than they do. Especially should they keep a clean slate in China, where they are on public trial with men of other nationalities, and where they should give effect to the promises of their various governments to concede a square deal to all.

If, however, an approved list is absolutely necessary, instead of permitting any partial person to draw it up, let us take the lists already approved by each of the foreign governments. In England you have the Colonial and India offices who have approved lists, Germany has its railway administration, and France the same. In America there is the Master Car Builders Association or some of the big corporations. What is good enough for these organizations is surely

good enough for China, for the men who drew them up surely know what they are doing as well as any of the engineers in China. Personal friendship and prejudice should not be allowed to influence any approved list.

An arrangement such as the above would make the awarding of contracts as fair as is humanly possible. The limiting specifications, without restricting the competition to a favored few, would make certain that the material did not vary outside of well defined limits. The independent buying office would have nothing to do, but issue and receive tenders. It can not, for value received, favor any manufacturer, because the lowest tenderer, accepting the necessary guarantees must get the order. To see that the workmanship, design, etc., were all as per standard wanted, we would have the inspecting engineers, and so that undue discrimination would not be shown against the products of the different countries, there will be a different consultant for each country. Such an arrangement, if seriously and fairly insisted upon and carried out, promises fair treatment to all.

Another point that should be taken up by the government is the training of Chinese engineers, for in future we hope to build and run our own railways as Japan has done. At present f reign engineers pooh pooh the idea of Chinese engineers ever becoming competent. But if they will only look around China they will see many evidences of works carried out by Chinese engineers in the olden time which attest a much greater engineering skill than any shown by foreign engineers in this country hitherto. But although foreign engineers have not shown any great ability yet, we do not jump to the conclusion that they couldn't if occasion arose, and they should remember that it is just as possible that Chinese engineers might also make good if they were given the chance, as they have done on the Kalgan railway. Much adverse criticism has been directed against this railway, but taking it all in all it is as good as any in China, and cost for cost is cheaper. I have no doubt that it is not finished as finely as say the Nanking railway is, but as a well known American engineer once said, "Engineering ability is shown in making one dollar go as far as another man would make two, and not to spend four dollars, where one dollar would have done." If you could compare the costs of similar articles on the books of the I. C. R. and the Kalgan railway as I have done at the archives at Peking you will find that the Kalgan costs are at least 5% cheaper than the I. C. R's, and that not for inferior material, but material of the same quality, and very often from the same manufacturer. The only failure on the whole line is for material compelled to be purchased from the approved list of the I. C. R. It appears to be only common sense to purchase a special article from a manufacturer who had previously turned out a similar article, but common sense and an approved list do not seem to run together, so the order was placed with an untried maker of the approved list with failure as the result.

In order to create a force of skilled Chinese engineers, instead of employing as many engineers as the I. C. R. does (who have more engineers than the Midland railway in England), three-fourths of the foreign staff should be dismissed and Chinese appointed in their place, and instead of having engineers bored to death with nothing to do every 50 miles, Chinese engineers might be appointed every 50 miles with a foreign engineer to supervise say every 200 miles.

It would also save exorbitant charges if the chief engineer had in his office a Chinese assistant engineer to take charge of the earthworks and other Chinese work, for it is notorious that the interpreters of the foreign engineer cheat them right and left. I remember a case in which a district engineer grew suspic ous of the labor returns from a certain work, and decided to pay a surprise visit to the job. He confidentially informed his interpreter of his intention telling him to keep it a secret. The interpreter, who was receiving half the squeeze, immediately informed the contractor, and when the engineer arrived the requisite number of men were of course on the spot. Foreigners may say, however, that the Chinese engineers will probably be as great squeezers as the interpreters, but provided they are paid fair wages they can be strictly honest as is shown by the records of the Kalgan and Szechuan railways.

It appears to me that if there is the will there is the way to alter the present unsatisfactory conditions, and let us hope that under the new régime there will be the will. If Peking really desires to change things she must get advisers who know their business, and not men whose only qualifications are "olo friend pidgin" or toadyism. The old position was one of the blind leading the blind. Each official seems to be making as much as he can out of his position trusting to luck that China will last till he has made enough.

The foreign powers, instead of trying to lift China out of the mire, are apparently each working for their own benefit. Admitted that our officials are as corrupt as foreigners say they are, would it not be better for the foreign powers to combine for assisting China along the path to prosperity rather than along the path to her destruction? Foreigners complain that our officials are too vacillating and are always playing one country off against another. How is that possible unless the foreign powers are each trying to cheat each other and are willing to be played off one against the other? China is big enough and rich enough if properly developed to provide a market for the surplus products of the manufacturing nations for many years, and the more prosperous she becomes the more she will buy.

In olden times the progress of one country was taken as a menace by another country, but nowadays surely every schoolboy knows that the prosperity of one country is bound to react favorably on the prosperity of all the others. All professors of political economy teach this as a maxim, why is it then not acted upon, or is it accepted as being as much an academic proposition as your great commandment "Do unto others as you would that they should do unto you"?

F. K. P.

THE ADAPTABILITY OF PHILIPPINE LABOR FOR ENGINEERING CONSTRUCTION

The adaptability of the Filipino labor in carrying out extensive undertakings is made the subject of an interesting report by the Director of Public Works to the Secretary of Commerce and Police of the Philippine Islands. It is a comprehensive review of the success of the Bureau in developing a reliable corps of laborers in its different divisions of activity and the data furnished should prove of great value in the consideration of engineering construction by private capital in the islands. Through the courtesy of the Secretary of Commerce and Police, we are enabled to reproduce this data in full as follows:

Labor Employed:—During the fiscal year ending June 30, 1911, from 13,000 to 19,000 laborers have been continuously employed on public works under the supervision of this Bureau.

The average has been 16,157 laborers for each working day, classified as follows:

Roads	10,300
Buildings	1,887
Bridges and culverts	1,630
Irrigation	1,026
Teamsters	591
Miscellaneous	487
Artesian Wells	236
Total	16,157

Wages:—The wage paid for unskilled labor ranges from 30 to 80 centavos per day, varying with locality. Where labor is plentiful and cost of living low, rates are low. With reverse conditions, rates are correspondingly high. For the last year the average daily rate of pay was ₱0.581.

Efficiency:—Due to lack of nourishing food, ignorance of the laws of correct living, and the effects of tropical climate and tropical diseases, the Filipino is, generally speaking, physically weak. In stature he does not equal the average American or European laborer. In addition to the above handicap he is usually untrained even in the use of tools so simple as pick and shovel. His wants are few, therefore he has no incentive for continuous hard labor. He does not work with the intention of making a steady livelihood, but merely to earn a few pesos to satisfy some immediate present need or whim. Under these conditions the untrained laborer is in many cases not worth even the small wages he receives; on the other hand, the Filipino laborer responds quickly to opportunity, is susceptible to training, and by patience and fair dealing may be developed into an efficient worker.

Contrary to prevailing opinion, the best workmen are not confined to any particular class, locality or tribe such as Ilocano, Bicol, Tagalog, Visayan, etc., but are largely the result of environments. The laborers in the vicinity of commercial centers and in thickly populated districts have from necessity as well as opportunity acquired habits of more or less continuous industry.. In nearly all localities where opportunity has presented itself, common laborers have learned to efficiently use saws, axes, stone drills, picks, shovels, scrapers, and other ordinary implements in a satisfactory manner.

By selection it is possible to develop laborers of a higher type who are quite capable operating machinery of such as stationary engines and b ilers, road rollers, and automobiles, and who make excellent carpenters, stone masons, blacksmiths, etc.

The greatest need of the Filipino laborer is training. Without it he is an inefficient and unprofitable worker. With training and selection he becomes not only efficient but reliable and trustworthy. It is believed that the efficiency of the Filipino laborer will increase in proportion as his own wants increase. With the desire to own better homes, dress better and eat better food he will work harder, more continuously and more intelligently.

In dealing with Filipino labor three things appear to be essential:

1. Competent foremen and overseers who thoroughly understand their business and who are just in their dealings with the laborers and tre t them with courteous consideration without bluster, and who will at the same time tolerate no imposition.

It is absolutely essential that the foreman fulfil strictly all promises made and never indulge in idle threats. Filipinos as a whole have no respect for any one who does not keep a promise made or who fails to inflict a penalty threatened.

2. Laborers should be properly housed, fed, and provided with wholesome recreation.

3. Filipinos should be paid promptly every Saturday night in time to permit them to return to their homes for Sunday.

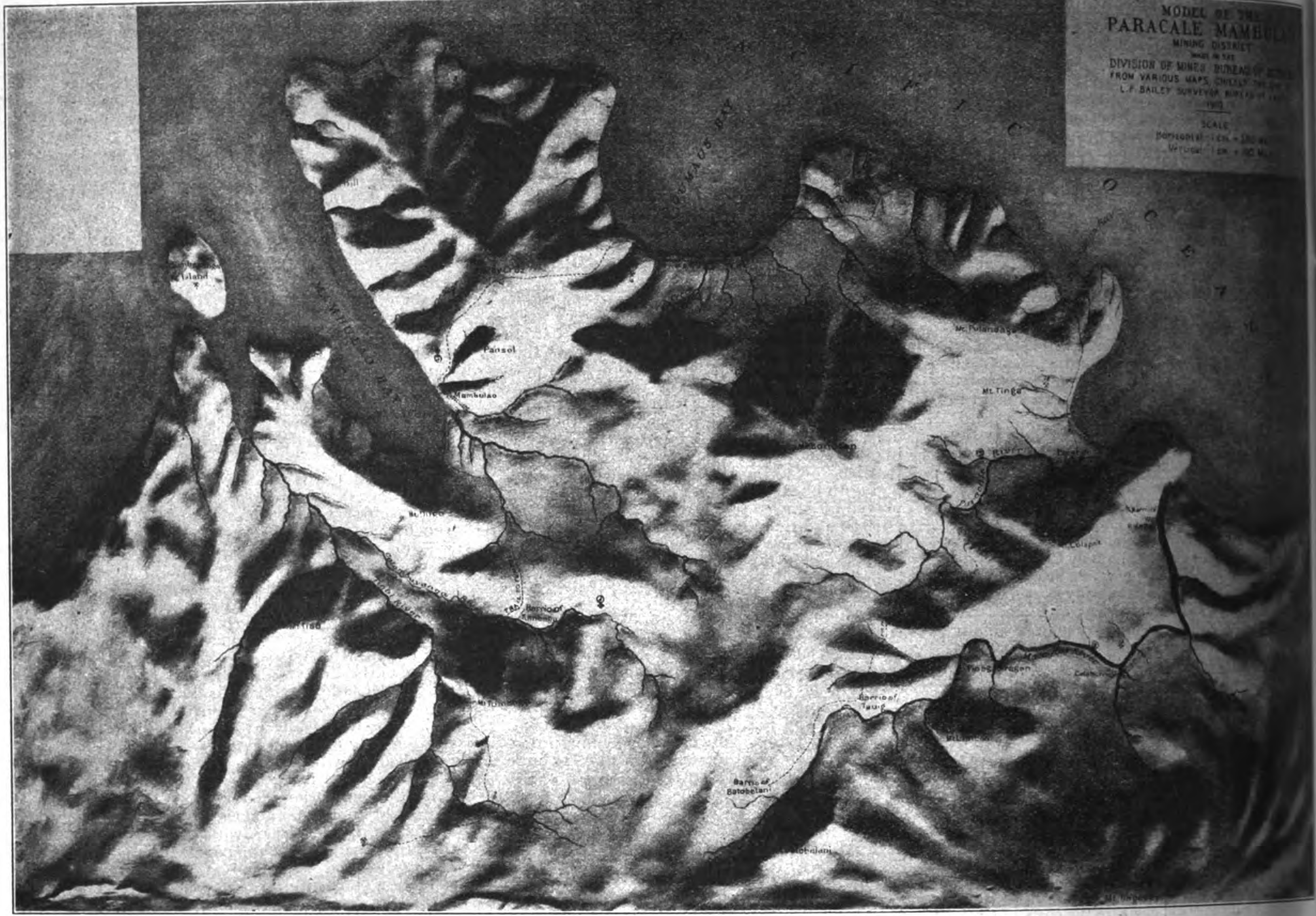
The failure to pay promptly, the requirements of overtime and holiday work, and the rough and unsympathetic character of the men put over them, have in many cases been responsible for the failure to obtain results from Filipino labor. When well fed and cared for and under firm, competent and kindly foremen, the laborer is capable of giving good, and sometimes excellent, results.

THE CHINESE REVOLUTION

The recapture of Hankow by the Imperial forces together with the surrender of Nanking to the Revolutionaries were the principal evidences of activity in the field during the month. Negotiations between Yuan Shih Kai and General Li Hung Hang looking to a compromise, so far, seem to have lacked progress, although hope is still held out that some ba is of understanding upon which all forces for reform could agree might be reached at an early date.

The retirement of the Prince Regent and the appointment of Yuan Shih Kai practically as Administrator for the Imperial House were the most significant reports from Peking.

Conflicting advices are being received daily from the different provinces that have declared their independence, but evidence of a widespread demand for reform is unmistakable. We have knowledge of no element in China that desires a continuance of the old order, save a very small remnant of Manchus entirely de-



pendent upon Imperial favor. In the Manchu provinces, since the revolution began, the sentiement there appears very strongly in favor of reform yet differing from the south in that the former prefer the retention of the monarchy in form while the active leaders in the South demand the complete uprooting of the dynasty and the establishment of republican form of government. Excluding the question of form of government there does not seem to be any serious differences to adjust if we accept as sincere the promises of Yuan Shih Kai, and are not misled as to the wishes of General Li.

General Li declares that his followers will be satisfied with nothing but a republic. He expresses distrust of Yuan Shih Kai and his promises declaring that once the revolutionary leaders entered into a compromise and disband their forces, the Imperialists would break every promise made. He even hints that the reactionaries would discredit Yuan Shih Kai, once peace was restored, and reform would be as far away as ever. If General Li were assured by substantial guarantees that the spirit of the pledges, made by Peking would be fulfilled, there might be hope of an early adjustment. The Revolutionary leaders feel that they are safer under arms than they would be if they accepted the overtures made and disbanded their forces. They distrust Peking and there is every indication that Peking is doubtful of the good intentions of the republican forces. At the present writing peace negotiations are in progress. The outcome remains doubtful, although the leaders on both sides seem prepared to discuss the situation dispassionately, and in the end may agree to sacrifice personal ambition and prejudice in the general interests of the Chinese people.

Yuan Shih Kai urges that unless the form of the monarchy be retained, the empire will be divided against itself and be exposed to disintegration. He opposes a republican form of government as not adaptable to the great mass of the Chinese people, while liberal constitutional government in the form of a limited monarchy would secure as great a measure of reform as a republic and at the same time preserve the integrity of the empire.

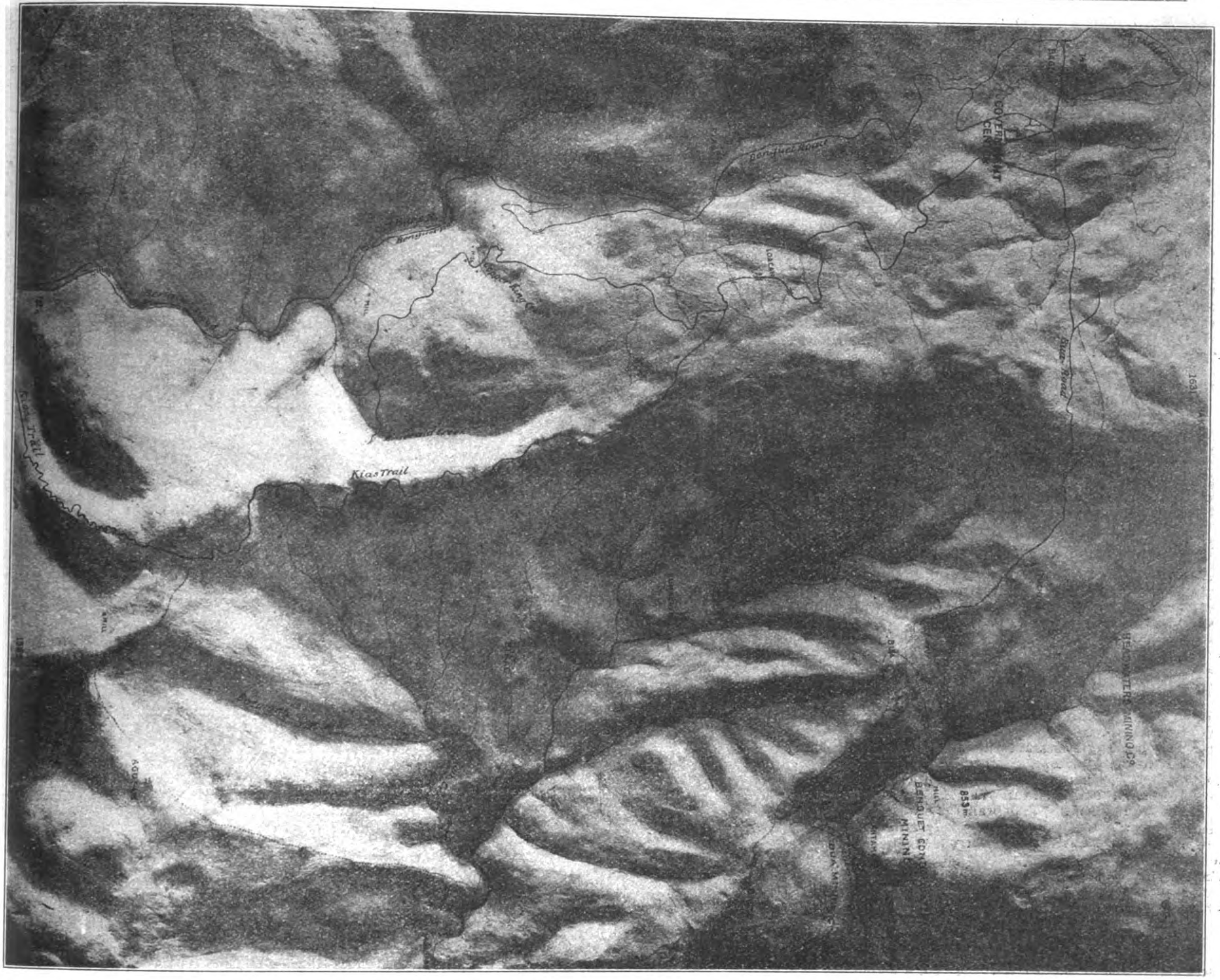
General Li expresses his lack of faith in the sincerity of purpose of the Imperialists, and urges that the Chinese need never hope for reform under the Manchu dynasty. He declares the only hope for the Chinese is the complete overthrow of the dynasty and the inauguration of an entirely new era under the banner of a republic.

Racial prejudice seems to have entered largely into the controversy and has more or less retarded dispassionate discussion. The elimination of the Manchu, even from participation on equal footing with the Chinese in the proposed republic, is advanced by the more radical among the revolutionaries and indicates how deeply rooted is the distrust of Imperial purpose among a large number of the leaders. Even the pronounced yet less radical attitude among the Manchu reformers, who have submitted petitions to Peking but who favor the limited monarchy, is interpreted by the Chinese as an evidence of Manchu craftiness.

It would seem therefore that the greatest obstacle to an adjustment is lack of confidence. We believe, if the Imperial and Revolutionary delegates respectively were assured that the terms upon which the two parties might agree would be carried out in the spirit as well as in the letter, the struggle now on would soon terminate. How is this confidence to be established and the actual carrying out of measures agreed upon guaranteed? That seems to be the problem awaiting solution.

Notwithstanding the present disturbed condition in China and the serious conflict of opinion, faith in the capacity of the Chinese people to solve their own problems is general. Their splendid showing in the suppression of opium of a measure of co operation along lines of reform has no parallel in western history. The reform of the present system of tribute so as to eliminate "squeeze" by the substitution of equitable taxation to provide revenue, provision for a civil list consistent with the needs of the administration, and a real budget that reflected the wishes of the country, are the pressing needs of the hour. Once these reforms are realized, those familiar with the capacity of the Chinese in all departments of industrial activity predict the greatest measure of progress in the development of the country and consequent content and prosperity of the Chinese people whether under a republic or a liberal limited monarchy.

So far as can be learned there is no disposition on the part of the powers to intervene, rather, indeed, a well defined understanding, appears to have been reached to keep "hands off" and let the Chinese settle their own differences and put their house in order. The protection accorded foreign interests by General Li and the absence of outrages by his army have won a large measure of confidence and sympathy from abroad. The fear that the disturbed conditions would entail the spread of anti-foreign fanaticism has been dispelled to large extent as the revolution progresses.



BAGUIO RELIEF MAP

The effect of the revolution upon trade has been more or less indirectly felt in Shanghai, especially with reference to the Yangtsze valley. Shipments up the Yangtsze have been suspended and the advances to finance this movement were not realized, thus locking up large sums in the native banks. Then followed a run on the banks f r a few days when payments were suspended and Chinese dealers having deposits found their money tied up. Before suspension there were a large number of native bank orders out which the banks refused to cash causing much embarrasment until arrangement were made to take them up. This relieved the situation somewhat, but the general stringency made it inconvenient for many dealers to take delivery of goods.

The peace goods guild petitioned the foreign merchants to cable the mills to stop shipments on the way and cancel all orders in the looms owing to the impossibility of taking delivery on account of the revolution. It is not improbable that this attitude on the part of the guild was encouraged in some measure by the drop in prices in Manchester as well as by the losses threatened through disturbed conditions.

Confidence in a marked increase of trade following the reforms inaugurated as an outcome of the revolution prevails among foreign firms. There is a feeling that whatever immediate losses are sustained, with a rejuvenated China, these will be more than recouped by increased trade following the impetus given every department of endeavor under the new regime.

THE MINING RESOURCES OF THE PHILIPPINES

(Continued from page 220)

tinued development but little. The operators seemed to realize that a few failures of hastily planned enterprises were no indication of the true worth of the ore bodies, and consequently began slowly to start operations on a more solid basis.

"In Benguet, the Major Mines Company erected a six-stamp mill with concentrating tables and spent large sums in surface construction, houses, sawmill, ore bins, tramways, roads, etc., preparatory to taking out ore. The Headwaters Company began the installation of a ten-stamp mill with complete cyanide equipment, and Mr. McElroy built a three-stamp mill. The Consolidated again began operating on a paying basis and the Bua tore down the old mill with the hope of building a larger one in a more suitable location. Farther south in Benguet, near the Pangasinan line, Messrs. McMichaels and Lambert are preparing to erect a Huntington mill on their property at Lubang. All of these companies have been pushing development work, as have many others in this district, although at present without any mills, and a large number of promising showings have been encountered.

"In Nueva Ecija and the adjoining country to the east, paying placer deposits have been met with and arrangements have been made for installing dredges. Platinum has been found in this district, and the country to the south.

"In Ambos Camarines, the Paracale Company built a new pontoon and put up a crusher and Huntington mill for treating the rich boulders raised by the dredge; the Philippines dredge was moved to the Maliguit River where it has at last proved a success; and arrangements have been made to build a dredge on the Gumaus River.

"In Masbate, the Colorado Company is erecting a twenty-stamp mill and cyanide plant, and several other companies have started with renewed activity to develop ore and prepare for mills.

"In Marinduque an English company has carried on operations and erected a three-stamp mill with concentration tables on a property 20 kilometers south of Santa Cruz.

"Numerous good reports continually come from Surigao, Mindanao, where several Americans are prospecting placer ground. Mindoro also shows promise in this direction, and it is very probable that dredges or some sluicing machinery will be placed in one of these districts before long.

"This present year will be an improvement over all the previous ones, for conservative men have been investing in a conservative manner."

Mr. Eddingfield also contributes an article on the Aroroy Mineral District of Masbate which is of special interest since it includes the Colorado Mining Co.'s property upon which a large mill recently installed is now operating. The outcome of this adventure means much to the future of gold mining in the Philippines. He gives the following description of the Colorado property and the progress made up to the end of the year:

"The Colorado mine is located on Bagadilla Mountain, and the vein on which most of the development work has been done outcrops very near the crest of the hill, striking about S. 45° E. dipping 70° to the NE. The highest point of the vein is about 320 meters above sea level and fully 290 meters above the boiler floor of the mill.

"There are two main tunnels driven along the foot wall of the vein. No. 1 is 30 meters below the highest point in the outcrop, and opens up the vein for a distance of 210 meters, No. 2 is 55 meters on the incline below No. 1 and opens up the vein for a distance of 380 meters. A third level, known as the 'intermediate,' is being driven 20 meters above No. 2, connecting three raises from No. 2 with the main shaft. These raises contain ore chutes and manways ready for stoping on the intermediate. On the first level, crosscuts have been driven at short intervals to the hanging wall and drifts have been driven in both directions along the hanging wall to connect the crosscuts, forming a main haulage way.

"A two-compartment incline shaft was sunk on the vein from the SE. opening of No. 1 to a depth of 122 meters on the incline. Crosscuts were driven between the walls of the vein at intervals of about 15 meters down the shaft.

"The vein varies in width from 3 to 12 meters, but averages about 5 meters. It is a quartz manganese vein containing calcite in depth, but honey-combed in the upper levels from the leaching away of the calcite. It presents a very marked ribbon or banded appearance from the layers of quartz, iron, and manganese. This banding is generally parallel to the walls, but in some places it is seen in circular form, probably because of movement in the fissure. Numerous irregularities occur in the dip and strike of the walls, and horses of wall rock are frequently encountered in the vein. These features are characteristic of the district as a whole.

"The hanging wall of the vein is a much decomposed andesite. The foot wall has the appearance of being a separate intrusion of a highly mineralized, light-colored, semi-granitic mass filled with impregnated quartz, having a width of about 20 meters on the second level. This seems to indicate that the vein is a contact deposit.

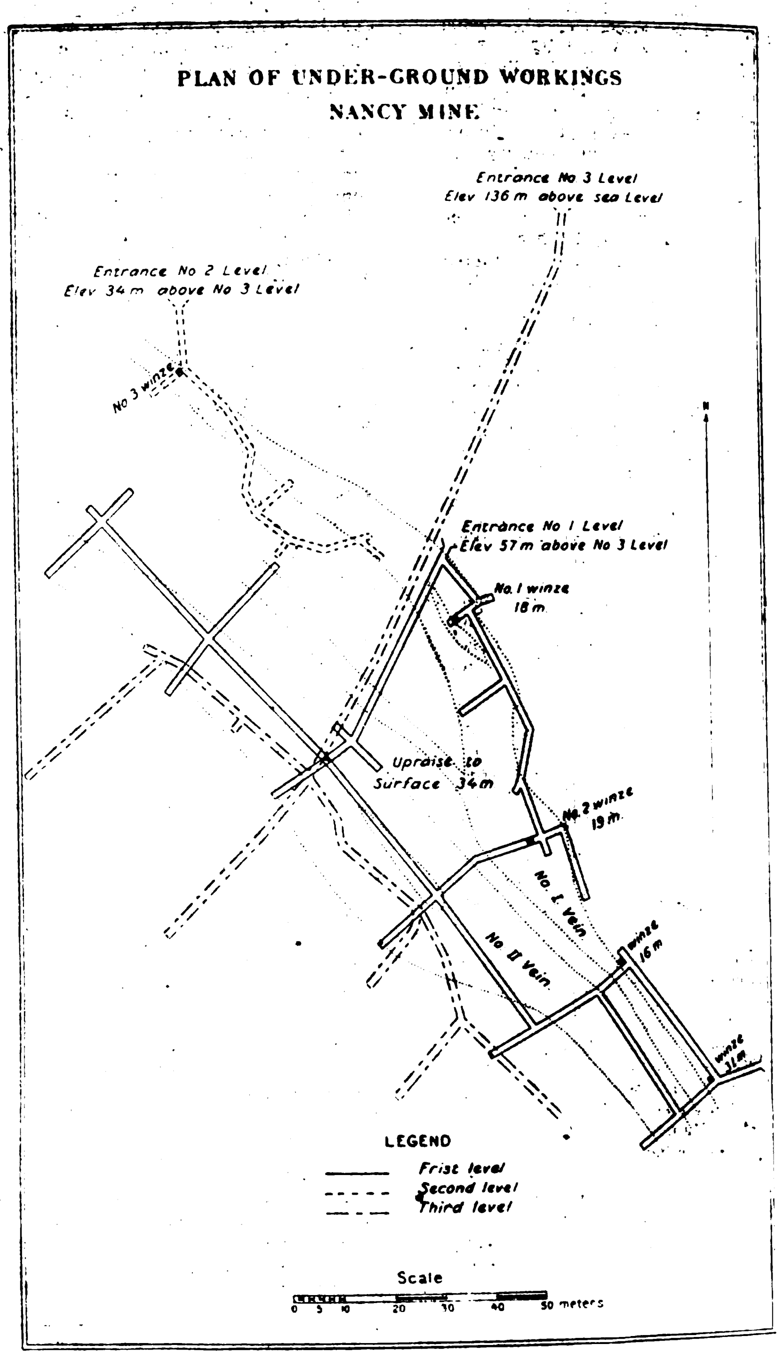
"Oxidation has been carried on to a greater depth in this district than in any other known section of the Islands. The ore is in a much oxidized state even at the foot of the shaft, but the wall rock is only slightly altered.

"Water should cause no trouble in the mine for almost one hundred meters more in depth. This presents a possibility of developing over one million tons of ore above the permanent water level.

"The vein is said to average 14 dollars to the ton, along the No. 1 and No. 2 drifts. Some values as low as 8 dollars and as high as 60 dollars were reported, showing irregularity in the distribution of values in various parts of the vein. However, it is a peculiar fact that a careful screening test of a sample of ore showed practically equal values for eight different screen products. The ore cyanides well, requiring but little lime for alkalinity and showing a good extraction of values with a moderate consumption of cyanide.

"The ore will all be taken out of the second level and lowered to the mill in a Seschen two-bucket rope tramway 320 meters long, having a pitch of 26°. The mill has the following process:

"(1) Grizzly bars and crusher. (2) Ore bins, 200-ton capacity. (3) Challenge ore feeders. (4) Stamp battery, 20 stamps; 1,250 pounds each. (5) Dorr classifier. (6a) Sands to 2 tube mills, 56 inches by 16 feet. (6b) Elevator to Dorr classifier. (6c) Slimes from Dorr classifier to Dorr thickening tank, 14 feet by 28 feet. (7a) Overflow to tank, 5 feet by 6 feet. (7b) Triplex pump, to (7c) battery storage tank, 16 feet by 24 feet, on orebin level. (7d) Underflow Dorr thickener to 2 air lift Pachuca tanks, 40 feet by 12 feet diameter. (8) Second Dorr thickener. (8a) Overflow to clarifying boxes. (8b) Zinc boxes. (8c) Sump. (8d) Triplex pump, to (8e) strong solution tank, 8 feet by 20 feet diameter. (8f) Underflow of Dorr thickener to agitation tank, 8 feet by 20 feet. (9) Two Oliver filters. (9a) Solution, to wet vacuum pump, to (9b) storage tank. (9c) Centrifugal pump to (9d) Second zinc boxes, (9e) to sump or to Oliver filter for wash solution. (9f) Pulp, to waste dump.



NANCY MINE, MASBATE

"Water is obtained from 14 wells in series located below the mill. It is pumped to one high-head storage tank above the mill and one low-head storage tank on the second Dorr thickener level.

"The power plant consists of three 100 horse-power boilers, and one 250 horsepower Bates-Corliss engine with hemp rope drive.

"The location is very favorable. Wood for fuel is moderately cheap and plentiful The mill is about 1 kilometer from the nearest navigable stream, and only about 5 kilometers from a good harbor."

The other properties in this district referred to in this paper upon which work was in progress are the Eastern, the Tengo and the Keystone No. 1 vein in the Eastern where opened up is referred to as appearing remarkably good and above the second level presents a possibility of having over 100,000 tons of ore averaging from 9 to 10 dollars per ton. The Tengo company has been developing a new vein and repairing the ten stamp mill formerly placed on the property The Keystone company is prospecting claims on Ororoy mountain and have installed air drills, the first used in the islands for mining purposes.

The Developments in the Baguio District is the subject of a paper by Warren D. Smith Ph. D., Chief of the Division. He writes:

"If the statistics of production alone were to be considered, then the past year has been one of stagnation and suspension of work in this district, but an examination of the properties shows that it has been one of recuperation and preparation for more active operations.

"*Benguet Consolidated Company.*—The Benguet Consolidated Mill and the Bua Mill suffered

severely from a storm in October, 1909. The latter suspended all operations, but the former continued development work and has consistently turned out over 100 ounces of bullion per month from its amalgamating plates. The company is more than making expenses and the mine has been kept in excellent condition. There is no question but that this company controls one of the largest ore bodies in the Philippine Islands.

"*The Headwaters Mining Company.*—The Headwaters Mine, located on the headwaters of the Antamok River, has recently completed the installation of an all-sliming cyanide plant consisting of the following:

"Rock crusher, ten-stamp Hendy mill, classifier, Hardinge conical mill, Frenier sand pump, classifier, slimes thickener tank, 2 Pachuca tanks for air agitation, pulp tanks, gold solution tanks, storage tanks, Ridgeway vacuum filter with necessary pumps, zinc boxes, Pelton water wheel, gasoline driving engine, and air compressor.

"This mine has a fair supply of ore blocked out on a strong lead which can be traced for several thousand feet on the surface and which is reported to average 16 pesos to the ton. Samples taken by members of the Division of Mines have run much higher.

"*Other Properties.*—The Major Mining Company on Major Creek, one of the numerous branches of Gold Creek, has in operation a six-stamp Hendy mill and intends shortly to put in a small cyanide plant.

"The Comote-Clayton property, which lies east of the Benguet Consolidated, presents some very good free-milling ore and the three-stamp mill which was erected several years ago is again being placed in condition. This mill is small but should yield a profit on the rich ores of the property.

"The Muyot Mining Company has not as yet installed machinery. However, its mine today is probably among those, which have not yet begun milling, the best developed property in the district.

"Mr. J. E. Kelly, at Bua, has four strong leads which give promise of developing a large deposit of rich ore.

"Mr. H. O. Hibbert, the locator of the Headwaters property, has taken over a large interest in the mine and claims of Mr. J. P. MacElroy on Emerald Creek. Mr. MacElroy, previous to the sale, had installed a three-stamp mill which was made in Manila.

"Other properties are held by Mr. J. E. Huiskamp in Batwaan; Mr. Calvin Horr, on the Ascension group, located near the Kias trail, and by Mr. Alexander Pau on the property north of the Major Group. All are carrying on development work and have uncovered some promising leads.

the district is that worked by Messrs. Probeck and Ebert on the "Inca" and associated claims. The "Inca" vein is about 21 meters wide and pans remarkably well. A one-stamp mill, for prospecting purposes only, has just been set up here.

"The mining men of this district are preparing a petition to the government asking for a permanent district mine warden. The idea of mining wardens came from the Australian mining men who are located in the district, and I believe that the more Australian ideas we adopt here in mining, the better off we shall be. The Australian mining law to-day is perhaps the best in the world.

"The division of mines has completed its report on the ore deposits of the district. The work was begun in 1906 by A. J. Eveland who made a topographic map and contributed notes on the geology of the district. This map has been revised and a fairly complete study of all the properties has been made.[1] The work has been done by Mr. F. T. Eddingfield, mining engineer, and the writer as geologist. The following facts seem to be fairly well established in regard to the ore deposits in the Benguet district:

"(1) The ore deposits are intimately related to igneous intrusions. (2) Gold is found in quartz fissure veins in andesitic intrusions; (3) In calcite veins, probably not fissures, but in andesitic intrusions; (4) In contact zones between sedimentaries and andesitic intrusions. (5) Gold was deposited from ascending waters. (6) The gold is associated with pyrite and in one locality with tellurium. (7) The gold veins in many cases carry much manganese oxide. (8) The ores are only partly free-milling. (9) There has been some secondary enrichment. (10) The ore deposits are found in a region of great rainfall and steep slopes. (11) The zone of oxidation is shallow. (12) Although none of the mines has gone below water level, the indications are that many of the deposits will become richer with depth.

The needs of this district are as follows:

"(1) Capital. (2) A hydro-electric power plant on the Agno River to run mills of a large capacity. (3) More development work. (4) A mine warden. (5) A location tax. (6) Greater publicity.

"The labor question in this district seems to be very favorable. When the Filipino becomes trained, he proves very satisfactory. The only trouble which arises is generally through lack of numbers. The Filipinos at present used in underground work are drawn from the rice fields of the lowlands."

Paracale-Mambulao District in which the greatest interest is taken on account of its rich placer properties is the subject of an interesting paper by Paul R. Fanning, S. B. He writes:

"Measured in terms of production, the mining industry in the Paracale-Mambulao district did not progress as much as was expected, and the output for 1910 shows an actual decrease from that of 1909; but measured in terms of future probabilities, the district is to-day in a more secure position than at any time in its history.

Gold production by years[1]

[In pesos Philippine currency.]

1907	*1908*	*1909*	*1910*
4,000	152,270	216,701	171,900

"A decrease of 44,801 pesos is to be noted between the production of 1909 and that of 1910. However, this retrogression is merely temporary and does not in any way mark the beginning of a decline. It can be attributed to the non-operation of the Paracale dredge for six months of the year during the construction of a new pontoon.

"During the year the Stanley dredge contributed to the production, and the Philippine's dredge, San Mauricio and Tumbaga mines entered the field as producers.

Gold production by companies in pesos, Philippine currency, 1910.

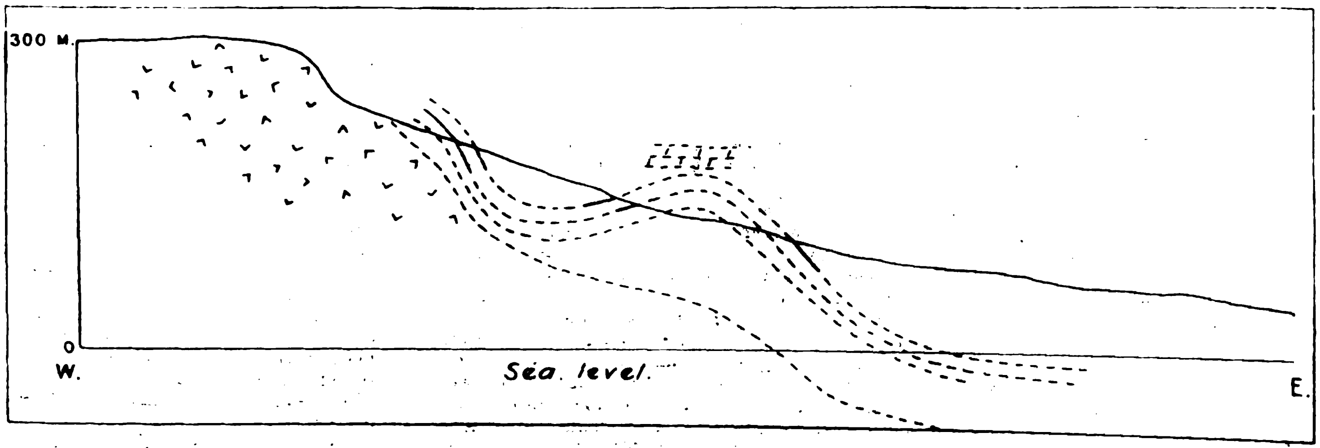
Paracale Gold Dredging Co.	69,855.00
San Mauricio Mining Co.	34,350.00
Stanley Gold Dredging Co.	41,000.00
Tumbaga Mining Co.	9,045.00
Heise Dredging Syndicate	17,650.00
Total	171,900.00

"*Dredging.*—The greatest confidence can be felt in future production from dredging, and the output of the district during the next few years will depend to a great extent upon this work

"During the year greater attention was paid to the testing of placer ground, and several properties are now in a position to command capital for the purchase of a dredge. Among these can be named the Gumaus, the Paracale Extension, and the Philippine Gold Dredging Company.

"*The Paracale Gold Dredging Company.*—The Paracale dredge operated for six months and produced 69,855 pesos worth of bullion, or one-third of the output of the entire district. Early in January the dredge sank in shallow water owing to the decay of the pontoon under the attacks of the teredos which infest the waters. The machinery was easily salved, and construction of the new pontoon was begun at once. Hand-sawed native hardwoods were used and as a protection against the teredos a lining of felt and tar was placed between the inside and outside sheathing. A new 120 horsepower tubular boiler, a 60 horse power compound engine with condenser, a 12-inch centrifugal pump and a new digging ladder and buckets were installed. Further, the screen was lengthened 5 feet and more table area was added to make a better saving of the gold. To complete the improvements, an electric lighting system was installed. The capacity of the buckets remains 4 cubic feet as formerly, but increased yardage is obtained by a bucket speed of twelve per minute instead of nine.

These improvements resulted in splendid yields of bullion, and from July to January



IDEAL SECTION IN PART OF THE POLILLO COAL FIELD

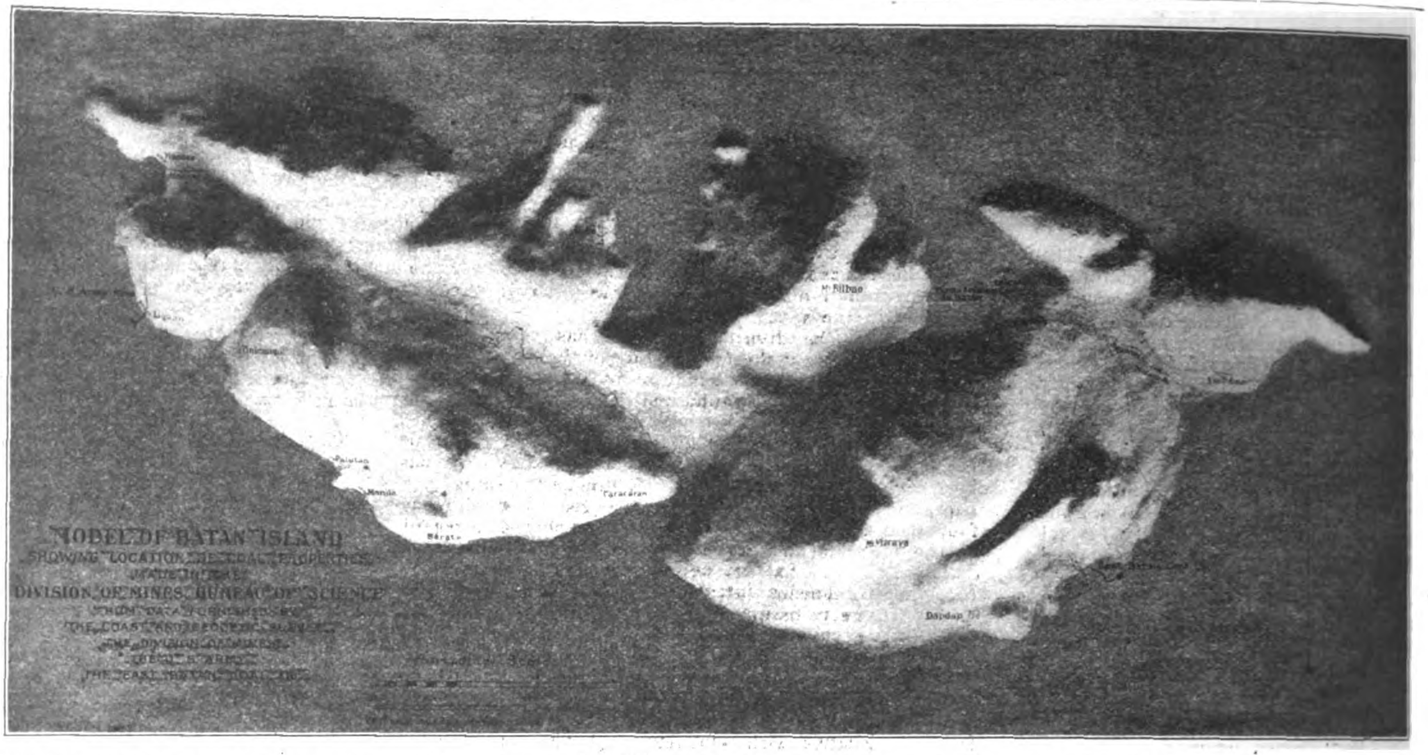
"No other than annual assessment work has been done on the Topside and Reliance groups. However, the geologic features of the district are such that an extensive, and probably rich, ore body could be developed.

"The Bonanza group which lies adjacent to the Headwaters on the east has good ground, although undeveloped.

"One of the most promising properties in

1 This map and paper will appear shortly in the *Philippine Journal of Science.*

1 Some silver is alloyed with the gold.



the average production was close to 10,800 pesos per month. This dredge still has a large acreage of rich ground and its future yearly production should well exceed that of the past.

During the latter part of the year a mill was being constructed for the treatment of the rich quartz boulders brought up by the dredge. A Huntington mill and Wilfley table will be used, and as there are several thousand tons of boulders on the dump, a splendid yield should be obtained.[1]

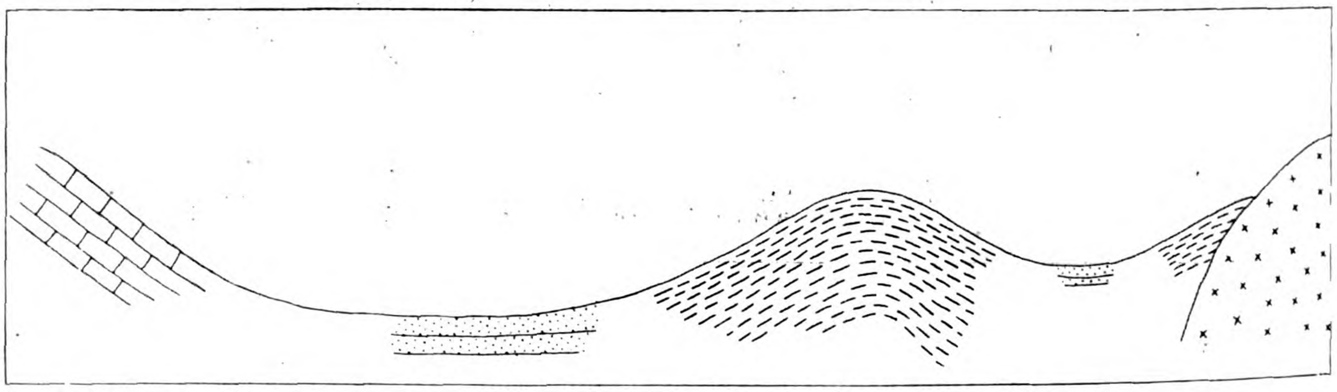
"*The Stanley Gold Dredging Company.*—The Stanley dredge operated very irregularly during the year and produced 41,000 pesos wotrh of bullion. This is a very creditable showing for the ground, as the machinery is not only in bad shape, but the design of the dredge, lacking as it does a revolving screen and sufficient gold saving devices, renders it incapable of making a close saving of the gold.

"*The Philippine Gold Dredging Company.*—The Philippine's dredge had proved itself too weak to handle the deeper material and during 1910 operated on its own ground for only a few hours. Early in the year the dredge was leased to the Heise Dredging Syndicate and later moved to the Malaguit River. The owners of this dredge are now in a fair way to receive a large return for their money, and it is quite probable that a new dredge will be bought so constructed as to handle their own ground which is said to be of good value.

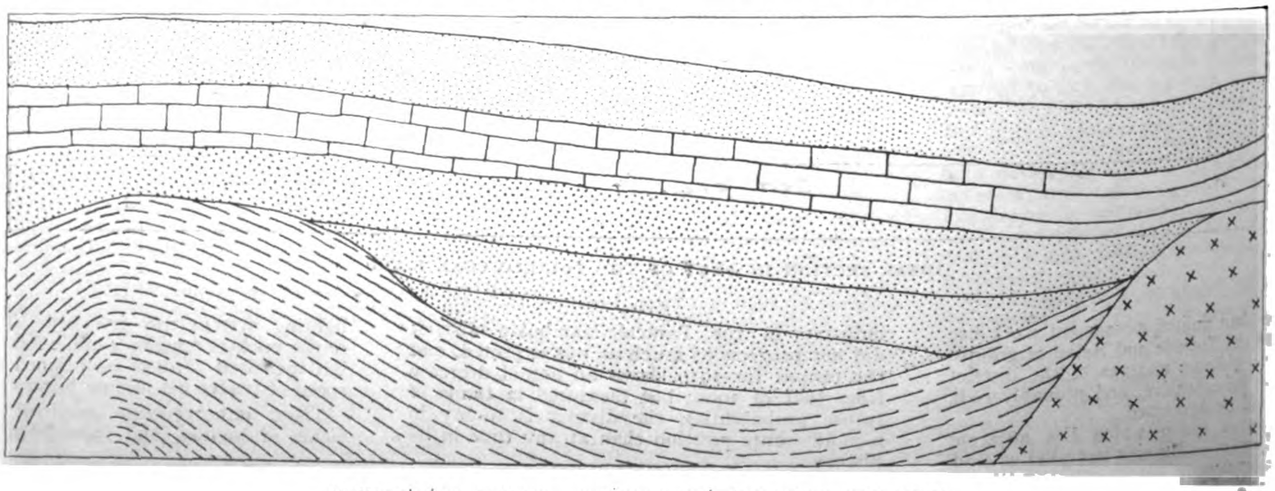
"*The Heise Dredging Syndicate.*—This Syndicate secured a lease on the Philippine's dredge and in August it began work on the Malaguit River. Various difficulties resulted in small returns for the first few months' work. The pay-channel was reached toward the middle of December, and in the period from December 15 to January 1 excellent cleanups were obtained.[1]

1 This mill is now reported to be saving twenty pesos per ton by amalgamation alone.

1 This dredge has averaged close to 7,200 pesos per month during the period from January to May, 1911



TAYABAS OIL FIELDS.—POSSIBLE SECTION FROM MONTATAJA TO THE VIGO RIVER



TAYABAS OIL FIELDS.—POSSIBLE SECTION EAST AND WEST

"*The Tumbaga Gold Mining Company.*—The Tumbaga mine continued its shaft to the 200-foot level and cross-cut to meet the vein. It is understood that the vein was not met, and as indicated by the winzes from the first level, the probability is that the stringers have pinched or faulted. However, in the upper workings a pocket of extraordinary ore was discovered which by smelter returns gave 9,045 pesos on a shipment of 2.5 tons.[1]

"*The Navotas Group.*—The Navotas property came into prominence by the discovery of some rich surface specimens containing visible gold. Capital was secured and a hoisting plant was installed. A shaft was sunk 30 meters and a cross-cut run to meet the vein, but as the mine is now indefinitely shut down, it is probable that the vein met did not come up to expectations."

Mr. Fanning adds interesting information on the geology, ore deposits, and metallurgy of the district which will prove of great assistance in guiding those interested in future development. This is particularly true of the treatment of ores in this district which heretofore has not been of a character best adapted to secure results. On this subject he writes:

"The 10-stamp Longos Point mill relied upon amalgamation alone to save the values. The ore was refractory and probably less than a 20 per cent saving was made. The 20-stamp San Mauricio mill used amalgamation and concentration on Traylor tables, but the extraction was seldom above 40 per cent. The Tumbaga ore was unique in its free-milling quality, and the Huntington mill and vanners would probably have made a good saving. The quartz boulders brought up by the Paracale dredge are fairly well adapted to amalgamation and concentration, so that the mill installed (a Huntington mill and Wilfley table) will probably make a good saving.

"Because of the lack of developed ores, it is as yet impossible to state definitely what treatment will give the best results. Owing to the nature of the ore, its variations in value and in mineralogy, each mine must make elaborate tests to determine the process which it will adopt.

"Most of the ores of the district are of too small value to permit shipping to smelters. Further, the indications are that the ores generally are refractory to amalgamation and concentration. Many of the surface ores contain so much copper as to prevent successful cyaniding. The probability is that with depth many such ores will possess little or no copper and so will become adapted to cyanide treatment. Tests made by the writer indicate that fine grinding, possibly combined with slime concentration, and air-agitation in cyanide solution will give an excellent extraction."

The subject of coal resources is covered by a paper from the pen of Dr. Warren D. Smith. The large importations of coal reaching 377,355 metric tons make the development of the coal measures of the archipelago most important. The only mines operating is the Batan Company's plant from which was realized 27,000 metric tons, of which 18,000 tons entered the market in competition with imported coals. The principal known coal deposits are found on Batan Islands, Cebu, Polillo, Mindoro, Masbate, and Mindanao. After an exhaustive review of the geology of the different deposits, Dr. Smith gives an epitome of the utilization of Philippine Coal as follows:

"Philippine coal can be used in the following ways: (1) Burned alone; (2) mixed with better coal; (3) in gas producers; (4) in the shape of briquets.

"1. Coal from Polillo, Cebu, and Sibuguey and Dumanquilas Bays, Mindanao, can stand on their own merits and be burned alone for steaming and other purposes. They are all bituminous coals with the exception of the coal from the last-named locality and that would more properly be called semi-anthracite.

"2. Coals like those from east Batan, Mindoro, and Dinagat while capable of being burned alone in properly constructed grates are materially improved by being mixed with Australian coal. The Manila Electric Light and R. R. Company has done this with very satisfactory results in the case of Batan coal. These coals can be made to produce much better results by using finer grates, longer fire-boxes and some device for returning the unburned gases through the furnaces before passing up the chimneys.

"3. Batan coal has been used in a German gas-producer which is expected to be on the market very soon. One of these has been bought by the Bureau of Science. The gas producer will undoubtedly play an important factor in the future of Philippine coal.

"4. Experiments on the briquetting of Philippine coal have recently been undertaken.

"The Bureau of Mines in Washington is now experimenting with Philippine coal in perfected machines. As one briquetting machine costs in the neighborhood of 60,000 pesos, the Bureau of Science has been unable, owing to the lack of funds, to take up this important line of investigation on a large scale, but has done what it could with the apparatus at hand.

"Coal briquets have been made both with and without binders in the laboratory of the division of mines. The latter method is not usually productive of satisfactory results. The possible binders for coal briquets are the following: (1) Pitch; (2) starch; (3) molasses; (4) sugar mill waste (bagasse); (5) tar from gas plants; (6) rice polishings (tiqui-tiqui).

"The first and fifth in this list are out of the question now, for we have no local supply. The second can not be considered because starch will bring more in the market than will the briquetted coal. No molasses is made in the Philippines. No. 4 might be utilized but has not been tried so far. This is used by itself as fuel in the sugar districts. The sixth has been used by us in our experiments in the Bureau of Science with the results that a very fair briquet has been made.

"In conclusion we might sum up the unfavorable and the favorable features connected with the subject of coal in the Philippines. The less favorable features are:

1. Some pinching of the seams in places.
2. Weak roof and floor in some fields.
3. Inferior grade of the coal in some of the more accessible fields.
4. The labor at present is almost unskilled.
5. Difficulties attending exploratory work, such as the jungle, lack of roads, etc.

"The more favorable features are:

1. An exceptionally good local market.
2. Cheapness of the labor (per diem). The labor is easily managed.
3. Abundance of timber.
4. Distance from possible competitors.

"Whether these last named can offset the first is only to be ascertained by actual trial. The writer believes they can and that coal mining can be carried on at a profit in the Philippines.

"Any estimates of the amount of workable coal available in the different fields would be only guesses in the absence of more development work. There seem to be, however, many million tons which can be extracted from the total area of land in the Archipelago underlain by coal."

Other subjects treated are "The Tayabas Oil Fields" by Mr. Eddingfield, "Philippine Placers" by R. Y. Hanlon, "On Briquetting Philippine Coals" by Wallace E. Pratt, besides an interesting collection of tables by F. T. Eddingfield on cost of mining in the Philippines. These tables follow:

"The costs of mining can be divided into two main groups: (1) Cost of labor; (2) Cost of supplies. In any one district where the actual cost of supplies per unit, and of labor per man, are uniform, the peculiar condition of the ore, the character of the country rock, the efficiency of labor, the efficiency of the process employed in mining or milling, and the policy of the management are elements which cause variation in the total cost per ton of ore. For this discussion, data from the three principal mining districts of the Philippines have been secured, i. e.: (1) Baguio mineral district, Benguet, Luzon. (2) Paracale, Ambos Camarines, Luzon. (3) Aroroy, Masbate. I intend first to tabulate the cost of labor and supplies in these various districts and then to discuss the special characteristics referred to above.

1 At this date the mine has indefinitely shut down.

Cost of white labor
(In Pesos Philippine Currency.)

	Baguio.		Paracale,	Aroroy,
	Per month.	Per day.	per month.	per month.
Superintendent	300-500		300-500	300-500
Engineers	a300		a250	a300
Mine Foreman		12	250	
Mill Foreman		15	250	
Shift bosses, mine			200	
Shift bosses, mill			200	
Mechanics		10	300	a300
Carpenters			250	
Clerks		8	150	

a Average.

Table of mine cost.
[In pesos Philippine currency.]

	Aroroy.	Baguio. No. 1.	Baguio. No. 2.	Paracale. No. 1.	Paracale. No. 2.
Drifting, per foot	3.10	2.00	10.00	5.00	a1.00
Cross cutting, per foot	2.50	......	......	5.00	a1.00
Timbering:					
Per foot drift	....	......	2.50	......	......
Per foot shaft	....	0.40	2.50	......	......
Shaft sinking, per foot	45.00	......	20.00	50.00	b150.00
Raising, per foot	5.00-6.00	......	......	......	......
Milling, per ton	....	1.50	......	......	......
Fuel, per ton	....	......	......	0.56	......

a Contract. *b* Over.

Costs for shipping concentrates.
[Figures in pesos per ton]

	Benguet Consolidated, Baguio, Benguet.		San Mauricio, Paracale District, A. C.	
Transportation	Antamok to Baguio	15.00	Mine to dock	0.80
	Baguio to Camp 1	30.00	Loading steamer	0.80
	Camp 1 to Manila	10.00	Freight to Manila	4.20
	Handling Manila	2.60	Lighterage Manila	3.00
	Freight to Seattle	6.00	Wharfage Manila	1.00
	Freight dock to smelter	0.86	Storage Manila	1.00
			Freight to Tacoma	6.00
Total		64.46		16.80
Treatment charge		12.00		15.00
Total charges		76.46		31.80

Cost of Supplies.

[In pesos Philippine currency.]

	Baguio.	Paracale.	Aroroy.
Mine timbers:			
Rough	Pine, 7 to 8 feet long, 0.10 per inch diameter.	Hardwood, 15 feet long, 0.10 per inch diameter.	Hardwood, 12 by 12 inches, 0.40 per running foot.
Framed	2.15 per set		
Fuel	Gasoline, .65 per gallon; pine, 2.50 per cord.	Native wood, 3.75 per cord; coal, Batan, 10 per ton.	Native wood, 3 per cord.
Explosives	Caps, 2 per box, dynamite, 20 per case; fuse, 2 per 100 feet.	Dynamite Atlas, 40 per cent, 650 per ton.	Dynamite, 650 per ton.
Candles	7.50 to 16.50 case	Goodman, 9	
Lumber	Lagging, 7 feet by 5 inches, 0.10 each; rough lumber, 95 per M.	R. O. pine, 65 per M board feet.	60 to 85 per M board feet.
Pipes	18 inches slip joint 3-16 inch by 10 feet, 39.54; 14 inches flange, 3-16 inch by 8 feet 30.25.	Small pipes, 0.25 to 0.75 per foot.	
Drill steel	⅞″ to 1.″ 0.60 per kilo		
Rails	7 kl. German 1.75 per meter	12 pounds T, 1.90 per foot	
Tools:			
Shovels	R. D. P. H., 1.95	R. D. P. H., 1.00	
Picks	Drifting, 2.25	Drifting, 0.75	
Hammers	3, 6, and 8 pounds, 2 to 6	4 and 8 pounds, 0.25 per pound.	
Wheelbarrows	Iron, 18.50	Iron, 11.50	
Lubricating oil	Cylinder, 2.55 per gallon	Cylinder, 1.50 per gallon	
Cement	12 per barrel	5.60 per barrel	5.60 per barrel.

Cost of native and Oriental labor.

[In pesos Philippine currency per day]

	Baguio.	Paracale.	Aroroy.
Capatases, mine	1.40-1.50	1.50	1.50
Capatases, mill	1.40-1.60	2.50	
Shift bosses, mine	1.50		
Mechanics		2.50	
Carpenters:			
Japanese	3.00-3.25	3.00	
Natives	1.00		
Miners and muckers	0.80-1.40	a1.05	1.00
Timbermen:			
Japanese	3.50		
Natives	1.50-2.00		1.20
Pumpmen		1.25	
Hoistmen		2.00	
Blacksmiths		2.75	

a Average.

Shipping charges from Manila to destination.

[In pesos per metric ton or cubic meter].

	Paracale.	Masbate.	Baguio.
Machinery	4.60-5.70	3.10-3.80	
Lumber	4.20-4.60	3.70-3.00	
Cement	6.70	4.80	
Ore	4.20-4.60	2.70-3.10	60.00-70.00
Dry goods	6.70	4.80	
Canned food	6.70	4.80	
Coal	4.20	2.70	

Cost of mining, milling, etc., at Baguio and Paracale

[Figures in pesos per ton].

	Baguio. A.	Baguio. B.	Paracale.
Cost of mining	1.00	9.13	9.00
Cost of milling	1.00		2.00
General and administration cost	1.00		2.00
Total	3.00	9.13	13.00

Table of rate of work.

	Baguio. No. 2.	Paracale
Tons mined per day	75	50-75
Feet advanced per shift per drift	2	1
Feet sunk per shift (shaft)	0.5	0.33
Feet sunk per shift (winze)	1	0.5
Feet raised per shift (raise)	1.5	1
Feet drilled per shift per man	7	4-6
Men per ton of ore	2	3-4

Philippine Division of Mines.—The Division of Mines, Bureau of Science, Philippine Islands, announces the completion of the new assay office. The growth of this department has so increased as to have necessitated further expansion. The capacity hitherto has been very limited, but owing to the recent installations of crushing and pulverising machines, large orders can now be handled with great facility. These machines represent the most modern types of apparatus for the preparation of ores for assaying and by the use of compressed air, a perfect cleaning can be made and so eliminate the possibility of salting the samples.

The erection of the coal assay furnace from the Denver Fire Clay Co. along with a Braun Gasoline furnace will permit of the assay of over 100 samples per day. This makes the plant probably the largest and most complete in the Orient.

In connection with these improvements, apparatus for the laboratory tests of ores has been added and it is now possible to determine in Manila the method of ore treatment and the type of mill to erect at the mine. With the increase of its facilities in the direction of assaying and ore sampling, the Bureau of Science is in a position to give rates on large lots submitted to it.

Several mills in the Philippine Islands have been failures owing to the type of mill erected. Preliminary testing of the ores to be handled in these mills would have indicated the right sort of a mill and so would have resulted in successful operation. The great uncertainty, expense, and time hitherto required for the shipment of lots of ore for testing in the United States are now eliminated as the present plant of the Bureau of Science can determine the various modifications in the process to be used. In order to assist the mining industry as much as possible, the charges for ore-test will only cover the actual cost of the work to the Bureau. Tests will be made from ₱25 00 up, varying with the difficulties and the number of tests and assays required.

At present the following points can be determined:

(1) Percentage recoverable by amalgamation.

(2) Percentage recoverable by rough concentration.

(3) Treatment of the concentrates.

(4) Adaptability of the ore to cyaniding, including such considerations as crushing in cyanide solution, amalgamation, concentration, leaching, sliming, fineness of ore for most economical extraction, time for extraction, strengths of solutions, ratio of solution to ore, use of oxidizing agents, feasibility of roasting, etc.;

(5) Combination of various methods with amalgamation, concentration, chlorination, or other mechanical process.

The need for such work has long been recognized and tests have already been made on ore shipments from Paracale, Masbate, Benguet, and China.

The work will be under the direct supervision of Mr. Paul R. Fanning, graduate of the Massachussetts Institute of Technology and formerly assistant in Henry E. Wood's Testing Laboratory in Denver. Mr. Fanning has had extended experience both in the testing of ores and in their actual mill treatment.

Sampling for valuation.—Owing to the variability of the ores of a mine, both in nature and in value, the proper sampling of the veins is a matter of considerable difficulty and a work requiring both experience and judgment. Preliminary sampling of the various workings are first made in order to know the values and average of the ore. These samples are obtained by cutting out grooves at right angles to the strike and dip of the vein. The groove should be from four to eight inches wide and from one to four inches deep. A sample is obtained weighing about 20 pounds to the running foot and no sample should be taken over four feet in length. Where the vein is wider than four feet two or more samples should be taken and the groove should be continuous in the same straight line. Rich or poor streaks should be sampled separately and where the sample can not be taken perpendicular to the vein, proper allowance should be made in order to obtain the correct length. Grab samples should never be taken, as they do not represent an average of the ore.

Sampling for ore testing.—When the preliminary sampling and assaying has been completed, it will then be possible to tell where to take the samples for ore testing. When the ore is of regular nature and value, this sampling is comparatively easy and the ore can be picked down from the various faces. The face is first cleaned off by picking and then a slice about six inches deep is taken off the whole face, using the greatest care not to include more fines than should properly belong in the slice. It is advisable to include in the ore as much wall rock as would ordinarily be mixed with the ore in stoping. The sample should be broken down into a box or large canvas spread on the floor. This sample is then taken outside, coned and quartered and the proportionate amount added to the samples taken in the same manner in other places. A sample weighing from 5 to 20 tons is thus obtained which can be broken, coned and quartered to from 500 pounds to 2 tons. This should then be stored or sacked and shipped for ore testing.

When the mine has very spotty values or the ore is of irregular nature such as being irregularly high or low in manganese, calcite, copper, or sulphides, the samples always should be mixed in such proportions as will represent the ore later to be treated by the mill. It is useless, for instance, to test an ore where the sample shows little copper, when the average mine-ore would show a considerable percentage of copper. In the same way, when the average mine-ore is $5 it would be very misleading to make a test on a sample where the value is $8. The value of the ore is a most important consideration in the testing of ores and in the design of a mill.

PRINCIPAL MINES IN CHINA WORKED BY FOREIGN METHODS*

COAL.

(1) *The Kaiping collieries* at Kaiping and Tongshan, in Chihli province, on Imperial Railways of North China, 80 miles from Tientsin. Opened in 1878. Owned (since 1900) by the Chinese Engineering and Mining Company, Limited (British).

Average daily capacity: Tongshan mine, 2,700 tons; Linsi, 2,700 tons; North-west Shaft, Tongshan, 600 tons; total, 6,000 tons.

Output in 1909, 1,361,730 tons; in [illegible] 1,174,312 tons.

PRICE per Ton (Wholesale) Coal.

	Navy Lump. Dol. c. s. d.	Loco. Lump. Dol. c. s. d.
At—		
Chinwangtao (shipping port on Gulf of Pechili, connected by rail with mine, 85 miles)	8 [illegible] 14 0	7 [illegible] [illegible]
Tientsin	8 50 14 1[illegible]	7 [illegible] [illegible]
	Taels c.	Taels c.
Shanghai	7 0 17 6	[illegible]

*Memorandum on Chinese Mines, by Mr. H. H. Fox, Acting Commercial Attaché to His Majesty's Legation at Peking, in British Diplomatic and Consular Reports.

At—	Linsi Lump. Dol. c.	s. d.	Slack. Dol. c.	s. d.
Chinwangtao (shipping port on Gulf of Pechili, connected by rail with mine, 85 miles)....	....	....	5 0 to 6 0	8 9 to 10 6
Tientsin	....	....	4 50 to 5 50	7 10 to 9 7
	Taels c.		Taels c.	
Shanghai............	5 50	18 9	4 50	11 3

Quality—Bituminous, lump and slack; suitable for locomotives, steamers, mills, steel makers, &c.

Head office—Tientsin. London office—22, Austin Friars, E C.

(2) *Lanchow collieries*, at Lanchow, in Chihli province, on Imperial Railways of North China; 83 miles from Tientsin. Owned and worked by Chinese company in opposition to Kaiping mines. Modern machinery. German engineers.

Average daily capacity 4,000 to 5,000 tons. Output about 1,000 tons daily; will probably be increased during the coming year.

Prices about the same as Kaiping in North China, but, so far, have not exported any coal.

Quality—Bituminous; lower grade than Kaiping, very dusty, only suitable for local Chinese purposes.

Head office—Tientsin.

(3) *Pekin Syndicate mines*, at Ching Hua Chen, in Honan province. Railway connection with Tientsin and Hankow viâ Tao-Ching Railway to Hsin Siang, on Peking-Hankow Railway, or by Wei River and Grand Canal to Tientsin. Opened in 1905. Output began in 1908. Capacity per diem, 2,000 tons.

Output in 1908 (four months), 12,648 tons; in 1909, 231,731 tons; in 1910, 357,205 tons.

PRICE per Ton (Wholesale).

At—	Dol. c.	£ s. d.
Tientsin	10 50	0 18 4
Hankow	10 50	0 18 4
	Taels c.	
Shanghai....	9 75	1 4 4

Quality—Hard anthracite; excellent steaming and household coal.

Head office in London—Peking Syndicate, Limited, 110, Cannon Street. In Tientsin—6, The Bund

(4) *Ching Ching (or Hsing) Collieries*, in Ch'ing Hsing Hsien, in Chihli (Shansi border); connected by rail with the Peking-Hankow line at Chengtingfu. Opened in 1903. Owned by Sino-German company and Chinese Government. Daily capacity 1,000 tons.

Output in 1910, 150,000 tons. Modern machinery. German engineers.

Price at Tientsin (wholesale), 7 dol. 50 c. (13*s*. 1*d*.) per ton.

Quality—Bituminous.

Head office at Tientsin.

(5) *Pao Chin Collieries*, in Ping'ting'chou, Eastern Shansi; connected by rail with Peking-Hankow line at Chengtingfu. Opened several years. Owned by Pao Chin Mining Company, of Shansi (Chinese).

Capacity per diem—No particulars.

Output—No particulars.

Price at Tientsin 11 dol. 75 c. (1*l*. 0*s*. 6*d*.) for lump coal per ton.

Quality—Anthracite.

Agents in Tientsin—A. Walte and Co. In Shanghai—H. Reuter, 28, The Bund.

(6) *Mengtikou mines*, Western Hills, near Peking, Chihli province. Owned by Anglo-Chinese syndicate; managed by Messrs. Doney and Co , of Tientsin.

Development hampered by dispute as to ownership and flooding of shafts.

Output in June and July, 1910, 50 tons per diem.

Quality—Anthracite.

Price at Peking, 6 taels (15*s*.) per ton.

(7) *To Li mines*, west of Chang Hsien, on Peking-Hankow Railway, 15 miles south-west of Peking. Owned by a Chinese syndicate, which is constructing an overhead railway from the mines to station at Chang-sin-tien. This line is at present transporting 200 tons per diem and, when completed, will be able to carry 1,000 tons per diem.

Quality—Anthracite.

Price at Peking, 7.83 taels (19*s*. 7*d*.) per ton.

(8) *Lin Sheng mines*, 11 miles by branch line from Ya-kou-ying, on Peking-Hankow Railway, near Peking. Chinese company; French manager. Modern mining machinery.

Output 500 tons per day which will be increased to 800 tons when underground pumping plant, now in course of erection, clears shafts of water.

Quality—Bituminous.

Price at Peking, 6 dol. 50 c. (11*s*. 4*d*) per ton.

(9) *Liu Ho Kou mine*, on light railway, 15 miles west of Feng Lo Chen, on Peking-Hankow line, in Chihli province.

Output 200 to 250 tons per diem.

Quality—Bituminous, soft, with 80 per cent. dust.

Price at Peking, 8 dol. (14*s*.) per ton.

(10) *Fushun collieries*, Fushun, near Mukden, in Manchuria; connected by rail with Suchiatun (34½ miles), on South Manchurian Railway. Owned and managed by the South Manchurian Railway Company from April 1, 1907.

Estimated output 3,000 tons per diem. Production in 1908, 383,612 tons; 1909, 393,630 tons; 1910, 830,328 tons.

WHOLESALE PRICES.

At—	Lump. Yen	s. d.	Unscreened. Yen	s. d.	Dust. Yen	s. d.
Dalny.........	8	16 0	7	14 0	6	12 0
	Taels c.		Taels. c.		Taels. c.	
Shanghai.....	6 80	17 0	6 20	15 5	5 50	13 9

Quality—Bituminous. Described by the company as the "best steaming coal in the Far East," but His Majesty's Consul at Dairen (trade report for 1909) says: "Fushun coal, owing to its combustibility is not in great demand as bunker coal. It is better adapted for household and industrial use, and in this respect is said to be superior to Japanese coal".

Head office—South Manchurian Railway Company (Mining Department), Dalny, Dairen. Agents—Mitsui and Co.

(11) The *Pinghsiang mines*, at Pinghsiang, in Kiangsi province; connected by rail (64 miles) with Chuchow, on the Hsiang River, 294 miles by water from Hankow. (Changsha).

Opened in 1898; owned by the Han Yeh Ping Iron and Coal Company (Chinese), under German supervision.

Average daily output up to July, 1909, 1,500 tons; from July, 1909, and at present, 2,000 tons.

Output in 1909, 520,000 tons; in 1910, 610,000 tons.

PRICE (Wholesale) at Hankow.

Per ton Delivered.

	Taels c.	£ s. d.
Coal—		
No. 1	7 50	0 18 9
,, 2	7 0	0 17 6
,, 8	6 0	0 15 0
Coke—	Dol. c.	
No. 1	16 0	1 8
,, 2	14 0	1 4 6

Quality—Bituminous, good steaming coal; coke "equal to best Durham".

The year 1910 was the best the mines have ever had the sales being very large.

(12) *The Shantung Mining Company's collieries*, at Fangtze, in Weihsien district, 102 miles from seaport of Tsingtau, and Hungshan, in Poshan district, 168 miles from Tsingtau; both mines connected by rail with that port. Owned and managed by a German company, the Schantung Bergbau Gesellschaft. Opened in 1902.

The total output of the Fangtze mines was in 1909, 272,000 tons; in 1910, 230,064 tons. Of the Hungshan mines, 1909, 160,000 tons; 1910, 252,816 tons.

WHOLESALE Prices per Ton.

At—	Weihsien. Dol. c.	s. d.	Hungshan. Dol. c.	£ s. d.
Tsingtau....	7 0 to 9 0	12 8 to 15 9	11 50 to 15 50	1 0 0 to 1 7 0
	Taels c.		Taels c.	
Shanghai—				
Lumps......	6 0*	15 0	8 25	1 7
Navy lumps	....	....	11 0	1 7 6
Nuts........	....	....	6 0 / 7 0 / 8 0	0 15 0 / 0 17 / 1 0 0

* Weihsien (Fangtze).

Quality—Both coals are bituminous, Fangtze being of inferior quality to Hungshan. The latter, which is used by the German cruiser squadron in China, has been described as "excellent steaming coal, similar to Cardiff," but, according to other reports, it is not a satisfactory steaming coal, being both dusty and dirty.

The Company's mines employ 77 Europeans and 5,800 Chinese.

NOTE.—The Chinese-owned mines in the Poshan Valley are said to have produced 250,000 tons in 1910.

(13) *The Chung Hsing collieries*, at Tsaochwang, in the I Hsien district, Southern Shantung; owned and managed by a Sino-German company. A railway from the mines to Taierhchwang, on Grand Canal, 35 miles, is under construction, and a complete set of mining machinery has recently been imported from Germany. The present output of coal is estimated at 300 tons per diem. Particulars as regards quality and price not available.

(14) *The Lung Wang Tung mines*, near Chungking, in Ssuchuan province; formerly owned by the Kiang Pei Ting Mining Company (British), now handed over to the Chiang Ho Mining Company (Chinese) and worked by native methods. [Chungking.]

Quality—Bituminous, good steaming coal.

Price 2.50 to 3 taels (6*s*. 3*d*. to 7*s*. 6*d*.) per ton at pit's mouth.

(15) *The Kueichow mines*, at Siangki, 30 miles from the Yangtze and 80 miles above Ichang, in Hupei province. The mines, connected with Yangtze by small navigable streams, are on line of projected Chuan-Han Railway. Worked by native methods.

Estimated output 400 tons per mensem.

Quality—"A clear burning bituminous coal, in calorific value said to equal 60 per cent. of Welsh coal." [Ichang.]

(16) Government collieries, Hohsien, Kuangsi province. Supplied with German machinery, 1910. [Wuchow.]

IRON

(1) *The Tayeh iron mines*, at Tieh-shan-pu, 17 miles by light railway from Huang-shih kang, on the Yangtze, 70 miles below Hankow, in Hupei province. Owned and managed by the Han Yeh Ping Iron and Coal Company, Limited (Chinese).

Described as "one of the richest iron mines in the world." "Ore exposed on surface . . . estimated at 500,000,000 tons." Under Japanese supervision; men employed 3,000.

Output in 1909: Magnetic ore, 306,000 tons; manganese ore, 1,500 tons.*

(2) *The Tung Kuan Shan mines*, in the Tungling district, on the Yangtze, 55 miles above Wuhu, in Anhui province

A concession to work these mines, granted to the London and China Syndicate (British) in 1905, was surrendered in 1910 and a Chinese company is now being formed for the purpose. [Wuhu.]

COPPER.

(1) Government smelting works at Yaokai, 70 miles west of Lanchow, in Kansu province, have recently been established to deal with copper ore mined in Tsingyuan district. Machinery of American and British make; latter now in course of erection. Works in charge of British engineer, who has four Belgian and Spanish assistants. Plant said to be capable of turning out 4 tons of copper in 24 hours from 7½ per cent. of ores.

A modern gold milling plant (British) has been erected at the same place, but work is suspended pending the arrival of a tubular boiler and pump ordered in Germany.

(2) *Government mines, at Ch'ang Pailing*, Kanchow prefecture of Kiangsi province. Have

* Figures for 1910 are not available.

been worked for many years by native methods. Inspected by German engineer in 1908, who reported very favourably both as to quantity and quality of ore. Samples were obtained containing as much as 40 per cent. of copper. [Kiukiang].

A copy of the engineer's report will be furnished on application to His Majesty's Commercial Attaché, Peking.

(3) *Government mines, at Pai Shui Ho* Penghsien district, Ssuchuan province. [Chengtu.]

Three Japanese assayists engaged and a smelting furnace purchased, September, 1910.

(4) *Government mines, in Huilichow*, Ningyuan prefecture, Ssuchuan province. [Chengtu].

Red and white copper, worked by native methods. These mines are the chief source of supply for the province of Ssuchuan.

Price of red copper slabs at Chengtu, 0.38, taels (*11d.*) per catty (1⅓ lbs.); white copper, 0.70 taels (*15.9d.*) per catty.

OTHER MINERALS.

Silver. -San Ch'a mines, near Kuei Hsien, Kuangsi province. Foreign machinery; Chinese management. A failure owing to bad management. [Wuchow].

Quicksilver.—The cinnabar mines, at Yuan Shan Chiang, 15 miles from Lung Chi Kow, in Kueichow province. [Yunnan.]

A concession to work these mines was acquired by a syndicate called the Anglo-French Quicksilver and Mining Concession (Kueichow province) of China, Limited, in 1898, but owing to difficulties with the Chinese authorities little progress has been made with the development of the properties, which include iron smelting works at Tsingki, Eastern Kueichow, and various mining rights in the same province.

Samples of the Yuan-shan chiang ore assayed by an expert give a maximum of 4.4 per cent. mercury and a minimum of 1.7 per cent.; average of assays 2.78 per cent. mercury.

Average estimated daily output of mines, 150 tons (of 2,204 lbs.).

London office of company—54, New Broad Street, E.C.

Tin.—(1) The Kochiu mines, 30 miles from Mengtzu, Yunnan province. Worked by native methods; 30,000 men employed; 4,216 tons, valued at 512,968*l.*, exported in 1909.

A blast furnace for these mines, purchased in Germany, arrived at Haiphong in January, 1911.

NOTE.—The above mines were included in a concession granted to the Yunnan Syndicate, Limited.

The syndicate, in 1907, transferred their mining rights in the district of Lingan (in which the Kochiu mines are situated) to a French company entitled Société d'Exploitation de Ling Ngan. Owing to local obstruction the company has, so far, been unable to make any progress with the development of the mines [Yunnan]

(2) Ho Yuan mines (Chinese), in Kuangsi province, near Wuchow. [Wuchow.]

(3) Niutsongling mines, near Nodoa (Tamchow department of Hainan). Owned by the Singapore Merchants Pioneer Company Limited, formed in 1908.

"A fairly rich stanniferous lode has been struck, the ore from which is expected to average 60 per cent. per ton." [Kiungchow]

Antimony.—(1) Pao Hua Company's mines (Chinese), in Kuangnan and Kaihua (Western Yunnan). Permit to work granted 1909. [Yunnan.]

(2) Szecheng mines, at Szecheng, in Western Kuangsi. Ore sent to refining works established at Wuchow in 1908. Distance of mines from works and cost of transport have hitherto rendered undertaking a failure. [Wuchow.]

(3) The Hunan mines, in three districts of Hunan province: (1) Central: Changteh, Anhua, Sinhua, Paoking and Changsha; (2) Southern: Hengchow, Yungchow and Chenchow; (3) Western: Yungshun, Fenghwang, Yuanchow and Shenchow.

"The ore produced in the vicinity of Sinhua and Anhua is the richest, attaining a fineness of over 70 per cent. of stibnite."

The Hua Chang Antimony Company, of Changsha, have begun to refine antimony by scientific methods, and in the same place the Imperial Smelting Works are in course of erection.

FAR EASTERN RAILWAY NEWS

MANILA RAILROAD CO. INCORPORATES.—Articles of incorporation have been filed with the Bureau of Archives, Philippine Islands, by the Manila Railroad Company, Horace L. Higgins, President and General Manager. The capital is fixed at £4,000,000, of which £2,339,340 is paid up. This company is active expanding its lines throughout Luzon and when present proposed construction is completed the system will comprise over 800 miles. The incorporation under the local corporation law was decided upon as convenient in view of the Philippine Government guarantee of interest of bonds for construction of the Southern Luzon lines.

ROYAL RAILWAYS OF SIAM.—Construction on the southern line has progressed on the Trang Tung Section to Kilometer 70 and from Petchaburi the railhead is at kilometer 86 according to the Bangkok Times.

KOREAN CONSTRUCTION.—According to the Seoul press the program first proposed to extend over a period of eleven years will be finished in seven.

Seoul-Wonsan Line.—Work on the Seoul-Wonsan line has made great progress. The construction work on the 20-mile section between Yonsan and Euichongpu was completed September, 1911. It opened to public traffic with five stations, at Hankang, Tukto, Chengyangli, Changdong, and Euichongpu. Work has also been commenced at Wonsan. Surveying of the route has been progressing and a construction office established at Wonsan. The 30-mile section between Wonsan and Sinyongchiwon is expected to be completed and open to traffic by March, 1913, and that between Euichongpu and Pyongkang, extending over 55 miles, will also be finished at the same time. There will then be only the 35-mile section between Pyongkang and Sinyongchiwon still unfinished. This portion is, however the most difficult section to work, as it will be laid over a mountainous locality, with rapid streams running through it. In consequence, many bridges and tunnels must be built before the railway is laid. This section will be com-

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The export of Antimony from Changsha in 1909 was: Regulus, 4,800 cwts.; crude, 110,825 cwts.; ore, 22,013 cwts.

NOTE.—The districts above referred to also produce iron, lead, zinc, tin, copper, sulphur, realgar and manganese. [Changsha.]

Orpiment (arsenic trisulphide) is obtained from mines near Chaochow and Menghua, in the Tali prefecture of Yunnan province [Tengyueh.]

Export through the Imperial Maritime Customs at Tengyueh in 1909, 8,764 cwts., valued at 8,627*l.*, sent principally to Burmah.

Petroleum oil is found in many places between Suitechow and Yenchang, in Eastern Shensi. At Yenchang are oil wells worked with rudimentary machinery under Japanese supervision. A Chinese company at Hsianfu has obtained a concession to develop these wells, and a large plant of machinery, purchased in Germany, recently arrived at Hankow and is now on its way to the wells, [Hankow.]

General. Yunnan.—An Anglo-French company called the Syndicat du Yunnan, Limited, holds a concession from the Chinese Government, dated June 21, 1902, to exploit the mineral deposits in the prefectures of Yunnan-fu, Ch'eng-chiang fu, Lui-an-fu, Kaihua fu, Chou-hsiang-fu, and the departments of Yuan-chiang-chow and Yung-pei-ting. These deposits are stated in the concession agreement to consist of copper, gold, silver, coal, iron, platinum, nickel, tin, petroleum, cinnabar and precious stones.

Owing to the opposition of the local gentry and officials the company have, so far, been unable to proceed with the development of their concession. [Yunnan Fu.]

APPENDIX 1.

The following is a list of the minerals known to exist in the 18 provinces of China, Manchuria and Turkestan, their principal places of production and the name of the nearest British Consulate being given in brackets:—

(*a*) Kansu province.—Coal (Kungch'angfu); iron, gold, silver, copper (Yaokai); petroleum. [Hankow.]

(*b*) Shensi province. Coal and iron (Sianfu); salt, gold, nickel, magnetite, marble and porphyry, petroleum (Yenchang). [Hankow].

(*c*) Shansi province. Coal and iron (Taiyuanfu, Pingtingchow, Tsechow); salt. [Tientsin].

(*d*) Honan Province.—Coal and iron (Tsinghuachen, Lushanhsien and Juchow); tin and argentiferous lead ore. [Hankow].

(*e*) Chihli province.—Coal (Western Hills, Peking, Kaiping, Lanchow, &c.) kaolin and sandstone, gold (Jehol). [Tientsin.]

(*f*) Shantung province.—Coal (Weihsien; Poshan and Ichowfu); iron (Kiulingchen), copper; argentiferous lead ore, gold (Chaoyuan, Pingtu and Weihaiwei); diamonds, gypsum, clay and sandstone. [Tsinan.]

(*g*) Szechuen province.—Salt (Tzulinching, Chiating and Paoning); coal and iron (Kuanhsien, Weiyuan, Chienwei, Ch'ichiang, Pahsien. Chiangpeiting); copper (Ningyuan); white copper (Huilichow); silver, gold, petroleum (Pahsien and Wanhsien); lead, antimony, sulphur, saltpetre, gypsum, jade. [Chengtu.]

(*h*) Hupeh province. Coal (K'ueichow, Wuchang, Hsiangyangfu); iron and zinc, gypsum (Yingcheng); copper (Chienshih). [Ich-ng.]

(*i*) Hunan province.—Coal (Hsiangtan and valley of Hsiang River); gold (Huitung Mopin)); silver, iron (Anhua and Paoking); copper, lead (Changning and Chiyang); zinc antimony (Anhua, Sinhua, Shaoyang and Shenchow); sulphur (Tzuli); realgar. [Changsha.]

(*j*) Kiangsi province.—Coal (Pinghsiang and Lohpinghsien); kaolin, copper (Kanchow). [Kiukiang.]

(*k*) Anhuei province.—Coal (Ningkuofu and Chihchow); iron (Hoshan); copper (Tungkuanshan); lead. [Wuhu.]

(*l*) Kiangsu province.—Coal, iron, marble, plumbago (Kaotze, Chinkiang). [Nanking.]

(*m*) Yunnan province.—Copper (Tungchuan and Chaotungfu); zinc, lead, tin (Kochiu); orpiment, coal (Talifu); salt, gold, gypsum, jade. [Yunnanfu.]

(*n*) Kueichow province.—Quicksilver (Pehmatung, Wuchuanhsien, Hsingifu); iron, coal copper, zinc, sulphur, marble. [Yunnanfu.]

(*o*) Kwangsi province.—Antimony (Szecheng); coal (Hohsien, Nanning, and Yungan) gold, silver, iron (Kuanyang); lead (Fuchwan) [Wuchow.]

(*p*) Kuangtung province.—Coal (Shaochowfu, Huahsien); iron, copper, lead, silver, tin, gold (Ch'inchow). [Canton and Amoy.]

(*q*) Fukien province.—Coal, lead, tin, gold, silver, iron (Kutien). [Foochow.]

(*r*) Chekiang province.—Coal (Chuchowfu) lime, gypsum, alum (Pingyang) building stone [Hangchow and Ningpo.]

(*s*) Manchuria.—Gold (valley of Amur River); coal (Liaoyang, Fushun, Yentai); soda (Tiehling); silver, copper lead, asbestos, soda [Mukden. Harbin and Dairen.]

(*t*) Sinkiang (new dominion or Chinese Turkestan).—Gold, lead, coal (Turfan); sulphur, saltpetre, alum, petroleum, jade.

APPENDIX 2.

EXPORT of Minerals to Foreign Countries and Original Export from each Customs District during the Year 1909.

	To Foreign Countries		From Customs District	
	Tons.	£	Tons	£
Antimony—				
Regulus and refined ..	7,812	91,3[illegible]	[illegible]	[illegible]
Ore ..	764	4,351	[illegible]	[illegible]
Iron—				
Pig and manufactured ..	38,104	121,414	[illegible]	[illegible]
Ore ..	87,701	25,812	[illegible]	[illegible]
Lead ..	12	134	[illegible]	[illegible]
" ore ..	3,975	12,5[illegible]	[illegible]	[illegible]
Quicksilver ..	60	9,528	[illegible]	[illegible]
Tin, in slabs ..	4,446	537,171	[illegible]	[illegible]
Zinc ..	1,239	2,968	[illegible]	[illegible]
" ore ..	7,459	9,485	[illegible]	[illegible]
Coal ..	195,950	142,07[illegible]	1,107,[illegible]	[illegible]
Total ..		956,571		[illegible]

pleted by the autumn of 1914. It may be added that the work on this line is being undertaken with a view to making it a permanent one. In consequence, no reconstruction work is expected to be needed. On the other hand, the construction expenses are much higher than those for the Honam Railway, being about 75,000 yen ($37,350) per mile, while those for the latter are only about 25,000 yen ($12,450) for a similar distance.

The Honam Line.—On the section between Taichon and Yongsan, a distance of 20 miles, the embankments and the laying of the track are completed. Construction cars are already running on it. The 37-mile section between Taichon and Kangkyong was completed in October, and the opening ceremony celebrated on the Emperor's birthday, November 3. Four stations, Kasuwon, Tukei, Yonsan, and Lonsan are established. The section from Kangkyong to Kunsan is to be finished during March, 1912, which will result in actually connecting Seoul and Kunsan by railroad. The construction work on the line is to be begun simultaneously from both termini. The section between Mokpo and Laju, a distance of 35 miles, and that between Li-li and Chyongeup near Taichon will be open to traffic during March, 1913. The 45-mile section between Chyongeup and Laju, which is the last section of the Honam line, will be finished in March, 1914.

Reconstruction of Seoul-Wiju Line.—The reconstruction of the Seoul-Wiju line, which was commenced in 1909, has since made much progress. The greater part of the work has already been completed; tunneling in the section between Ko-song and Hanpo, a distance of 23 miles, and the reconstruction work between Yang-chaik and Tong-im, 21 miles, are all that remain unfinished. The whole line will be completed by July, 1912. Then the gradient will be less than 1 per cent throughout the line, which will allow the use of large locomotives of 100 tons now employed on the Seoul-Fusan route. The time required for covering the Seoul-Wiju line has already been shortened by two hours and a saving of two hours more will be effected upon the completion of the reconstruction of the line.

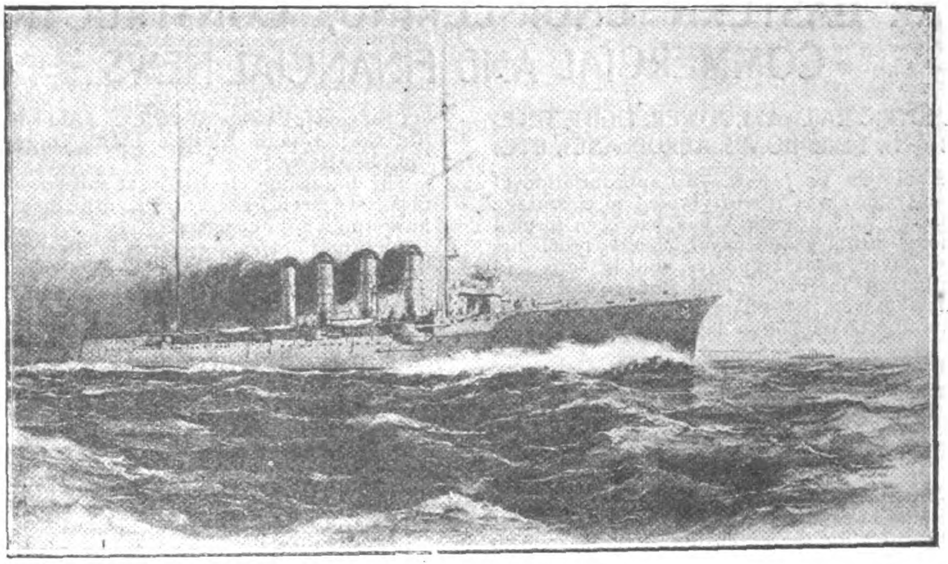
FRENCH INDO-CHINA RAILWAYS—Out of a proposed loan for francs 100,000,000 recommended by the Governor General fcs. 60,000,000 will be spent in the construction of lines uniting Pnom-penh and Battambang, Mytho and Cantho, Vinh and Kwang-tri, and Nhatrang and Saigon.

THE SHANGHAI-NANKING RAILWAY—According to General Manager Pope the revolution has boomed business on this line. Covering one week of traffic business increased from $42,000 Mex, the best previous record, to $64,000. The earnings of the train mile increased from $3.50 to $5.00.

NEW SOUTH WALES RAILWAYS—The government proposes the expenditure of £8,000,000 in railways and other public works in addition to the present extensive system with a view to opening up rich agricultural territory. The earnings of the railways for 1911 amounted to $36,050,059 with operating expenses $23,529,528, or over 65% of earnings. The surplus after meeting interest charges was $9,592,845. There were 3,800 miles open for traffic representing a total capital account of $248,054,751.

THE CHINESE EASTERN RAILWAY—The fiscal year 1910 shows a marked improvement by the company. The deficits of Roubles 3,700,000 in 1908 and 700,000 in 1909 have been changed to a profit of Roubles 1,300,000 in 1910. The gross receipts were Roubles 17,300,000 and gross expenditure Roubles 16,000,000 for the year.

THE ANTUNG MUKDEN RAILWAY—This railway was opened to traffic on October 30, the occasion also celebrating the completion of the Yalu railway bridge. This line, which is the last link completing an all Japanese connection from Tokyo to Mukden, is 170 miles long. The total distance from Tokyo via Shimonoseki and Fusan to Mukden is approximately 1,582 miles, while via Dairen it is 1711 miles making the new through route via Korea about 30 hours shorter at less outlay. The Yalu Bridge is 3,097 feet in length and its construction began in 1908.



THE JAPANESE CRUISER YAHAGI

The Yahagi, a protected cruiser, second class, built at the Mitsui Bishi Dock Yards and Engineering Works, Nagasaki, for the Japanese Navy, was launched October 3 with impressive ceremony. Prince Takada of the Imperial family was present.

The keel of the Yahagi was laid on April 6, 1910, and previous to launching the engines, boilers, and funnels were installed, making in all 18 months on the stocks. Her two sister ships the Chicuma and Hirado were launched recently from the Sasebo and Kawasaki dockyards respectively. Following are the dimensions:

Length	475 feet.
Breadth	46.6 "
Depth	28.6 "
Drought	16.7 "
Displacement	5,000 tons
Horse-power	25,000
Speed	26 knots

Engines—Parson's Steam Turbine.

PROPOSED KEDAH RAILWAY.—The sum of $1,400,000 annually will be appropriated in 1912 and 1913 for the construction of a line through the Province of Wellesley, Kedah and Perlis.

JAPANESE IMPERIAL RAILWAYS—The net earnings of the lines for the year are expected to exceed the estimates by yen 3,000,000 making in all yen 11,000,000. These profits will be utilized for expansion in construction.

F. M. S. RAILWAYS.—The railway department proposes expending $5,000,000, Straits Cur., on new construction work in 1912. The extension of the Pahang-Kalantan line towards Kedah and the completion of the deviation of the main line to Salak South are the most important works. A line to the Rawang Coal field may also be considered. It is also proposed to expend $447,888 in the purchase of seven locomotives, 100 freight cars and additional passenger coaches.

PERSONAL.—Alex Strausz jr., formerly auditor of the Philippine Railway Co. who recently returned to the United States, has accepted the position of auditor with the Pierce Syndicate that has large holdings in Mexico, including the electric railway of Mexico City.

NEW RECORD MADE BY SILK TRAIN.—The silk train over the Great Northern line, carrying the cargo of silk and silk goods of the Nippon Yusen Kaisha's American line "Inaba Maru" that sailed from Yokohama September 27, made the coast to coast journey in 81 hours 50 minutes, lowering all previous records by sixteen hours. A dispatch from St. Paul under date of October 18 says:

"All running records between Seattle and New York were smashed by the $1,000,000 silk train which passed through St. Paul early Sunday morning. Advices received at the Great Northern general offices are that the train arrived in New York at 5:35 P. M. Monday the 17th, making the coast-to-coast journey in 81 hours and 50 minutes.

"The best time made by a silk train, starting over the Great Northern, previously, was 102 hours and 5 minutes, a year ago. The Chicago, Milwaukee & St. Paul last winter made the run in 97 hours and 40 minutes.

"The record of the silk train beats that made by the fast mail of the Great Northern, which makes the journey from St. Paul to Seattle in 48 hours. The actual running time from Seattle, made by the silk train of five cars, was 45 hours and 16 minutes. It left Seattle at 3:45 o'clock Friday morning, arriving in St. Paul at 4:01 Sunday morning.

"Nineteen minutes were consumed in switching and inspecting the cars at St. Paul transferring them to the Burlington. The run from St. Paul to Chicago was made in 9 hours and 44 minutes. The records show that 41 minutes were spent in getting the train through Chicago. The Lake Shore carried the train through from Chicago to New York in 26 hours and 50 minutes.

"The average speed between Seattle and St. Paul was 40.1 miles per hour for 1,814 miles, over two mountain ranges."

MANILA RAILWAY CO.—The report for the year 1910 shows 217 miles in operation and the gross receipts $2,377,603, an increase of $330,500 over the previous year. The operating expenses were $947,706, an increase of $48,000; the net revenue was $1,428,897, an increase of $282,000. The ratio of working expense to revenue was 40% against 44% in 1909.

TYER'S SIGNAL EQUIPMENT IN SOUTH AFRICA.—According to the Railway Gazette, the South African Railways have placed an order with Messrs. Tyer & Co., Ltd., which is now approaching completion, for a large number of their single line tablet machines for working the section of the railway between Randfontein and Fourteen Streams Railway. These machines are a combination of absolute block-working and permissive-working, the latter in times of seasonal traffic enable nearly 40 trains to be sent consecutively in safety in one direction. The order also includes a number of crossing instruments, which allow two or more trains to cross at an intermediate point in a block section.

FAR EASTERN ENGINEERING, CONSTRUCTION, COMMERCIAL AND FINANCIAL NEWS

ELECTRIC RAILWAYS, POWER, LIGHT, TELEGRAPHS, TELEPHONES, AEROPLANES, ETC.

AVIATION IN JAPAN.—An appropriation of Yen 375,000 was recently voted to encourage aviation and a society has has been formed among military and naval officers, professors and government employes, and is active in furthering interest. The *Kokumin*, a semi-official journal, has offered a purse of Yen 5,000 for a flight over Tokyo Bay.

PACIFIC WIRELESS RECORD BROKEN.—Messages from a Japanese wireless station on Hokushu Islands was reported received in San Francisco on October 6 and messages exchanged a distance of 6,000 miles.

MANILA ELECTRIC RAILROAD EXTENSION.—Plans have been submitted to the municipal authorities for the extension of the system to serve the new port district.

EASTERN EXTENSION TELEGRAPH COMPANY.—The Eastern Extension, Australasia, and China Telegraph Company report for the half-year ended June 30, 1911, that the gross receipts amounted to £329,709, against £344,960 for the corresponding half-year of 1910. The working expenses, including £18,973 for maintenance of cables, absorb £151,618 against £152,407 for the corresponding period of 1910, leaving a balance of £178,091. From this is deducted £2,942 for income-tax payable in England, £15,048 for interest on debenture stock, and £11,020 for Coronation bonus to staff and other extraordinary expenses, leaving £149,080 as the net profit for the half-year. After adding £27,617 brought forward from the previous half-year, there is an available balance of £176,698. Two quarterly interim dividends of 1¼ per cent. each, amounting to £75,000 having been paid for the half-year leaving a balance of £101,698, of which £50,000 has been transferred to the general reserve fund, and the balance of £51,698 carried forward.

THE EASTERN TELEGRAPH COMPANY, LIMITED—The report of the directors for the half-year ended June 30, 1911, states that the revenue amounted to £67,396 13s 6d. from which are deducted £232,755 12s 8d. for the ordinary expenses, and £58,602 18s. 7d for expenditure relating to maintenance of cables, sundry differences in exchange, and income tax payable abroad, leaving a balance of £381,038 2s. 3d., to which is added £23,762 9s 10d. brought from the preceding acc unt, making a total available balance of £404,800 12s. 1d.

After providing for income tax, interest on mortgage debenture stock, and for two quarterly dividends on the preference stock, which in all absorb £81,260 3s. 10d., there remains a balance of £323,540 8s 3d., out of which the directors have distributed a bonus to the staff in celebration of the Coronation of King George V. costing £24,492 4s. 2d., and have placed £150,000 to the general reserve fund, and have allocated £100,000 to meet the two interim dividends of 1¼ per cent. each on the ordinary stock, the balance of £49,048 4s. 1d. being carried forward to the next account.

KYUSHU ELECTRIC RAILWAYS AND LIGHT COMPANIES.—The following is the result of operations of companies giving capital and rate of dividend: Kumamoto Electric Co., \$62,000 (10 per cent); Kurume Electric Light Co., \$68,000 (10 per cent); Kyushu Electric Co., \$477,000 (7 per cent); Miyakonojo Electric Co., \$52,000 (5 per cent); Nagasaki Electric Light Co., \$100,000 (6½ per cent); Naokata Electric Light Co., \$53,000 (8 per cent); Nakatsu Electric Co., \$50,000; Oshima Electric Co., \$6,000; Saiki Electric Co., \$22,000; Sasebo Electric Light Co., \$3,000,000 (15 per cent); Shimabara Hydroelectric Co., \$36,000 (7 per cent); Takeda Hydroelectric Co., \$15,000 (10 per cent); Usuki Electric Co., \$20,000; Wakamatsu Electric Light Co., \$50,000 (15 per cent); Yawata Electric Co.; Kanada Electric Co.; Taikan Electric Light Co., \$15,000 (building).

The following electric light and power comnies have been organized in Kyushu district and have applied for charters:

Nagasaki Prefecture.—Hirado Electric Light Co., Sonogi Electric Light Co., Keichiku Electric Light Co., Mogi Electric Light Co.

Oita Prefecture.—Mori Electric Co., Tsusu Electric Co., Kamaye Electric Co., Kokuto Electric Co., Inukai Electric Co.

Miyazaki Prefecture.—Kirishima Hidroelectric Co., Aburatsu Electric Co., Minami Kyushu Electric Co.

Kagoshima Prefecture.—Sendai Electric Co., Kajiki Electric Co., Demizu Electric Co., Shifushi Electric Co., Makurasaki Electric Co.

Saga Prefecture.—North Kyushu Electric Co., Karatsu Electric Light Co.

Kumamoto Prefecture.—Ushibuka Electric Light Co., Hondo Electric Light Co., Hitoyoshi Electric Light Co.

Fukuoka Prefecture.—Moji Electric Co., Yashima Electric Light Co., Tsuyasaki Electric Co., Fukuoka Electric Light Co., Itoshima Electric Light Co., Mayebara Electric Light Co., Fukushima Branch, Kyushu Electric Co., Orio Electric Light Co.

ELECTRIC INSTALLATION FOR CUBA.—The Cuban American Sugar Company, New York City, has ordered 3 1000 Kw. three-phase turbo generators, 1 motor generator exciter set, and a switchboard from the General Electric Company.

Mr. Gano Dunn has just returned to New York from abroad, where, as a representative of the United States Government, and as President of the American Institute of Electrical Engineers, he has been attending the International Electrical Congress at Turin and the meeting of the International Electro-Technical Commission, the body that has been organized to bring about international uniformity of standards and practice in the electrical industry.

Mr. Dunn, who for many years was First Vice-President and Chief Engineer of the Crocker Wheeler Company, and is a past President of the New York Electrical Society, has been elected a Director and a Vice-President of J. G. White & Company, Inc.

Mr. D. Sterrett Pindell, B. A., E. E., has been added to the staff of the engineering and construction firm of C. G. Young, 60 Wall Street, New York City.

Mr. Pindell has had valuable experience in a wide range of engineering, construction and operation of public service utilities throughout the United States and Canada, including steam and electric railways, electric lighting, hydro-electric power development, building construction, etc. His present activities will be especially in connection with examinations and reports for which the firm of C. G. Young has a high reputation—many large and important undertakings in this and foreign countries having been financed upon Mr. Young's recommendations.

PUBLIC WORKS, DOCKS, WHARVES, BUILDINGS, ETC.

HONGKONG HARBOR REFUGE.—The Director of Public Works reported to the Legislature that at the end of three years less than \$1,000,000 had been expended in this work although the estimates called for an expenditure of \$2,300,000 in five years. This work is to be pressed.

A MILLION FOR MORO PROVINCE PUBLIC WORKS.—Estimates on over 50 projects including extensive roads, public buildings, wharves, etc., have been prepared that will represent an outlay for the year of ₱1,000,000.

CEBU WATER SYSTEM.—The new gravity system costing ₱1,550,000 now being installed by the Atlantic Gulf & Pacific Co. will be completed by the end of the year. The water is taken from the Labangan River. The system includes a 333,000,000 gallon reservoir and a distributing tank with a capacity of 4,000,000 gals.

SPECIAL PHILIPPINE PUBLIC WORKS FUNDS.—The legislature has provided for the loan of half the gold standard fund to the provinces and municipalities for public works. This makes ₱7,000,000 available in addition to the regular appropriations for insular works.

A POWERFUL BRITISH DREDGER FOR PANAMA.—Messrs. Wm. Simons & Co., Limited, Renfrew, launched on the 12th September last an extremely powerful bucket hopper dredger which they have built to the order of the United States Government for carrying out some of the most arduous under-water cutting to be done in connection with the Panama Canal.

The dredger is of the twin-screw type and will make the voyage to the Pacific Coast under its own steam. The vessel has a hopper capacity for 1,200 tons of dredgings. The bucket ladder is designed for dredging up to a depth of 50 feet.

The vessel is propelled at a speed of 10 knots per hour by two sets of triple expansion surface condensing engines supplied with steam from two cylindrical multitubular boilers, constructed to Lloyd's requirements for a working pressure of 180 lbs, per square inch.

A complete outfit of the most modern auxiliary machinery is provided in the engine room including independent air pumps, circulating pumps, feed pumps, feed heater and filter, &c.

The dredging gear is of the most massive description and is arranged to give three speeds of bucket to suit the various kinds of material to be dealt with. The dredging gear can be driven by either of the main propelling engines.

Two sets of buckets are provided, one of 54 cubic feet capacity for dredging soft material, and one of 35 cubic feet capacity for dredging stiff clay. The bucket ladder is a steel girder of exceptional strength, and an idea of the enormous strength of the bucket chain may be conveyed by the statement that the ladder with its chain of buckets, links and pins, weighs upwards of 240 tons. The upper end of the bucket ladder is supported on an independent pivot shaft and the lower end is controlled by powerful steel wire rope tackle and independent steam hoist gear which is designed for raising the ladder at a speed of 10 feet per minute.

Steam manoeuvring winches are fitted at bow and stern, each driven by independent two-cylinder engines, and each barrel is fitted with friction clutch and brake to enable the mooring chains to work independently of each other, or simultaneously, as may be required.

Shoots are provided for loading into the vessel' own hopper, also overboard shoots controlled by independent steam winches for loading into barges alongside.

The hopper doors are controlled by independent hydraulic gear.

Steam steering gear, full electric light installation, and refrigerating plant, are provided, also cabins for officers, comfortable quarters for the crew, and the most modern equipment for a vessel of this class.

YOKOHAMA HARBOR WORKS—Plans are completed to expend yen 1,240,000 in the enlargement and improvement of the pier at Yokohama. The plan is to increase the present width of 63 feet to 132; to dredge the harbour inside the breakwater so that steamers of the largest tonnage can be accommodated.

The present pier is merely a roadway. This will be improved by erecting 2 shed 450 feet long and 72 feet wide, having an upper waiting room for 1st class passengers, so they can disembark direct from the decks of the steamers.

PHILIPPINE HARBORS.—The following allotments have been made by the Secretary of Commerce and Police: construction of Iloilo River walls, ₱75,000; streets in new port of Manila ₱43,000; dredging Manila harbor ₱150,000.

KEELUNG HARBOR.—Work in this harbor has progressed steadily during the past year. [illegible] acres were dredged to a depth of 30 ft. and [illegible] acres to a depth of 27 ft., besides some shallower

areas. Quays.—720 feet of quay wall were completed during the year, having a height of 40 ft. and a depth alongside at low water of 30 ft. where steamers of 1,000 to 6,000 tons can be berthed; 900 ft. of quay wall, of a height of 17 ft. and having a depth alongside as low water of 12 ft., were added during the year, bringing the total length of this portion of the quay now completed up to 3,600 ft. Landing Facilities.—Six electric cranes of the kind known as the electric tower transporter, have been ordered from the United Kingdom. These are said to work very rapidly, and a feature of great importance at Keelung, where during the winter half-year the rain is almost continuous, is that the cargo can be worked under a movable covering which is attached to the crane. Electric capstans will be erected on the quays to move the cranes, which will run on rails.

MANILA'S PUBLIC AQUARIUM.—This construction will be completed and opened January 1. It comprises a gallery of 29 tanks, and a main reservoir with a capacity of 50 000 gallons. An effort is being made to have a representative collection of the 1,200 species of fish known to exist in insular waters.

FILIPINO Y. M. C. A. BUILDINGS.—The International Committee offered to contribute ₱110,000 and a ₱45,000 site towards a student association building and ₱120,000 towards a Y. M. C. A. building in Manila provided the city would raise ₱80,000. After a campaign of five days the amount was raised and plans for the buildings are under way. When completed the total investment in Y. M. C. A. buildings in Manila will reach approximately ₱800,000.

SHIPBUILDING, GENERAL MARINE AND FISHERIES

AMERICAN SHIPBUILDING ACTIVITY.—Anticipating the opening of the Panama Canal activity in shipbuilding is indicated by the extensive plans of several large companies. The Atlantic and Pacific Transportation Company recently organized and capitalized at $15,000,000 plans the construction of fifteen ships. The American Hawaiian S. S. Co. have contracted with the Maryland Steel Company for four new ships with a cargo capacity of 9.000 tons each. The Standard Oil Co. is also considering the construction of several additional vessels for their fleet in addition to the two new tank ships on the ways.

BLUE FUNNEL LINE.—This company announces that the new steamer Talthybius will replace the Oania on the Far Eastern run leaving Liverpool in February, 1912, and the Keeman will be superseded by a new steamer in October next. These steamers are to be approximately 10,000 tons each.

DIRECT MANILA-SAN FRANCISCO LINE—An effort is being made by the commercial interests of the Philippines to interest capital in establishing direct connection with San Francisco. Captain Robert Dollar of the Dollar Steamship Company has been looking over the situation with a view to expanding in that direction if prospects are favorable.

THE TRAWLING INDUSTRY.—The expansion of the trawling industry in the Far East following the success attained by trawling companies in Japan include the formation of Hongkong and South China Steam Fisheries, Ltd., the Shanghai Fisheries, Ltd., and the Philippine Fisheries Co., Manila. Operations at Hongkong and Manila have been in progress for some time. The trawlers are the most modern of their kind and their successful operation will no doubt encourage the formation of a large number of similar companies.

GASOLINE CRAFT FOR PHILIPPINE LUMBER TRADE.—The gasoline schooner Eclipse arrived in Manila from Honolulu via Hongkong the latter part of November. It is a 211 ton vessel equipped with a Hercules three cylinder, 125 h. p. gasoline engine. She made the run to Hongkong under sail. The Eclipse is owned by the Insular Transportation Co.

CRUDE OIL MOTOR BARGE FOR BANGKOK.—The successful trial trip of Messrs. Howarth Erskine, Ltd., new twin screw crude oil Dolinder motor barge is reported by the *Bangkok Times*. This vessel is 110 feet over all, beam 23 feet, and draft loaded, 7' 8", with a net cargo capacity of 300 tons. It is fitted with liquid fuel tanks having 700 gallons capacity and kerosene tanks of 100 gallons. On the outward trial trip kerosene was used and inward, liquid fuel, averaging 2½ gallons per hour either way with a speed average of 7.16 knots.

SUBSIDY FOR PHILIPPINE COASTWISE SHIPPING—A bill has been introduced in the legislature authorizing an appropriation of ₱120,000 for the encouragement of local shipping lines.

MINES, MINERALS, THE METAL TRADE, MACHINERY, ETC.

MITSUI BUSSAN KAISHHA.—This company's activities in 1910 are represented by exportations to Far Eastern ports of 4.340,000 tons out of a total export from all mines in Japan of 9,400,000 tons during the year. The company supplied 48% of the coal imports at Hongkong, 45% at Singapore, 39% at Shanghai.

SUNGEI RAIA TIN MINES.—The accounts for the half year show a profit of £4,573 and two interim dividends of 6 l have been paid leaving a balance of £1,924 forward after providing £1,584 for depreciation. The company is negotiating for an additional area of 100 acres.

THE GOPENG TIN MINES.—The Gopeng Tin Mining Co. Ltd. has declared its usual quarterly dividend of 18 pence and the New Gopeng Tin Mining Co. Ltd a dividend of 15 pence a share.

NEW TIN MINING Co.—The Tronoh South Ltd. has been organized in London with a capital of £100,000 to develop property a short distance from Tronoh station and covering an area of 230 acres.

GOLD DREDGING RECORD—The Mining Journal directs attention to a record of efficiency in dredging in Australia. An Australian dredging record is stated to have been achieved by the No. 1 plant of the Tewksbury Proprietary Company, Braidwood, during the June half-year—400,500 cubic yards of ground being treated, at an average rate of 13 cubic yards per hour—the actual dredging cost being less than 1d. per cubic yard. The total costs (including management) averaged 1 08d. per cubic yard, while the ground was worth 2.19d per cubic yard. The profit for the term totalled £1,854. In all, 37 acres have been dredged during the sixteen months, while the total area to be worked by this plant is 685 acres.

THE SHANTUNG MINING CO.—The balance sheet for the year 1910-11 shows a loss of marks 963.31. At the annual meeting the management was authorized to conclude an agreement with Peking with reference to rights to exploit iron mines in Shantung.

RAUB AUSTRALIAN GOLD MINING CO. LTD.—The returns for the four weeks ended November 4, amounted to 775 ounces.

AMERICAN MINING ENGINEERS VISIT JAPAN.—A party of members of the American Institute of Mining Engineers with their families, numbering 89 in all, spent three weeks in Japan last month. Dr. Joseph Struthers of New York, secretary of the Institute, was in charge. Among the prominent members of the party were Robert W. Hunt of Chicago, acting vice-president; Prof. J. W. Richards of S. Bethlehem, Pa., Vice-President; Mr. D. W. Brunton of Denver, ex-President; Mr. W. L. Saunders of New York, Vice-President; Dr. H. S. Drinker of S. Bethlehem, President of Lehigh University, and Dr. R. W Raymond of Booklyn, Secretary of the Institute for twenty-five years.

OIL CONSUMPTION IN THE ORIENT—Conservative estimates place the total imports of 324,-579,000 gallons an increase of about 20% during the year. Of this American imports amounted to 214,000,000 gallons.

CHINESE ENGINEERING AND MINING CO. LTD.—The net profits for the year ended February 28, 1911, amounted to £152,219. The net profit after providing for all charges in China, £192,592; balance brought forward from last year £5,012 and gross receipts in London £579, total, £198,183. Deduct expenditure in Europe; salaries, stores, &c. £7,014; debentures, interest £25,700 debentures, redemption £10,000; directors' fees, £3,250; total £45,964; leaving a net balance of £152,219, which the directors recommend should be appropriated as follows:—In placing to reserve for depreciation (making a total reserve of £280,009) £35,000; in paying a final dividend of 1s. per share (free of tax) payable 2nd November 1911, £50,000; making a dividend of 10 per cent. for the year with the interim dividend of 1s. per share paid 1st May 1911, £50,000; directors' percentage of profits in accordance with the Article of Association, £1,220; income tax, £9,756 and carry forward £6,243

THE PEKING SYNDICATE LTD.—The total output for October was 35,000 tons of coal and sales 41,000 tons.

FINANCIAL, COMMERCIAL AND MISCELLANEOUS

FOREIGN INTERESTS IN CHINA.—Consul General Anderson of Hongkong presents an interesting table comparing the foreign interest in China for the years 1906 and 1910. By firms and population the Japanese lead. In 1906 there were 739 Japanese firms and 15,548 persons and in 1910, 1,601 firms and 65,438 persons. Russians come next in increase in number of persons, viz 20 firms and 273 persons in 1906 and 298 firms and 49,395 persons in 1910. The British show a steady increase from 492 firms, 9,256 persons in 1906, to 601 firms, 10,140 persons in 1910.

The German increase is next in importance from 199 firms, 1,939 persons in 1906 to 238 firms, 4,106 persons in 1910.

American interests have fallen off from 112 firms 3.447 persons in 1906 to 100 firms and 3,176 persons in 1910.

The Portuguese increased from 51 firms, 3,-184 persons in 1906 to 57 firms, 3,377 persons in 1910.

The French increased in number of firms but fell off in number of persons viz 94 firms, 2,189 persons, in 1906, and 110 firms, 1,925 persons, in 1910. The totals of all foreign firms and nationals in 1906 were 1,837 firms, 38 597 persons and in 1910 3,239 firms, 141,868 persons the, increase in number of persons being principally from Britain, Germany, Russia and Japan.

THE BANK OF THE PHILIPPINES—The new charter of the Banco-Español Filipino changing the name to the Bank of the Philippines has been approved by the legislature to become effective January 1, 1912. At a meeting of the stockholders held early this month it was decided to increase the capital stock by ₱1,500,000 bringing it up to ₱4,500,000. The sale of this stock was authorized at ₱275, a premium of ₱75 a share, approximately the market value of the old stock.

Under the new charter the bank is authorized to act as a trust company, etc.

PHILIPPINE U. S. TRADE —The returns for the fiscal year 1911 place the volume at $36,-632,705 as compared with $29,591,916 in 1910. Imports from the United States for 1911 amounted to $19 818,841 as against $10.798.678 in 1910 while the export show a falling off from $18,793,687 in 1910 to $16.813,864 in 1911.

ILOILO BRANCH FOR CHARTERED BANK.—The Chartered Bank of India, Australia and China will inaugurate a branch in Iloilo January 1912.

PHILIPPINE VEGETABLE OIL CO.—This company was incorporated early in the month with a capital of ₱350,000 for the purpose of installing and operating a cocoanut oil factory, and to carry on the manufacture of soap, etc. from the by-products. The incorporators are Archbishop J. J. Harty, P.C. Whitaker, Major T. L. Hartigan, Judge W. A. Kincaid, and President John S. Hord of the Banco Español Filipino.

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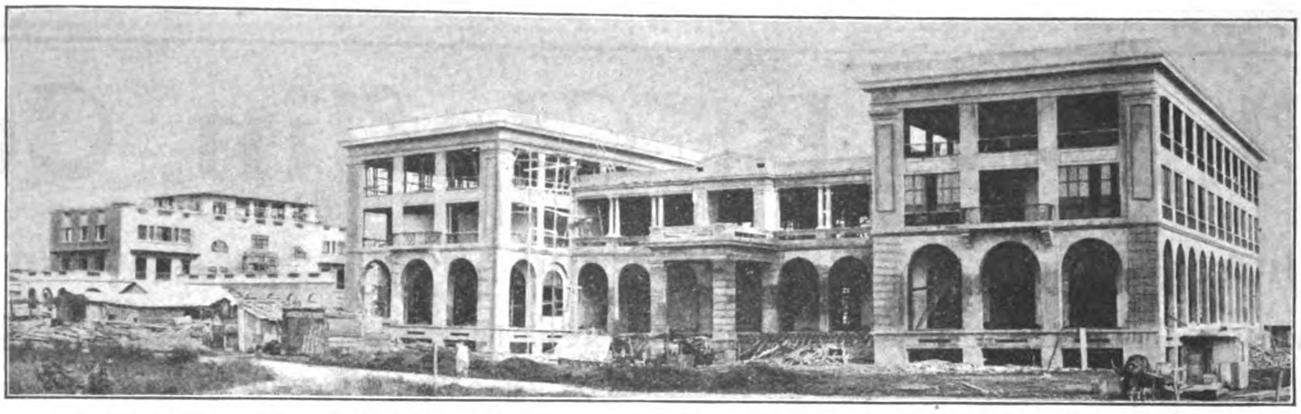

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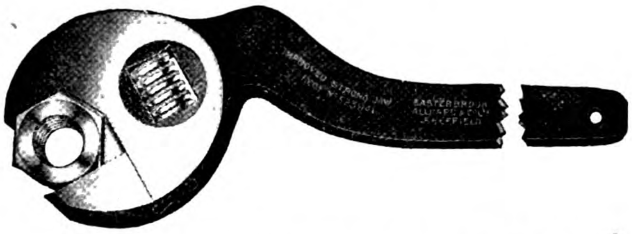

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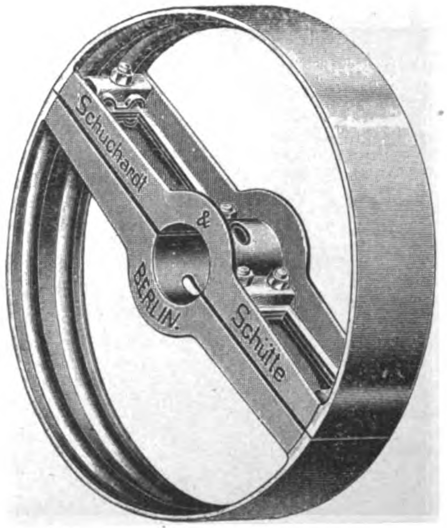

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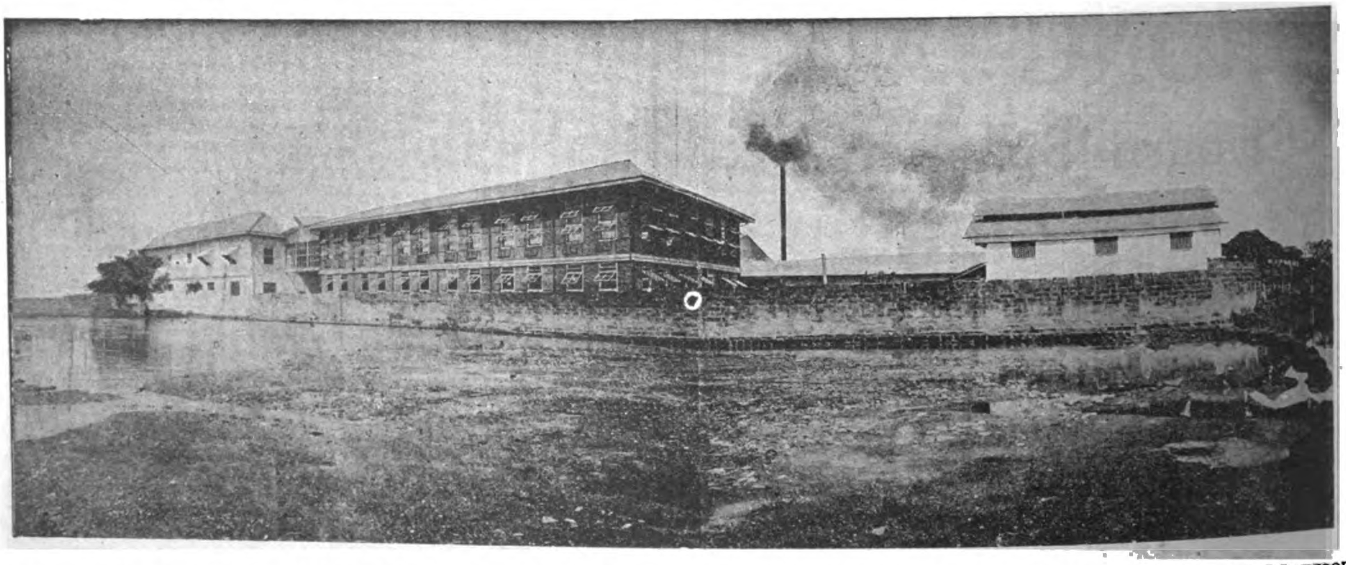

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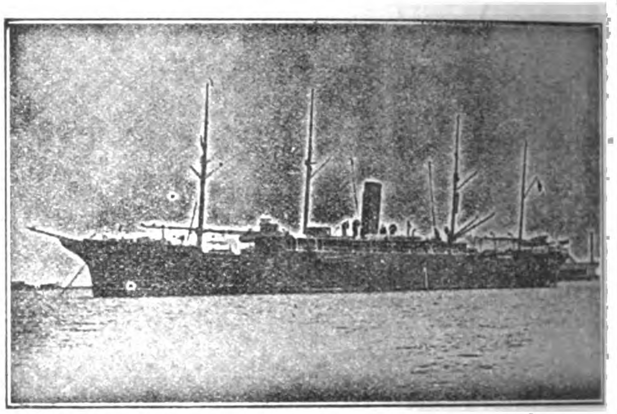

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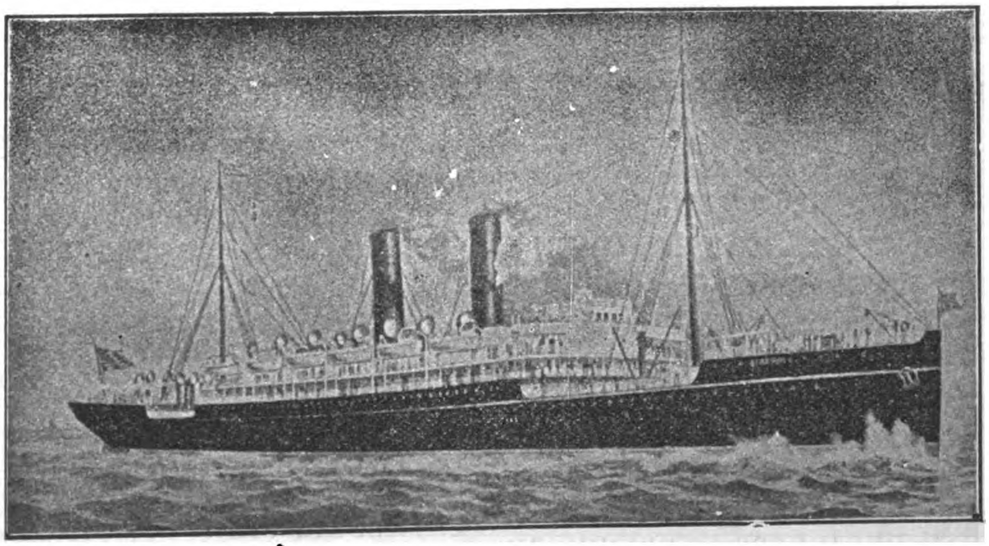

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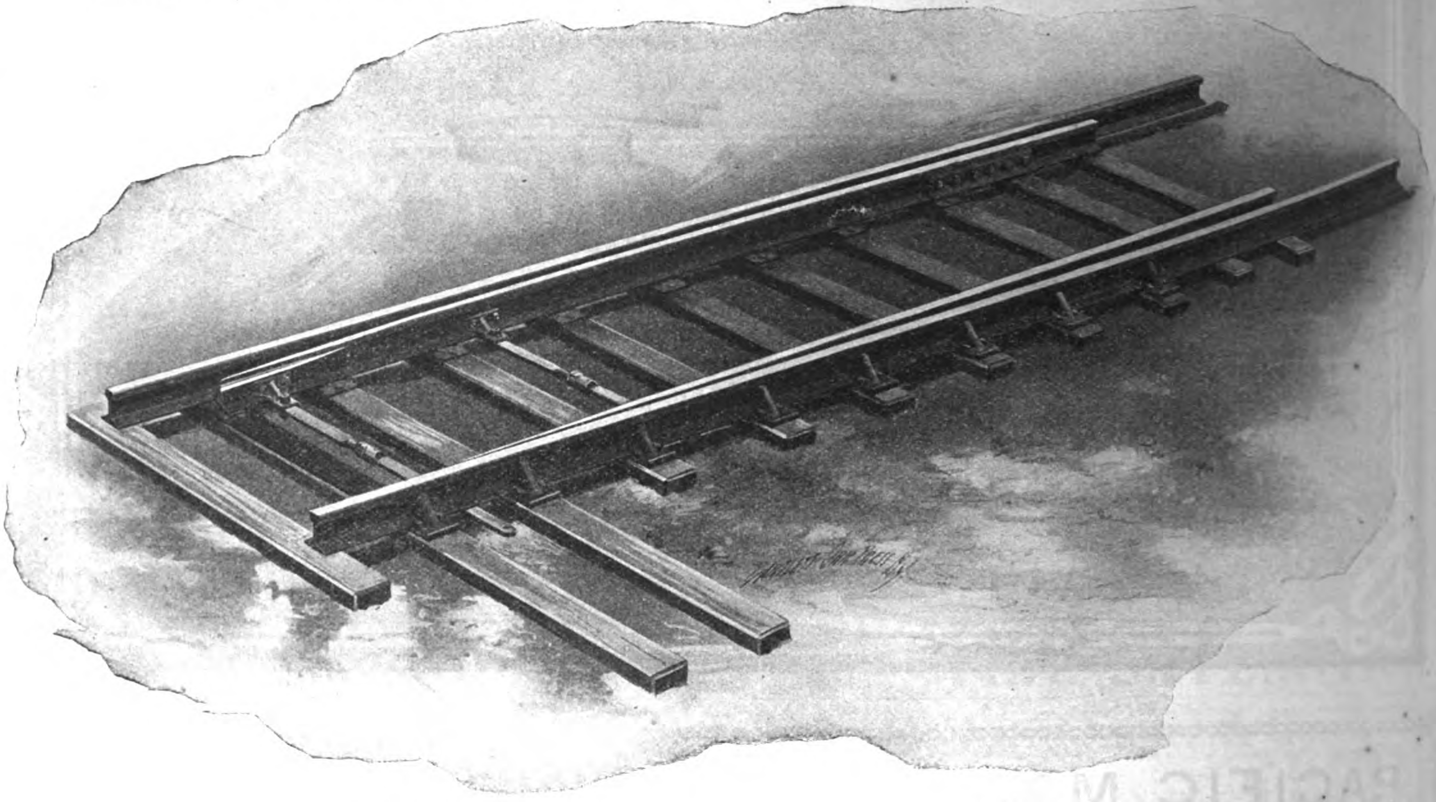

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Manganese	.60–.90
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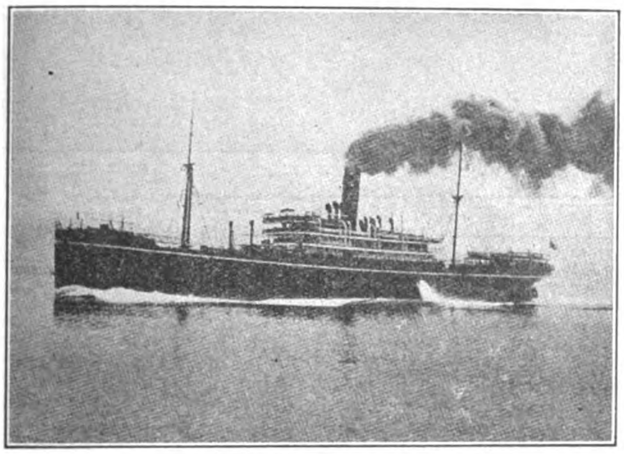

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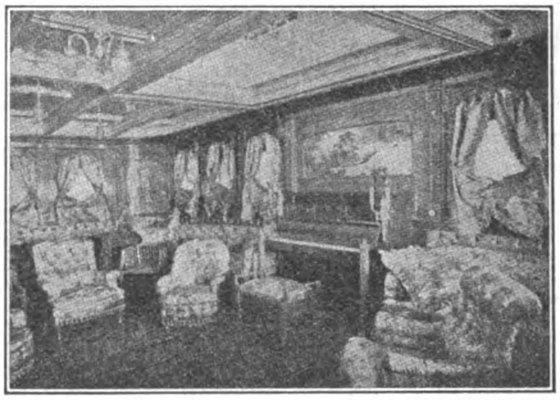

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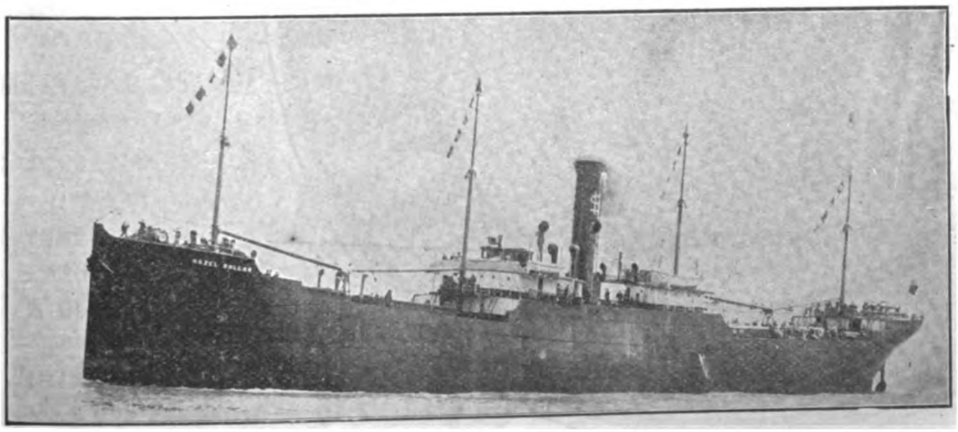

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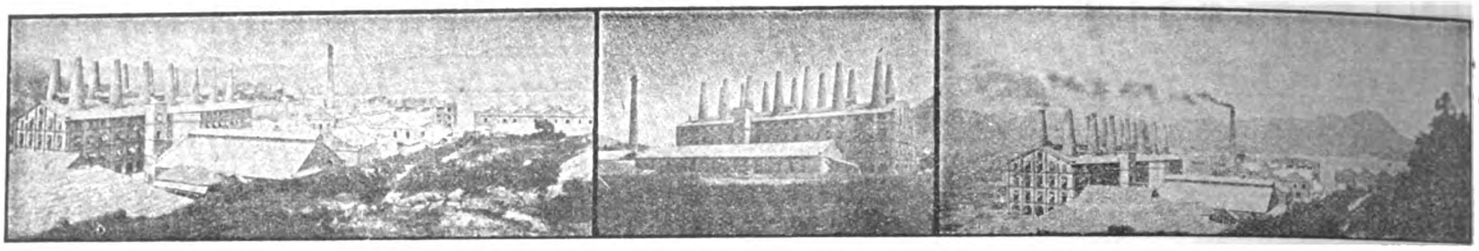

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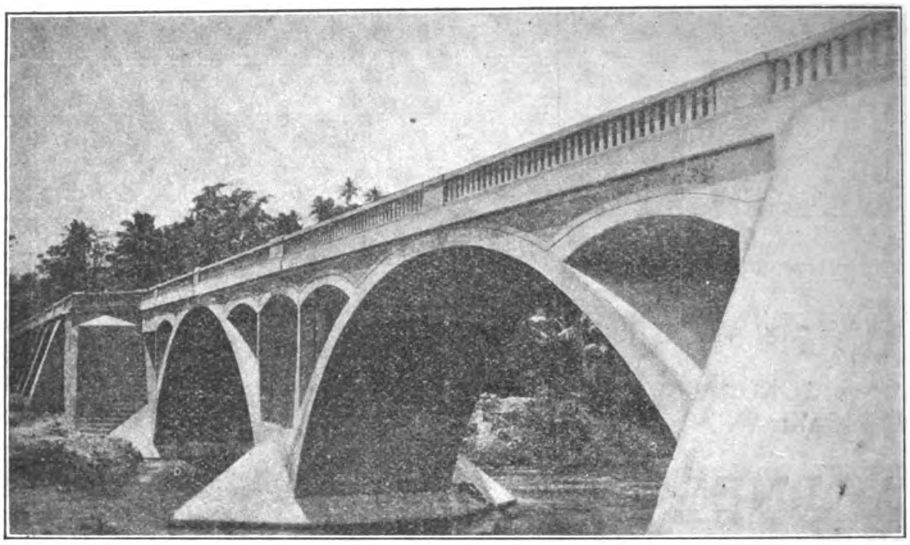

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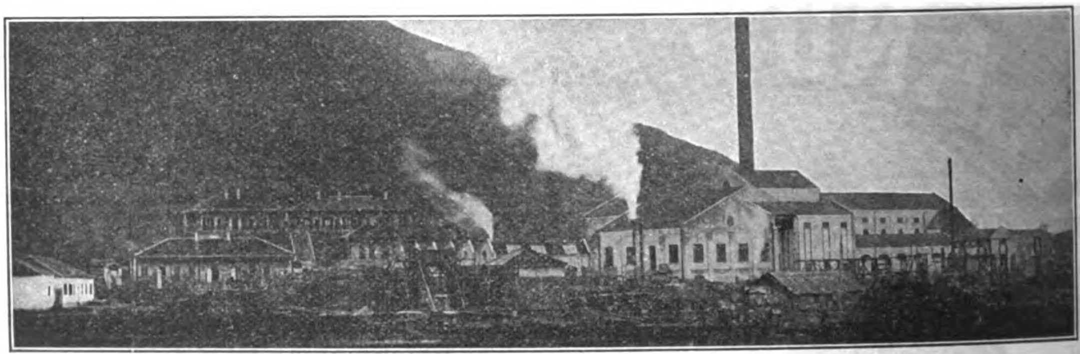

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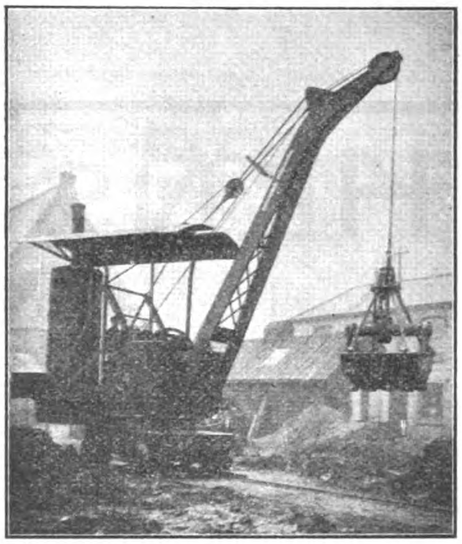

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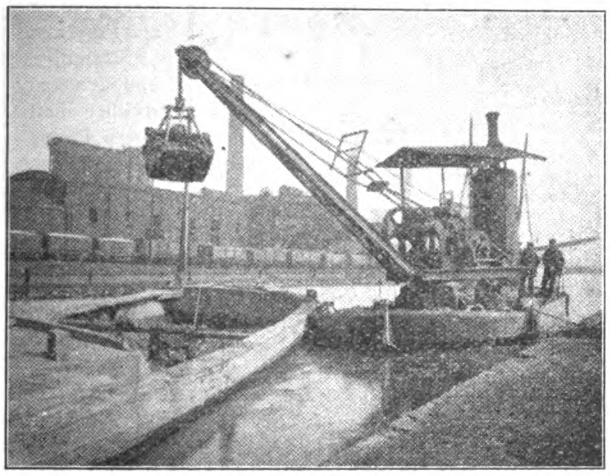

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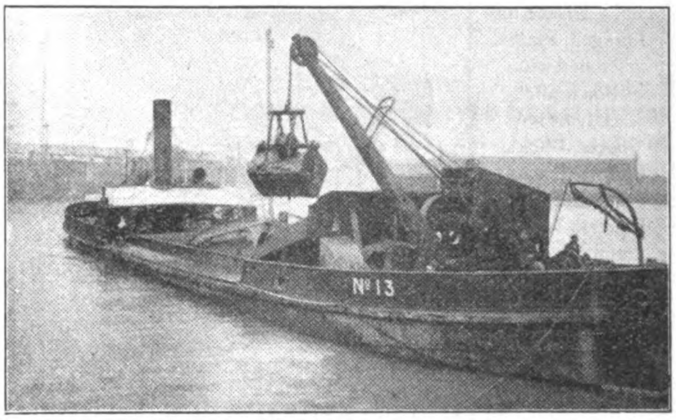

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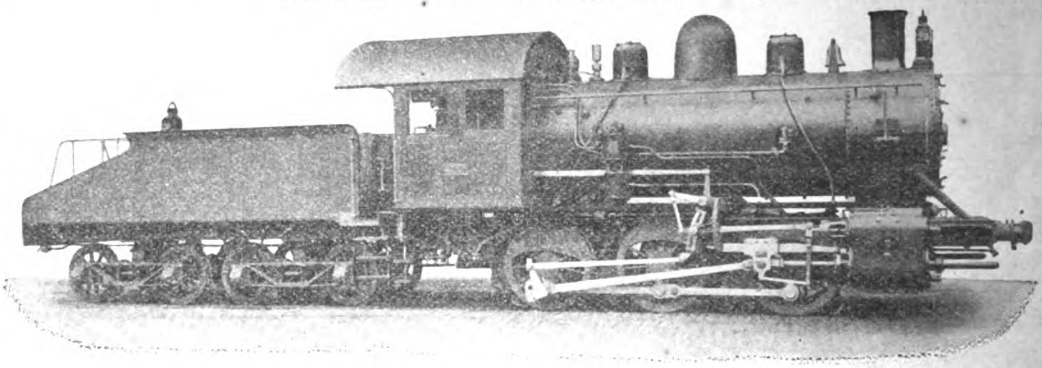

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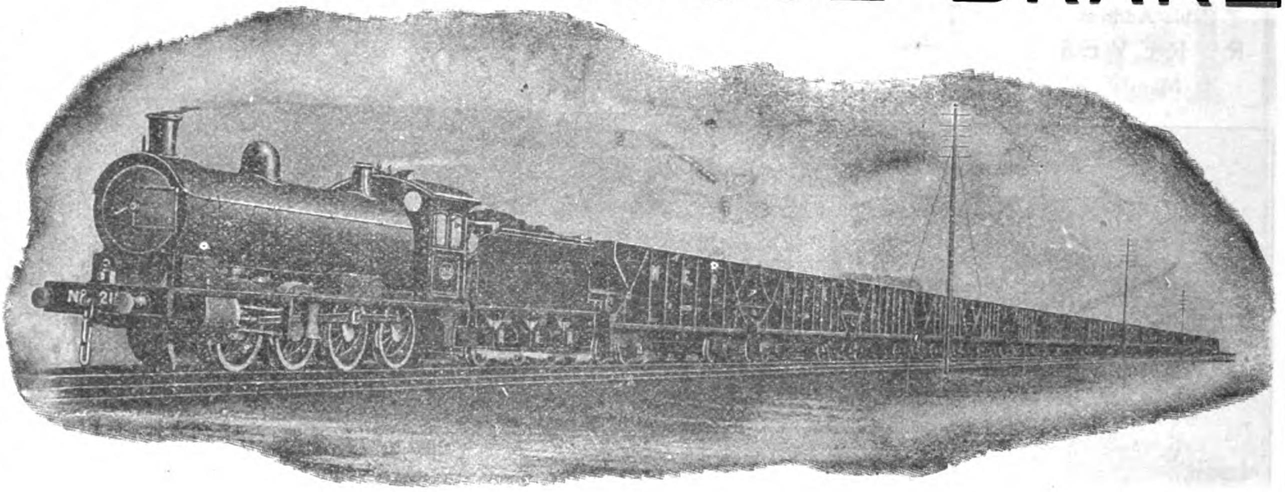

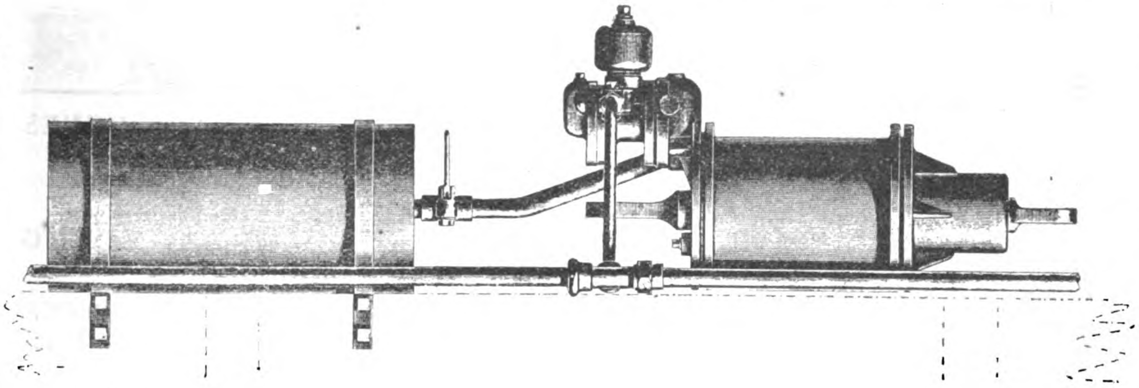

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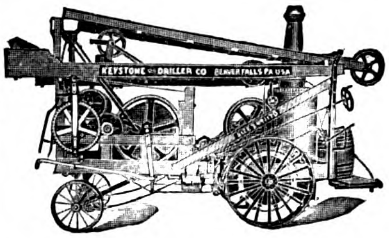

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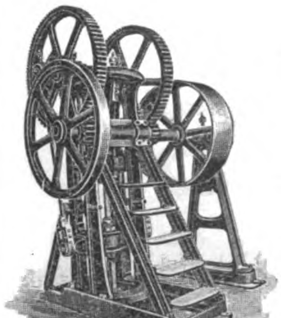

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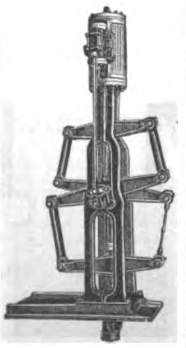

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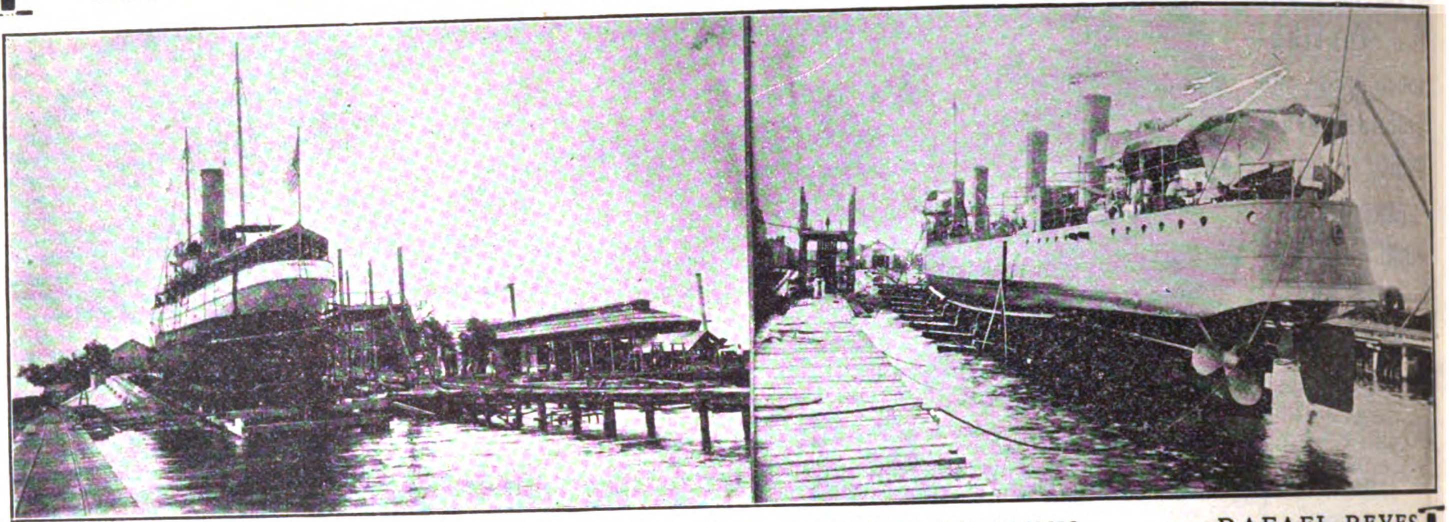

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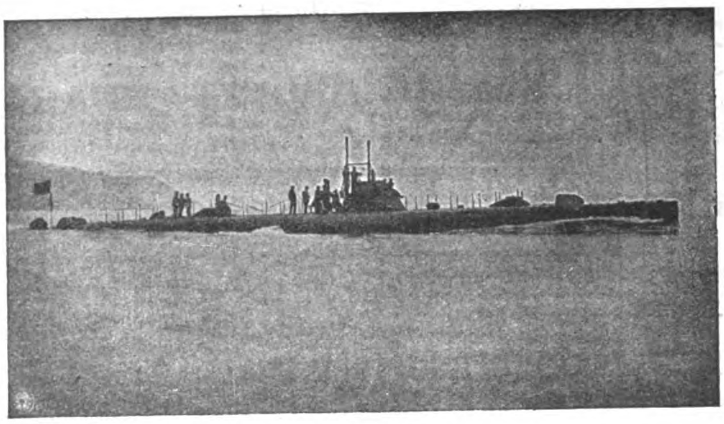

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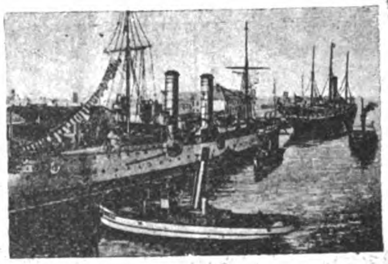

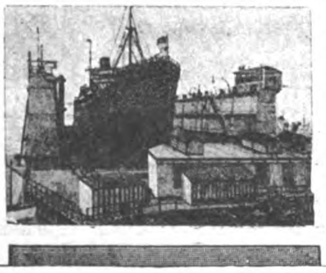

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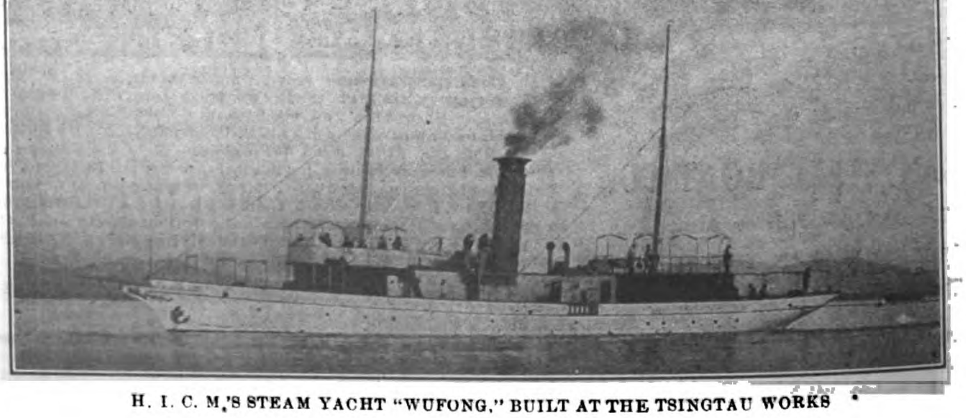

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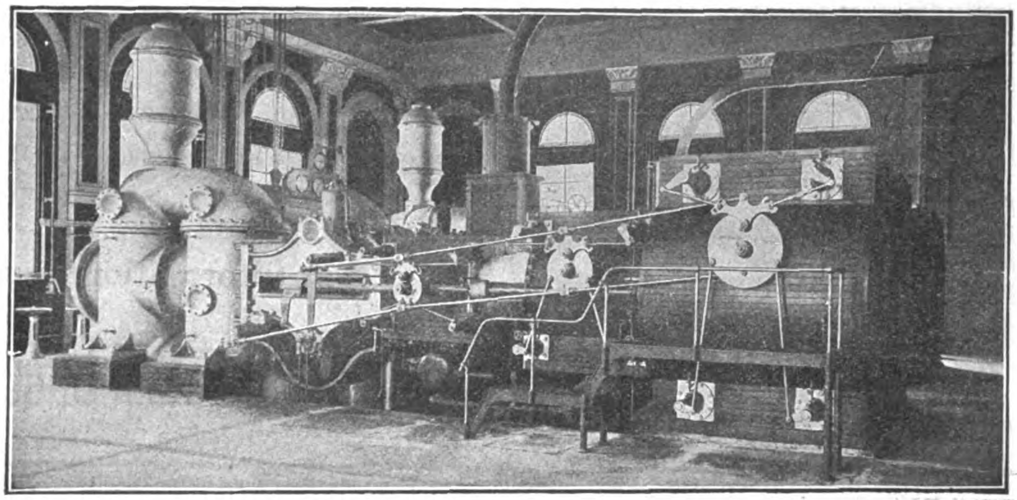

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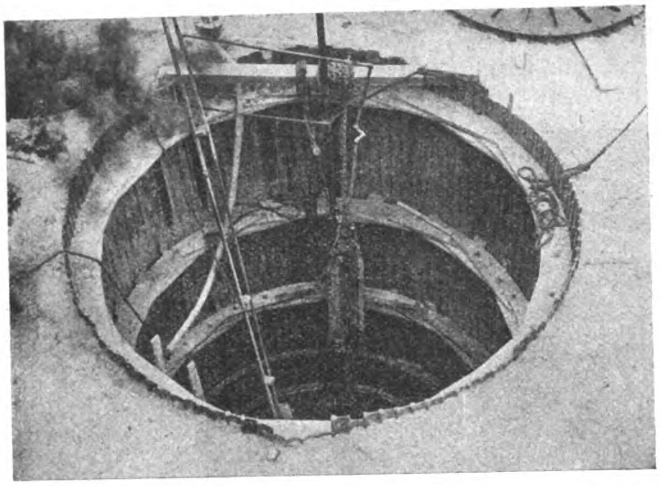

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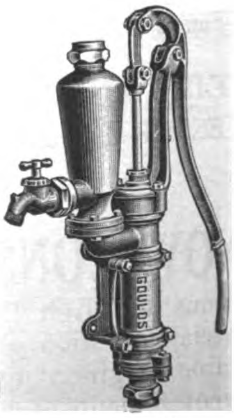

FIG. 1413

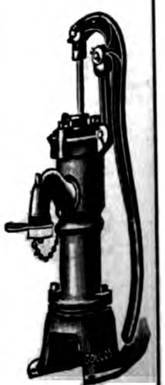

FIG. 1168

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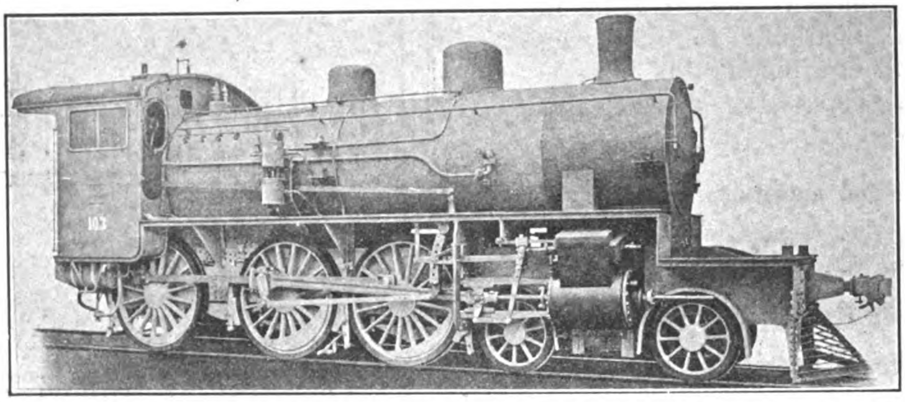

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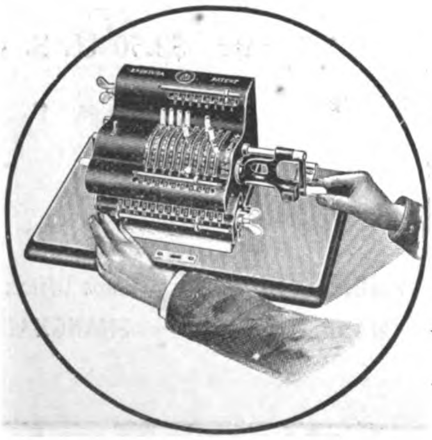

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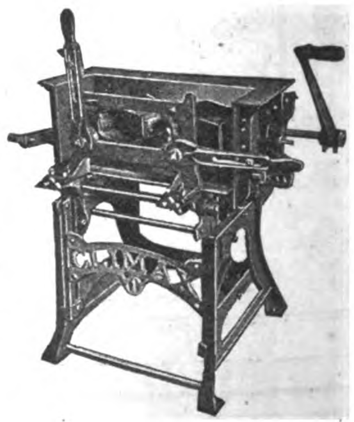

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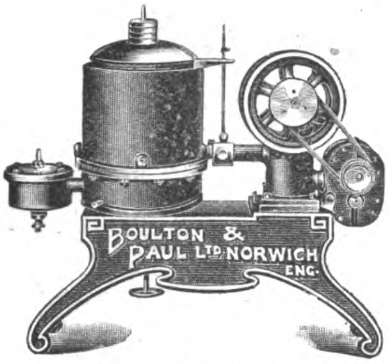

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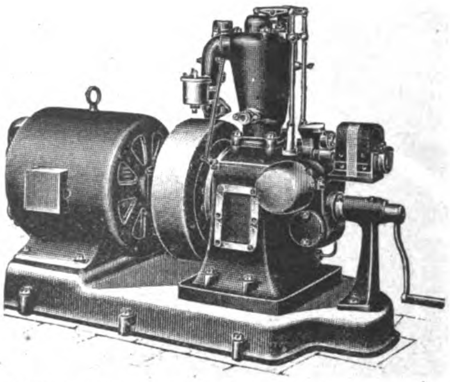

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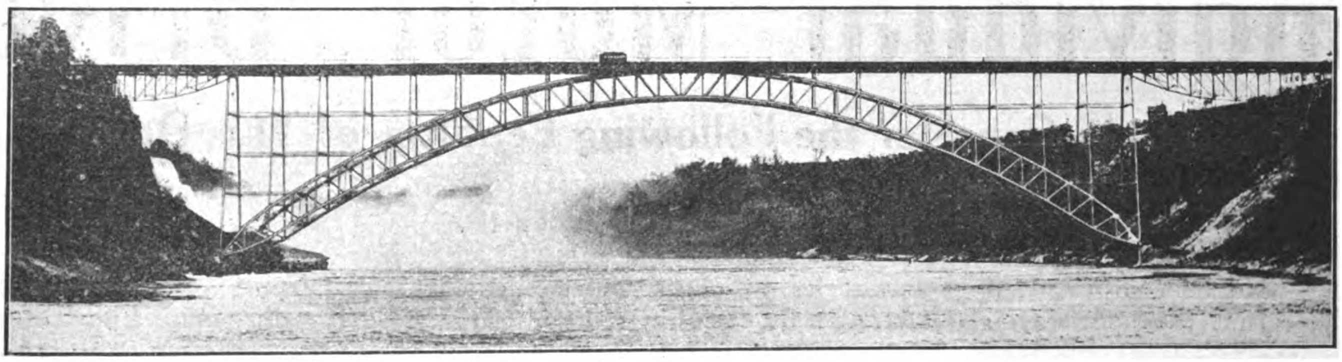

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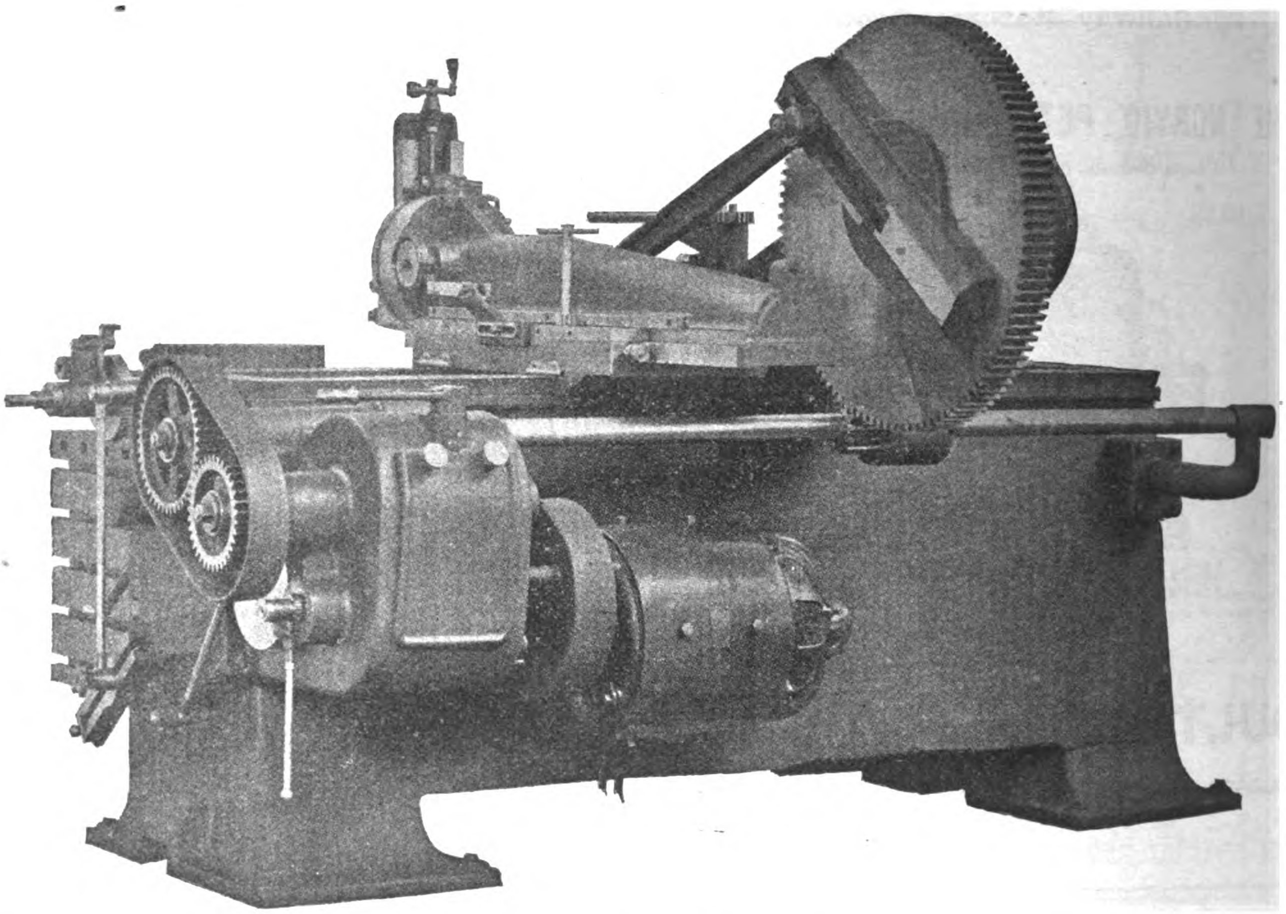

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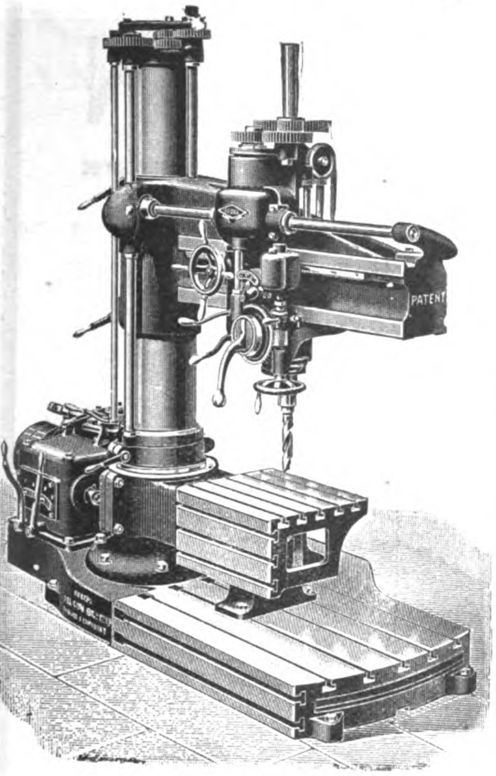

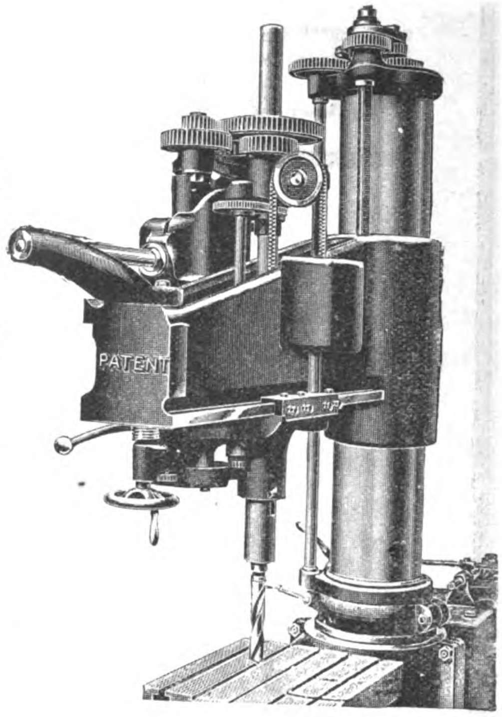

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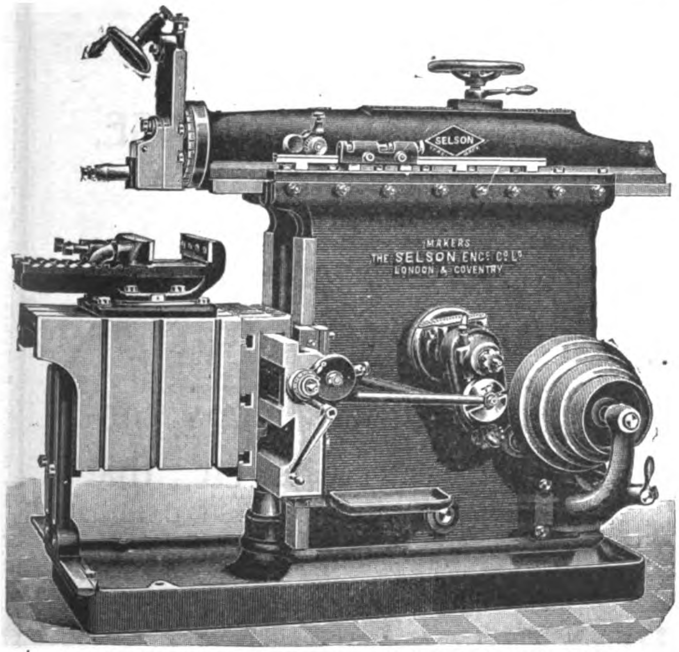

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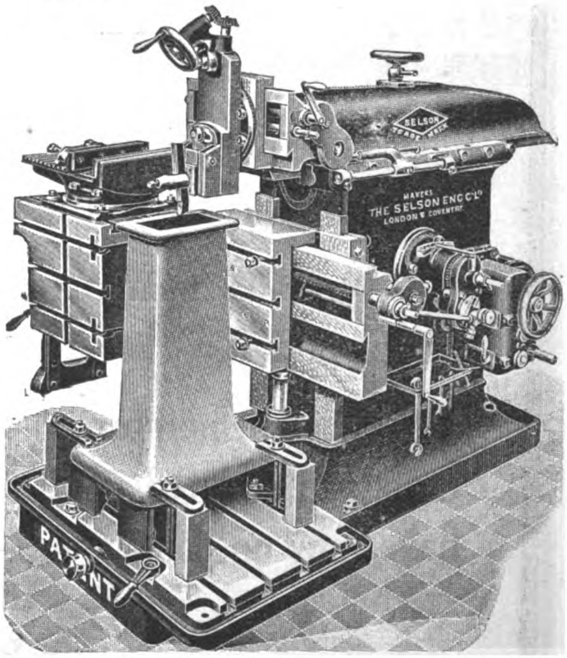

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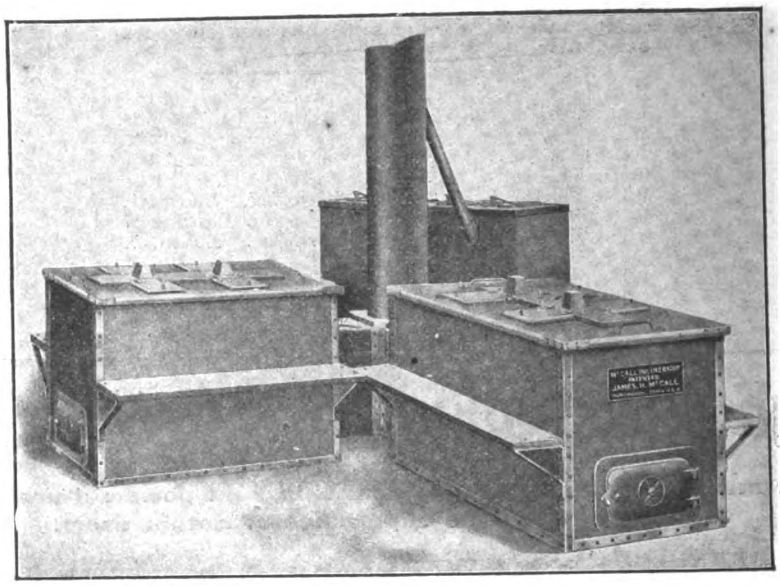

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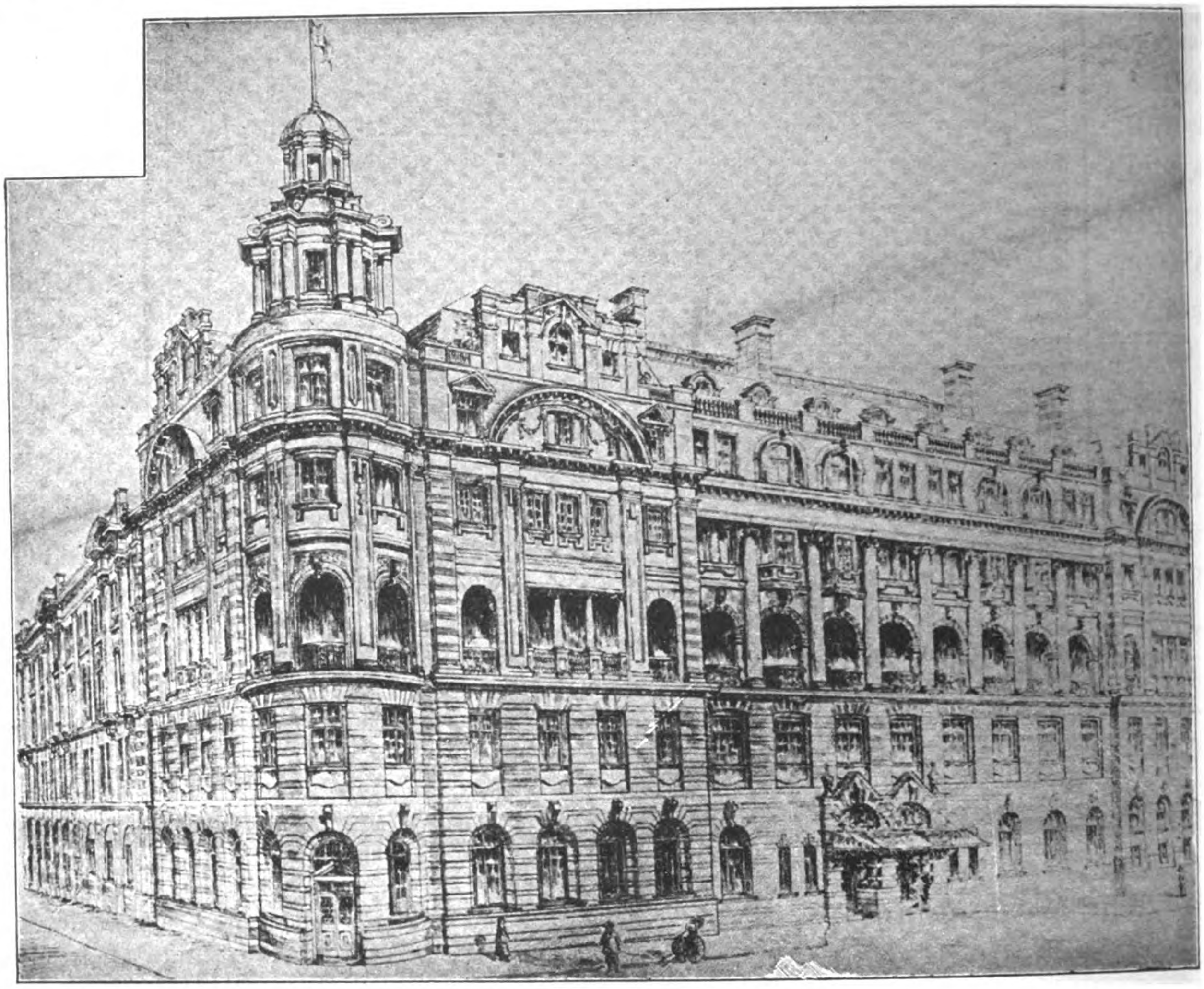

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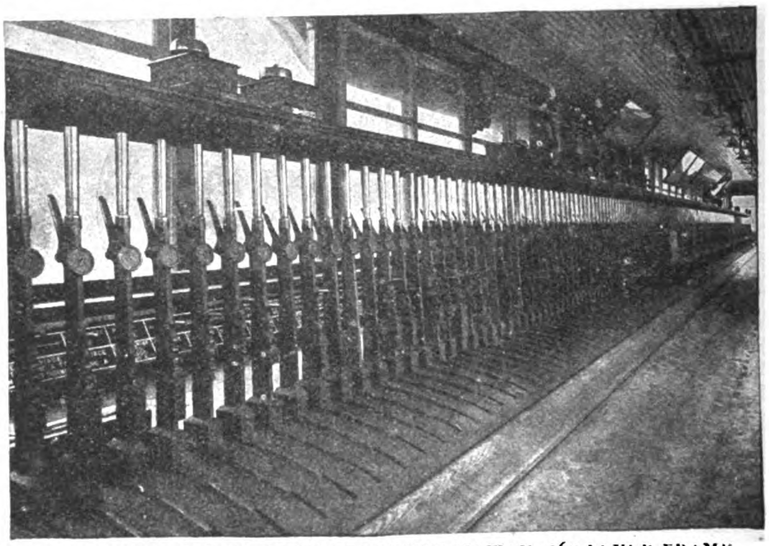

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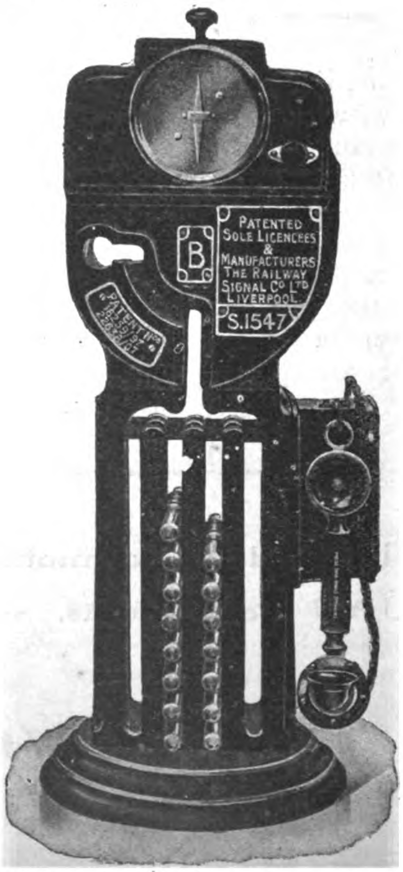

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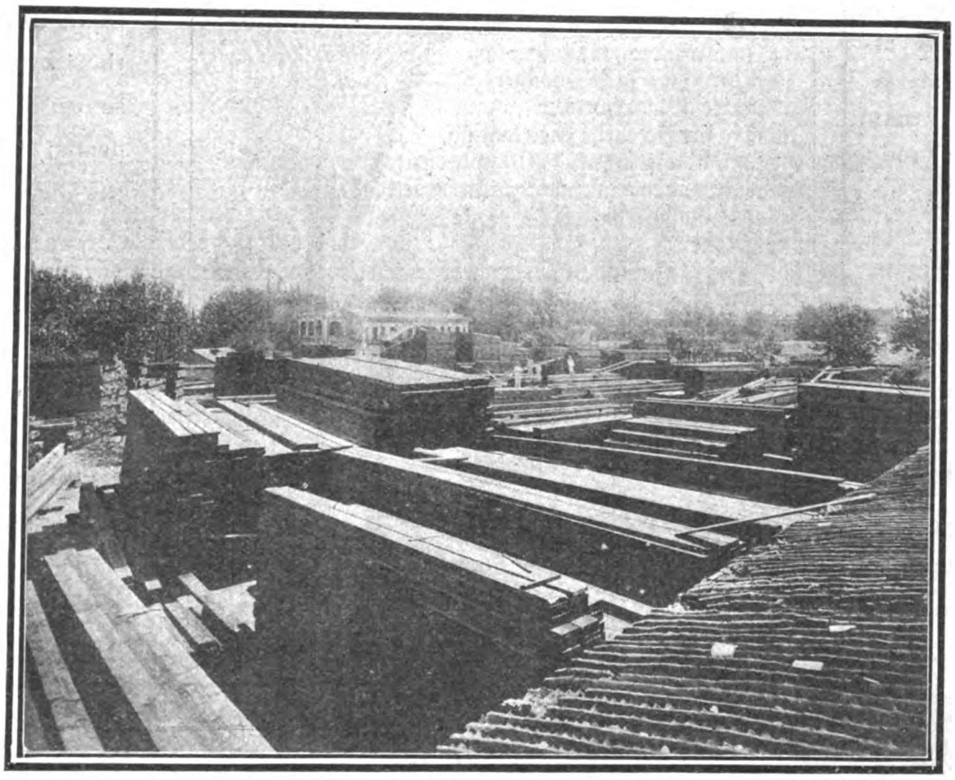

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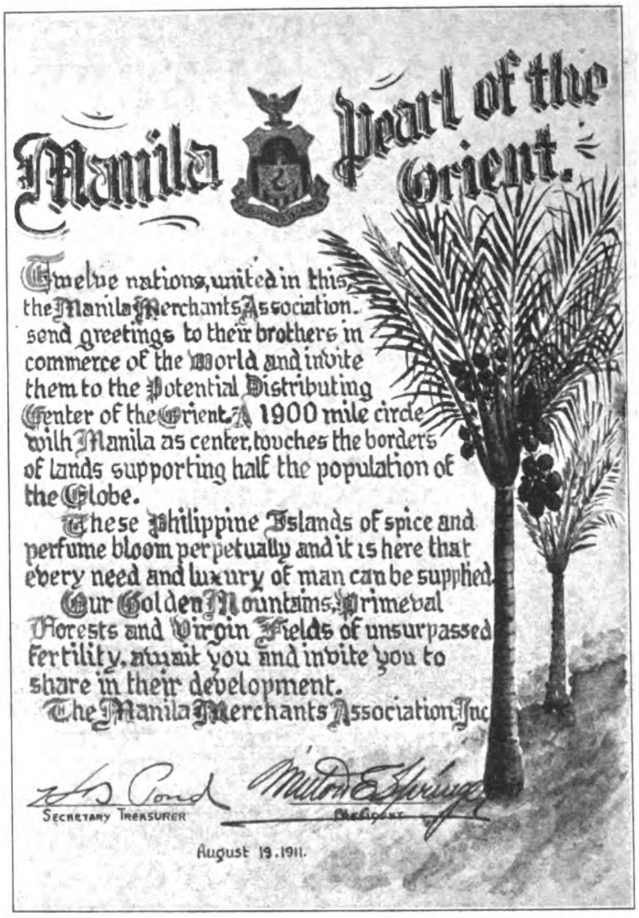

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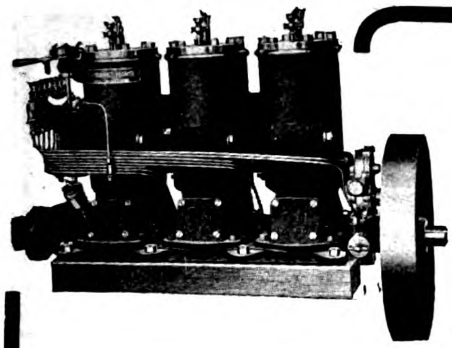

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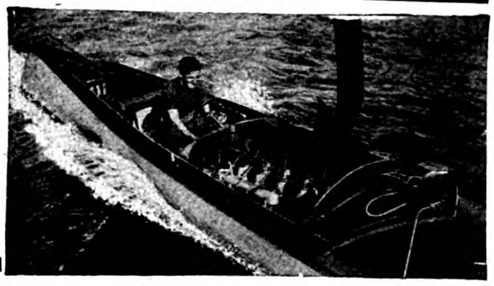

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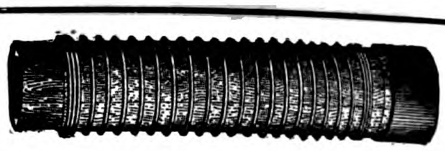

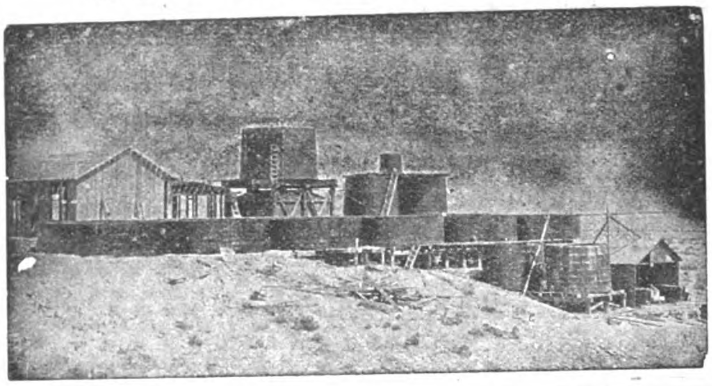

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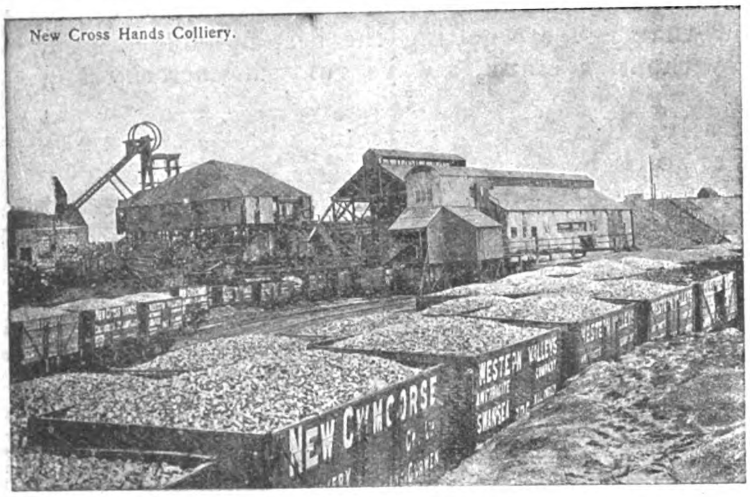
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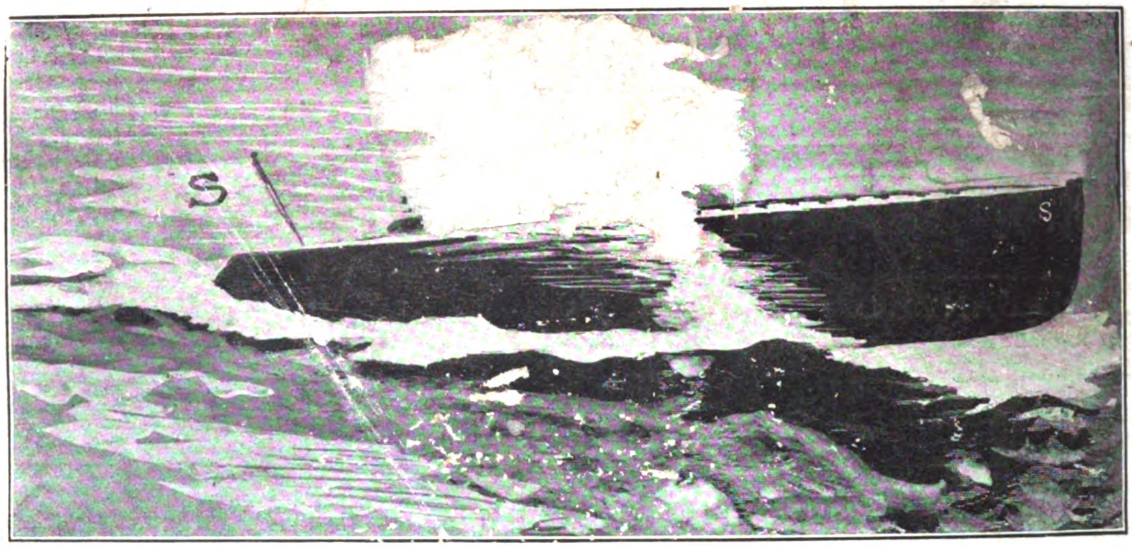

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